Telkom University

MMU
MULTIMEDIA UNIVERSITY

Universitas
Gadjah Mada

iCoiCT

The 8th International Conference
on Information and Communication Technology
ICoICT 2020

24-26 JUNE 2020
VIRTUAL CONFERENCE

IEEE
INDONESIA SECTION

IEEE
Signal Processing Society
Indonesia Chapter

CONTENTS

COMMITTEES

Steering Committee

A Adiwijaya, Telkom University, Indonesia
Ahmad Rafi, Multimedia University, Malaysia
Afizan Azman, Melaka International College of Science and Technology Malaysia
Ari Moesriami Barmawi, Telkom University, Indonesia
Hairul A. Abdul-Rashid, Multimedia University, Malaysia
Song Hoe Lau, Multimedia University, Malaysia
Maman Abdurohman, Telkom University, Indonesia
Parman Sukarno, Telkom University, Indonesia
Rina Pudjiastuti, Telkom University, Indonesia
Shafinar Ismail, Universiti Teknologi Mara, Malaysia
Syed Abdul Rahman Al Haddad, Universiti Putra Malaysia, Malaysia
Kiki Maulana Adhinugraha, La Trobe University, Australia
Sultan Alamri, Saudi Electronic University, Saudi Arabia

Conference Committee

General Chair
Ema Rachmawati, Telkom University, Indonesia

General Co-Chair
Warih Maharani, Telkom University, Indonesia
Ong Thian Song, Multimedia University, Malaysia

Secretariat Chair
Siti Karimah, Telkom University, Indonesia
Shin Yin Ooi, Multimedia University, Malaysia
Rita Rismala, Telkom University, Indonesia

Publication Chair
Dawam Dwi Jatmiko, Telkom University, Indonesia
Anditya Arifianto, Telkom University, Indonesia

Finance Chair
Annisa Aditsania, Telkom University, Indonesia
Siew Chin Chong, Multimedia University, Malaysia
Siti Sa'adah, Telkom University, Indonesia

Event and Logistic Chair
Fazmah Arif, Telkom University, Indonesia
Mira Sabariah, Telkom University, Indonesia
Prati Hutari Gani, Telkom University, Indonesia

Public Relation Chair
Z. K. A. Baizal, Telkom University, Indonesia
Mohd Fikri Azli Abdullah, Multimedia University, Malaysia

Call For Paper Chair
Wikky Fawwaz Al Maki, Telkom University, Indonesia

Tutorial and Special Session Chair
Didit Adytia, Telkom University, Indonesia

Sponsorship Chair
Kemas Lhaksmana, Telkom University, Indonesia

Webmaster
Rahmat Yasirandi, Telkom University, Indonesia
Yusza Reditya Murti, Telkom University, Indonesia

Technical Program Committee

TPC Chair
Bayu Effianto, Telkom University, Indonesia

Track Chair
Seno Adi Putra, **SSi MT**, Telkom University, Indonesia
Tee Connie, Multimedia University, Malaysia
Putu Harry Gunawan, Telkom University, Indonesia
Ying Han Pang, Multimedia University, Malaysia
Mardhani Riasetiawan, Universitas Gadjah Mada, Indonesia
Ade Romadony, Telkom University, Indonesia
Raden Sumiharto, Universitas Gadjah Mada, Indonesia

TPC Member
Andrew Teoh Beng Jin, Yonsei University, South Korea
Andri Nugraha, Institut Teknologi Bandung, Indonesia
Chee Hooi Teoh, GST Smart Solution Sdn Bhd, Malaysia
Chien Sing Lee, Sunway University, Malaysia
Ching Chieh Kiu, Taylors University, Malaysia
Ching Seong Tan, i-cycle Global, Malaysia
Esa Prakarsa, Indonesia Institute of Sciences, Indonesia
Farah Afianti, Telkom University, Indonesia
Fiky Suratman, Telkom University, Indonesia
Fitri Zulkifli, Universitas Indonesia, Indonesia
Gandeva Bayu Satrya, Telkom University, Indonesia
Geong-Sen Poh, NUS, Singapore
Kartigayan Muthukaruppan, PG Intsys Sdn Bhd, Malaysia
Kenny Cheah, BNU-HKBU United International College, Malaysia
Khairul Salleh Mohamed Sahari, Universiti Tenaga Nasional, Malaysia
Kiki Adhinugraha, La Trobe University, Australia

Kok-Seong Wong, Nazarbayev University, Kazakhstan
Kung-Keat Teoh, Flinders University, Australia
M. Raihan, North Western University, Bangladesh
Md. Shohel Sayeed, Multimedia University, Malaysia
Mohammad Athar Ali, Buchingham University, United Kingdom
Mohd Helmy Abd Wahab, Universiti Tun Hussein Onn Malaysia, Malaysia
Mohd Razali Md Tomari, University Tun Hussein Onn Malaysia, Malaysia
Muhamad Koyimatu, Universitas Pertamina, Indonesia
Paskorn Champrasert, Chiang Mai University, Thailand
Risnandar Risnandar, Telkom University, Indonesia
Sargunam Thirugnanam, Manipal International University, Malaysia
Seong Oun Hwang, Hongik University, South Korea
Sultan Alamri, Saudi Electronic University, Saudi Arabia
Syh-Yuan Tan, Newcastle University, United Kingdom
Tu Nguyen, Purdue University Fort Wayne, USA
Uchenna Cyril Eze, BNU-HKBU United International College, Malaysia
Warih Maharani, Telkom University, Indonesia
Wei Chuen Yau, Xiamen University Malaysia, Malaysia
Wikky Fawwaz Al Maki, Telkom University, Indonesia
Xin Wang, Monash University, Malaysia
Yassine Maleh, Senior Member of IEEE, Morocco
Yohei Murakami, Ritsumeikan University, Japan

Reviewers

Achmad Rizal, Telkom University, Indonesia
Afrida Helen, Universitas Padjadjaran, Indonesia
Agfianto Eko Putra, Universitas Gadjah Mada, Indonesia
Agung Toto Wibowo Catur Wirawan, Telkom University, Indonesia
Agus Sihabuddin, Gadjah Mada University, Indonesia
Albertus Joko Santoso, Universitas Atma Jaya Yogyakarta, Indonesia
Andi Dharmawan, Universitas Gadjah Mada, Indonesia
Andi Wahju Rahardjo Emanuel, Universitas Atma Jaya Yogyakarta, Indonesia
Andry Alamsyah, Telkom University, Indonesia
Angelina Prima Kurniati, Telkom University, Indonesia
Aradea Aradea, Siliwangi University, Indonesia
Arie Ardiyanti, Telkom University, Indonesia
Arief Fetchul Huda, Universitas Islam Negeri Bandung, Indonesia
Asep Najmurrokhman, Universitas Jenderal Achmad Yani, Indonesia
Bedy Purnama, Telkom University, Indonesia
Bety Hayat Susanti, Jalan Raya Haji Usa, Indonesia
Brady Rikumahu, Telkom University, Indonesia
Catherine Sereati, Universitas Katolik Indonesia Atma Jaya, Indonesia
Catur Wirawan Wijiutomo, Telkom University, Indonesia
Cecilia Esti Nugraheni, Parahyangan Catholic University, Indonesia
Choo Kim Tan, Multimedia University, Malaysia
Chris J. Hinde, Loughborough University, United Kingdom
Christian Naa, Fakultas Teknologi Industri, Indonesia

Dadan Nur Ramadan, Telkom University, Indonesia
Dade Nurjanah, Telkom University, Indonesia
Dana Kusumo, Telkom University, Indonesia
Danang Lelono, University Gadjah Mada, Indonesia
Dany E. Saputra, STMIK Amik Bandung, Indonesia
Deni Saepudin, Telkom University, Indonesia
Dian Andriana, Indonesian Institute of Sciences, Indonesia
Didit Adytia, Telkom University, Indonesia
Dody Utama, Institut Teknologi Bandung, Indonesia
Dwiza Riana, STMIK Nusa Mandiri Jakarta, Indonesia
Edwin Setiawan Nugraha, President University, Indonesia
Emil R. Kaburuan, BINUS University, Indonesia
Erda Guslinar Perdana, Telkom University, Indonesia
Esih Sukaesih, UIN Sunan Gunung Djati Bandung, Indonesia
Faizal Makhrus, Universitas Gadjah Mada, Indonesia
Fang-Fang Chua, Multimedia University, Malaysia
Fariska Ruskanda, Institut Teknologi Bandung, Indonesia
Fazat Azizah, Institut Teknologi Bandung, Indonesia
Fazmah Arif Yulianto, Telkom University, Indonesia
Fetty Fitriyanti Lubis, Institut Teknologi Bandung, Indonesia
Go Hasegawa, Tohoku University, Japan
Goh Kah Ong Michael, Multimedia University, Malaysia
Hapnes Toba, Maranatha Christian University, Indonesia
Harco Lelie Hendric Spits Warnars, Bina Nusantara University, Indonesia
Harry Budi Santoso, Universitas Indonesia, Indonesia
Harry Septanto, National Institute of Aeronautics and Space, Indonesia
Hertog Nugroho, Politeknik Negeri Bandung, Indonesia
Hilal H. Nuha, Telkom University, Indonesia
Hilman F. Pardede, Indonesia Institute of Sciences, Indonesia
I Dyah Irawati, Telkom University, Indonesia
Idham Ananta, Universitas Gadjah Mada, Indonesia
Imelda Atastina, Institut Teknologi Bandung, Indonesia
Indra Budi, Faculty of Computer Science, Indonesia
Indra Gunawan, Institut Teknologi bandung, Indonesia
Indrawati Indrawati, Telkom University, Indonesia
Intan Nurma Yulita, Universitas Padjadjaran, Indonesia
Irma Palupi, Telkom University, Indonesia
Irwan Irwan, Institut Teknologi Bandung, Indonesia
Isman Kurniawan, Telkom University, Indonesia
Izzatdin Abdul Aziz, Universiti Teknologi PETRONAS, Malaysia
Jaratus Andritsch, Prince of Songkla University, Thailand
Ji-Jian Chin, Multimedia University, Malaysia
Jimmy Tirtawangsa, Telkom University, Indonesia
Joon Liang Tan, Multimedia University, Malaysia
Karel Octavianus Bachri, Atma Jaya Catholic University of Indonesia, Indonesia
Kemas Lhaksamana, Telkom University, Indonesia
Khoirul Anwar, Telkom University, Indonesia

Kian Meng Yap, Sunway University, Malaysia
Kim Piew Lai, Multimedia University, Malaysia
Kusuma Ayu Laksitowening, Telkom University, Indonesia
Lee Ying Chong, Multimedia University, Malaysia
Leonard Goeirmanto, Mercu Buana University, Indonesia
Leow Meng Chew, Multimedia University, Malaysia
Lillian Yee Kiaw Wang, Monash University Malaysia, Malaysia
Lukman Abdurrahman, Telkom University, Indonesia
Mahmud Dri Sulistiyo, Telkom University, Indonesia
Maman Abdurohman, Telkom University, Indonesia
Marisa Paryasto, Telkom University, Indonesia
Masayu Leylia Khodra, Institut Teknologi Bandung, Indonesia
Mewati Ayub, Maranatha Christian University, Indonesia
Moch Arif Bijaksana, Telkom University, Indonesia
Mohamda Syafri Tuloli, Universitas Negeri Gorontalo, Indonesia
Muhammad Kusban, Universitas Gadjah Mada, Indonesia
Mustafa Bin Man, University Malaysia Terengganu, Malaysia
Mustafa Mat Deris, University Tun Hussein Onn Malaysia, Malaysia
Niken Cahyani, Telkom University, Indonesia
Noor Cholis Basjaruddin, Politeknik Negeri Bandung, Indonesia
Noor Ifada, University of Trunojoyo Madura, Indonesia
Nur Afny Catur Andryani, Tanri Abeng University, Indonesia
Nurul Hidayah Ab Rahman, Universiti Tun Hussein Onn Malaysia, Malaysia
Nyoman Karna, Telkom University, Indonesia
Oh Tick Hui, Multimedia University, Malaysia
Ong Thian Song, Multimedia University, Malaysia
Parman Sukarno, Telkom University, Indonesia
Pey Yun Goh, Multimedia University, Malaysia
Philip T Moore, Lanzou University, China
Radityo Eko Prasojo, Kata.ai, Indonesia
Rahmad Mahendra, Universitas Indonesia, Indonesia
Rani Megasari, Indonesia University of Education, Indonesia
Retantyo Wardoyo, Universitas Gadjah Mada, Indonesia
Reza Pulunga, Universitas Gadjah Mada, Indonesia
Rimba Whidiana Ciptasari, Telkom University, Indonesia
Rina Mardiati, Institut Teknologi Bandung, Indonesia
Rinaldi Munir, Institut Teknologi Bandung, Indonesia
Ririn Agustin, Universitas Pasundan, Indonesia
Rita Purnamasari, Institut Teknologi Bandung, Indonesia
Riza Satria Perdana, Institut Teknologi Bandung, Indonesia
Saiful Akbar, Institut Teknologi Bandung, Indonesia
Samsul Arifin, Bina Nusantara University, Indonesia
Satria Mandala, Telkom University, Indonesia
Setyorini Anwar, Institut Teknologi Bandung, Indonesia
Shen Yee Pang, Multimedia University, Malaysia
Shih Yin Ooi, Multimedia University, Malaysia
Shing Chyi Chua, Multimedia University, Malaysia

Shukor Sanim Mohd Fauzi, Universiti Teknologi Mara, Perlis Campus, Malaysia
Siew Chin Chong, Multimedia University, Malaysia
Sin Yin Tan, Multimedia University, Malaysia
Siong Hoe Lau, Multimedia University, Malaysia
Siti Zainab Ibrahim, Multimedia University, Malaysia
Subarmaniam Kannan, Multimedia University, Malaysia
Sugondo Hadiyoso, Telkom University, Indonesia
Suyanto Suyanto, Telkom University, Indonesia
Suyoto Suyoto, Universitas Atma Jaya Yogyakarta, Indonesia
Tedjo Darmanto, STMIK AMIK Bandung, Indonesia
Thomas Anung Basuki, Curtin University, Malaysia
Tien Fabrianti Kusumasari, Telkom University, Indonesia
Tiong Sik Ng, Multimedia University, Malaysia
Titin Pramiyanti, Universitas Pembangunan Nasional Veteran Jakarta, Indonesia
Tjokorda Agung Budi Wirayuda, Telkom University, Indonesia
Tohari Ahmad, Institut Teknologi Sepuluh Nopember, Indonesia
Untari Wisesty, Telkom University, Indonesia
Vera Suryani, Telkom University, Indonesia
Wan Nural Jawahir Hj. Wan Yussof, Universitas Malaysia Terengganu, Malaysia
Wee How Khoh, Multimedia University, Malaysia
Wiwin Suwarningsih, Indonesia Institute of Science, Indonesia
Yanti Rusmawati, Institut Teknologi Bandung, Indonesia
Yee Yen Yuen, Multimedia University, Malaysia
Yohanes Suyanto, Universitas Gadjah Mada, Indonesia
Yudha Purwanto, Telkom University, Indonesia
Yuliant Sibaroni, Telkom University, Indonesia
Z. K. A. Baizal, Telkom University, Indonesia

KEYNOTES SPEAKERS
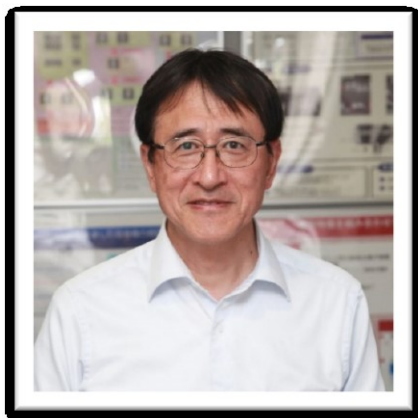
Prof. Hiroshi Murase

Hiroshi Murase received the B.S., M.S., and Ph.D in electrical engineering from Nagoya University, Japan, in 1978, 1980, and 1987, respectively. In 1980 he joined the Nippon Telegraph and Telephone Corporation (NTT). From 1992 to 1993 he was a visiting research scientist at Columbia University, New York. From 2001 to 2003, he was Executive Manager of NTT Communication Science Laboratories. In 2003, he moved to Nagoya University. He is currently a Professor at the Graduate School of Informatics, Nagoya University. He was awarded the IEEE CVPR Best Paper Award in 1994, the IEEE ICRA Best Video Award in 1996, the IEEE Transaction on Multimedia Paper Award in 2004, etc. He got a Medal with Purple Ribbon from the Government of Japan in 2012. His research interests include computer vision, pattern recognition, multimedia information recognition, and ITS applications. He is a fellow of the IEEE, a fellow of the IPSJ, and a fellow of the IEICE.

Keynote Title: Image Recognition for Driver Assistance

The driver assistance system through image recognition has become important, as the traffic accident rate of the elderly driver increases in Japan. This may also occur in other countries. On the other hand, the accuracy of image recognition has been improved by the development of deep neural networks or other machine learning technologies. However, a large size of learning data is necessary for these methods. First, I will present an efficient enhancement of learning data for in-vehicle camera images. Then, I will introduce several image recognition methods for driving assistance that we have developed so far, such as the recognition of traffic signs, the recognition of walking pedestrian while operating a smartphone, the recognition of the driver's visibility, the weather recognition, and other research topics. In addition, I will talk about the human pose estimation using a super-low-resolution infrared sensor array for the purpose of watching the elderly people at home.

Telkom University MMU Universitas Gadjah Mada

iCoiCT

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

IEEE INDONESIA SECTION

Prof. Yukihiro Kubo

Ritsumeikan University, Japan

Yukihiro Kubo received the B.S. (1997), M.S. (1999) and Ph.D. (2002) degrees in electrical and electronic engineering from Ritsumeikan University, Kyoto, Japan. He worked in the production section of GPS carnavigation systems at Mitsubishi Electric Corp., Sanda Works from 2002 to 2004. He joined Department of Electrical and Electronic Engineering of Ritsumeikan University in 2004, and he is presently a professor. His research interests include GPS/GNSS signal processing and INS/GNSS integration systems.

Recent publications:
1. H. Hasegawa, G. Okuda, Y. Kubo and S. Sugimoto: A New GNSS Relative Positioning Algorithm Based on Alternative Use of the Positions of Reference Receivers, Proceedings of the 49th ISCIE International Symposium on Stochastic Systems Theory and Its Applications, pp. 137-141, Jun.,2018.
2. K. Abe, Y. Arakawa, Y. Kubo and S. Sugimoto: GNSS Integer Ambiguity Resolution Methods Applied by Kalman Filter –The Review and Comparison, Proceedings of the 49th ISCIE International Symposium on Stochastic Systems Theory and Its Applications, pp. 131-136, Jun., 2018.

Keynote Title: Principle of Precise GNSS Positioning and Its Applications to Disaster Monitoring Systems in Japan

Recently, a lot of services are provided based on location information based on GNSS (Global Navigation Satellite Systems). In this presentation, the principle of satellite positioning is reviewed. There exist many methods and algorithms for satellite positioning, very simple and fundamental method as well as precise positioning methods are focused on. In the latter half of the presentation, as case studies of the application of precise satellite positioning, two systems for disaster monitoring and mitigation operated in Japan are introduced. One is the GNSS reference station network (GEONET), and another is the GPS ocean and tsunami monitoring system.

Dr. Ardhasena S., Indonesia

BMKG, Indonesia

Dr Sopaheluwakan is the deputy director for climate and air quality research in the Indonesian Agency for Meteorology Climatology and Geophysics (BMKG). He is an applied nathematician with wide interest of modelling phenomena in nature, such as water waves, optical waves in photonic devices, and climate. He is internationally active in the field of climate related activities under the World Meteorological Organization (WMO) from climate policy related, climate services and standards developments: presently serving as the chair of the working group on Climate Service of Regional Association – V South West Pasific, co-chair of the Expert Team on Global Climate Statement (responsible for the annual global climate statement for the World's policy reference), and a member of the Interprogramme Task Team on Cataloging Extreme Weather Water and Climate Events (IPTT-CWWCE) of the WMO, where within this team, he contributes to the development of a global framework and standardized approach for systematic cataloging of extreme weather and climate events and their unique identification system, which will be useful for the purpose of attribution of disaster losses and damages due to extreme hydrometeorological events.

Keynote Title: Potential Role for ICT and Science for Strengthening Disaster Resilience in Indonesia

Telkom University MMU Universitas Gadjah Mada

iCoICT

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

IEEE
INDONESIA SECTION

TUTORIAL SPEAKERS

Idham Ananta Timur, S.T., M. Kom

Department of Computer Science and Electronics, Faculty of Mathematics and Natural Science, Universitas Gadjah Mada, Indonesia

He is an active member of Computer System and Network Research Labs. His main research interest is Intelligent Environments which refer to physical spaces in which pervasive computing technology are woven and used to achieve specific goals for the user, the environment or both. At the moment, he and his team are working on the idea of how autonomous robots collaboratively interact within an intelligent environment.

Tutorial Title: Toward Autonomous Robot for Disaster Mitigation Support using Deep Reinforcement Learning

Disaster usually leads to uncertainty. Natural disaster, like earthquake, tsunami, landslides, volcanoes, floods usually change the landscape on earth. The rescue missions afterward, depending on the destruction level, will involve searching for survivors, deploying logistics and mapping the area to for a better mitigation management. However, doing all those actions might need more expensive vehicles, gasolines, and manpower. In this area, a smart autonomous robot might help.

However, developing a smart autonomous robot is also a challenging problem. Training an autonomous car to follow the lane in a known and well-defined road is already difficult let alone exploring unexpected, unseen aftermath of disaster landscape with so many kinds of unidentified objects. This tutorial will introduce the ideas and demonstrate how an end-to-end deep learning and deep reinforcement learning might be able to help developing autonomous vehicle and discuss the issues surrounding such approaches to tackle the aforementioned challenge.

ASSOC. PROF. DR. MD Shohel Sayeed

Chairperson of The Centre for Intelligent Cloud Computing (CICC), Multimedia University, Malaysia

His core research interest is in the area of Biometrics, big data, cloud computing, artificial intelligence, information security, image and signal processing, pattern recognition and classification. He has published over 60 research papers in international peer-reviewed journals and international conference proceedings as a result of his research work. His research works have been published by high ranked peer- reviewed journals such as IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), International Journal of Pattern Recognition and Artificial Intelligence (IJPRI), Expert Systems with Applications, Discrete Dynamics in Nature and Society (DDNS) as well as several peer-reviewed International journals. Several of his findings have been presented in a number of well recognized IEEE conferences as well. He has been appointed technical paper reviewer for Journal of Pattern Recognition Letters, IEEE Transaction on Neural Networks, IEEE Transactions on Automation Science and Engineering, Journal of Computer Methods and Programs in Biomedicine and International Journal of Computer Theory and Engineering. He has also been invited to review technical papers for several international conferences. In recognition of his professional contribution, he has obtained recognition as a Senior member of IEEE Computer Society, IEEE Communication Society and International Association of Computer Science and Information Technology (IACSIT).

Dr. Shohel has invited as a Chief Guest and keynote speaker at the second International Conference on Advanced Computing (ICAC 2019). Apart from the ICAC 2019, Dr. Shohel was also invited as the keynote speaker for several international conferences such as the International Conference on Recent Trends and Challenges in Healthcare Informatics (RCHI- 2019), International Conference on Recent Trends in Advanced Computing (ICRTAC 2019) and International Conference on Computational Intelligence and Applications (lCCIA 2019). Furth/ermore, Dr. Shohel was also invited as the keynote speaker for the International Conference on Modern Research (Multidisciplinary) 2019, International Conference on Advanced Computing (ICAC 2015), International Symposium Innovative Management, Information & Production (IMIP 2015) and International Conference on Innovations in Computer Science and Technology (ICICST 2016), respectively.

Tutorial Title: The Fourth Industrial Revolution - A Global Revolution in Science, Technology and Society Towards a Better Life

The major technological advancements of the Fourth Industrial Revolution, or Industry 4.0, are revolutionizing industrial production. The First Industrial Revolution was

Telkom University MMU Universitas Gadjah Mada

iCoiCT

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

IEEE

based on mechanization and steam engines; the second on the use of electricity energy and mass production; and the third on electronics and information technologies, resulting in a high level of automation in manufacturing. Industry 4.0 takes automation of manufacturing processes to a higher level with smart autonomous systems capable of self-cognition, self-optimization, and self-customization.

Industry 4.0 includes concepts, tools and applications that complement a smart embedded system of machines able to communicate with each other and people and perform autonomous tasks in industrial production processes. The main tools include cyber-physical systems (CPSs), the Internet of Things (IoT), big data and cloud computing, autonomous robots, simulation and visualization models, and additive manufacturing. Automation and robotics are perceived as key components – the arms and legs – of Industry 4.0; cameras and other sensors are perceived as the senses; data and connectivity are compared to the nervous system; and artificial intelligence (AI) is the brain. AI enhances industrial processes by enabling the synergetic collaboration between humans and robots in smart factories for mass customization.

Industry 4.0 will affect all sectors and disciplines, bringing about a structural transformation in the global economy and leading to a new division of labour, which will have a huge impact on developing countries. A new wave of outsourcing and in-shoring will be triggered, with new technologies, such as additive manufacturing using innovations such as 3D printing, rendering some outsourcing unnecessary. In-shoring could become a new trend in industrialized countries, depriving developing countries of job opportunities.

Industry 4.0 will also contribute to realizing the circular economy, in which end-of-life products are reused and recycled, and to facilitating the reaping of benefits and opportunities from this. This transformation will also bring with it a change in the nature of jobs, requiring not only increased technical competencies but also interpersonal skills, and will feature remote, flexible and on-demand work.

It is the goal of 4th Industrial Revolution to create a human-centric society in which both economic development and the resolution of societal challenges are achieved, and people can enjoy a high quality of life that is fully active and comfortable. It is a society that will attend in detail to the various needs of people, regardless of region, age, sex, language, etc. by providing necessary items and services. The key to its realization is the fusion of cyber space and the real world (physical space) to generate quality data, and from there create new values and solutions to resolve challenges. Hence, the main objective of the 4th Industrial Revolution is to realize a society where people enjoy life to the fullest.

Dr. Eng. Muhammad Haris

AI Research Manager, Bukalapak, Indonesia

Muhammad Haris works as AI Research Manager at BukaLapak. He received S. Kom (Bachelor of Computer Science) from the Faculty of Computer Science, University of Indonesia, Depok, Indonesia, in 2009. Then, he received the M. Eng and Dr. Eng degree from Department of Intelligent Interaction Technologies, University of Tsukuba, Japan, in 2014 and 2017, respectively, under the supervision of Dr. Hajime Nobuhara. He worked as postdoctoral fellow in Intelligent Information Media Laboratory, Toyota Technological Institute with Prof. Norimichi Ukita. He also serves as reviewer for several journal and conferences such as IEEE TPAMI, IEEE TIP, IEEE TNNLS, and CVIU.

Tutorial Title: New Trends in Image/ Video Super-Resolution

Super-Resolution (SR) is an ill-posed inverse problem where the aim is to recover a high-resolution (HR) image/video from a low-resolution (LR) image/video. Recent years have witnessed an increased interest from the vision and graphics communities in these fundamental topics of research. Not only has there been a constantly growing flow of related paper, but also substantial progress has been achieved. Each step forward eases the use of images by people or computers for the fulfillment of further tasks, as super-resolution serves as an important frontend. Not surprisingly then, there is a growing range of applications in the fields such as surveillance, electronics, remote sensing, etc. Therefore, this tutorial aims to provide an overview of the trends and advances in those areas

Telkom University MMU Universitas Gadjah Mada

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

iCoiCT

IEEE INDONESIA SECTION

Yunita Sari, Ph.D

Department of Computer Science and Electronics, Faculty of Mathematics and Natural Science, Universitas Gadjah Mada, Indonesia

She received her bachelor degree in Computer Science from Universitas Gadjah Mada and Master in Information Technology from Universiti Teknologi PETRONAS, Malaysia. She got Ph.D degrees in Natural Language Processing from the Department of Computer Science, University of Sheffield, UK where she did a research on Neural and Non-Neural models for authorship attribution. Her research interests are (but not limited to) Authorship Identification, Social Media Analysis, Text Summarisation, Essay Scoring and Machine Learning. She is currently involved in several projects related to Natural Language Processing.

Tutorial Title: **What can Natural Language Processing Do in a Disaster?**

In the disaster situation, social media can play an important role for propagating information among people. While most communication channels are unavailable, Twitter emerges as an alternative media for reporting problems and aid messages. However, with the massive amounts of information that have been produced by users, it is very challenging to identify the right and relevant information. In this tutorial, we are going to discuss on how Natural Language Processing can help addressing the problems. The talk will be focusing on the current state of the art methods in this area, challenges and research directions to be explored.

Telkom University MMU Universitas Gadjah Mada

iCoiCT

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

IEEE
INDONESIA SECTION

Thomhert Suprapto Siadari

ETRI School, University of Science & Technology, Republic of Korea

Thomhert S. Siadari received his BS degree in Telecommunication Engineering from Telkom University, Indonesia, in 2011 and his M.Eng degree in IT Convergence Engineering from Kumoh National Institute of Technology, Republic of Korea, in 2013. Currently, he is pursuing PhD degree in ICT from the ETRI School, University of Science & Technology (https://ust.ac.kr) and also a student researcher at City & Transportation ICT Research Department, ETRI (https://etri.re.kr) supervised by Prof. Hyunjin Yoon. His research interests are mainly related to image and video understanding using deep learning in various applications including smart city and medical healthcare.

Tutorial Title: Deep Representation Learning for Recognizing Human and Object Interactions

Human–object interaction (HOI) detection aims to detect human and object locations and classify their interactions at the instance level (e.g. a person riding a bike, carrying a backpack, and throwing a Frisbee), which can be formulated as detecting a triplet (human, action, and object). This task is beneficial to many applications that require a deeper understanding of semantic scenes, such as video surveillance and visual question answering.

Dr. Lim Kian Ming

Academic Coordinator for Google Web Academy and Amazon Web Services, Faculty of Information Science and Technology, Multimedia University, Malaysia.

Dr. Lim Kian Ming received B.IT (Hons) in Information Systems Engineering, Master of Engineering Science (MEngSc) and Ph.D. (I.T.) degrees from Multimedia University. His Ph.D. dissertation emphasizes on deep neural networks for pattern recognition. He has published a number of influential publications on Machine Learning, Computer Vision, and Pattern Recognition. His research works has also qualified him for several innovation awards at the University, National and International levels. He has filed some copyrights for his innovations. In addition, he is also active in academic curriculum. He is the Programme Co-coordinator of B.IT (Hons) Artificial Intelligence. In addition, he is also the Academia Coordinator for Google Web Academy and Amazon Web Services. He is currently a Lecturer with the Faculty of Information Science and Technology, Multimedia University. His research interests include machine learning, deep learning, computer vision, and pattern recognition.

Tutorial Title: Deep Learning and Its Applications in Video Analytics

Deep learning has recently achieved very promising results in a wide range of areas such as computer vision, natural language processing and speech recognition. In contrast to hand-crafted methods, deep learning aims to learn hierarchical representations from large-scale data (e.g. images and videos) via deep architecture models with multiple layers of non-linear transformations. As compared to hand-crafted features, it is easier to achieve higher performance using the learned hierarchical representations. The principle behind the success of deep learning is that it is able to extract different levels of abstractions embedded in the data by carefully design the layer's depth and width. Then, the features that are beneficial for the learning tasks are properly selected.

In recent years, video analytics has attracted increasing interests from both academic and industry. The main goal of video analytics is to automatically recognize the temporal and spatial events in videos. Thanks to the enormous advancements achieved in deep learning, recent improvements in video analytics, ranging from the applications of object tracking, object detection, human-computer interaction, and video surveillance; has automated many tasks in the industries.

This tutorial commences with the concept of deep learning and followed by its applications in video analytics.

Telkom University MMU Universitas Gadjah Mada

iCoiCT

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

IEEE

ABSTRACT

Track 1A: CLIMATE CHANGE MONITORING

Prediction of Sea Level by Using Autoregressive Integrated Moving Average (ARIMA): Case Study in Tanjung Intan Harbour Cilacap, Indonesia

Yehezkiel Kevin Purba; Deni Saepudin; Didit Adytia

Sea Level forecasting is vital for shores engineering applications such as for engineering construction plan in the shore or in offshore, routing of ships at harbor, etc. Researchers have been conducting many methods to predict sea level, such as Artificial Neural Network, SARIMA, ARIMA, etc. In this paper, we will use a model of Autoregressive Integrated Moving Average (ARIMA) to predict sea level in Cilacap, Indonesia. The ARIMA parameters are obtained by conducting parameter tuning so that the model gives the lowest root mean square error value (RMSE) and the highest correlation coefficient.

Wave Prediction by using Support Vector Regression, Study Case in Jakarta Bay

Elizabeth Manurung; Didit Adytia; Nugrahinggil Subasita

Prediction of wave conditions is necessary for coastal and offshore operations, naval navigation and port activities. The prediction is usually obtained by using traditional semi-empirical methods and numerical approaches by using wave models. In this paper, we propose a soft computing approach for predicting wave condition, i.e. the Support Vector Regression (SVR), based on wind information as input for the regression model. Because of the limitation of wind and wave measurement data, here we use wind data obtained from the ECMWF ERA-5 and wave simulated data based on the SWAN model, as training data for the SVR model. As a study case, we choose an area with a rather complex geometry and bathymetry, i.e. an archipelago country consisting of small islands; the Jakarta Bay, in Indonesia. We investigate effect of wind input points with respect to the obtained wave prediction. Results of SVR approach are analyzed qualitatively by comparing with wave data as well as quantitatively by using correlation coefficient and RMSE. The results show a good agreement with wave data.

Sea Level Prediction by Using Seasonal Autoregressive Integrated Moving Average Model, Case Study in Semarang, Indonesia

Ronald Tulus; Didit Adytia; Nugrahinggil Subasita; Dede Tarwidi

Sea level prediction system is an important tool for many coastal engineering applications, such as for designing of engineering structures in coastal or in offshore, routing of vessels, predicting and preventing flood in low land coastal areas, etc. One classical method to predict sea level is by using the Tidal Harmonic Analysis, in which the sea level is approximated by summation of tidal components. The method needs long historical time series data, and it cannot predict non-tidal component or sea-level anomaly. In this paper, we propose a sea level prediction by using the Autoregressive Integrated Moving Average (ARIMA) and the Seasonal Autoregressive Integrated Moving Average (SARIMA) to predict sea level. Here, we choose a study case in Tanjung Mas Harbour in Semarang, Indonesia. Several input combinations for the ARIMA and the SARIMA are investigated for finding the best fit parameters. Results of prediction by using both methods are compared with the classical Tidal Harmonic Analysis. The accuracy of each method is investigated by calculating the RMSE and R value. Despite of the seasonal data that is used in this paper, the ARIMA method gives the best prediction.

Utilization of Internet of Thing and Social Media in Designing a Smart System for Identification Pollution Quality of Air, Water, and Temperature

Muhardi Saputra; Wahjoe Witjaksono; Warih Puspitasari

The problem of pollution in big cities is one form of social issues. Natural sources and human activities can cause air pollution. Classification of air pollutants is divided into two, the first is a primary pollutant that is a pollutant which is generated directly from the source of air pollution, and the second is a secondary pollutant that is a pollutant that occurs from primary reactions in the atmosphere. The nature of air causes the effects of air pollution can be direct and local, regional, and global. Air pollution can endanger the health of humans, animals, and plants, disrupt aesthetics and comfort, or damage property. To overcome this social problem, the Government has regulated in Government Regulation Number 41 of 1999 concerning Air Pollution Control. Cooperation is needed for all relevant stakeholders and the community to overcome these social problems. Current conditions both the Government and the public are difficult to find out information about air quality in the surrounding environment, so the role of community functions is very limited in anticipating and overcoming the problem of air pollution. Based on these problems, Machine-to-Machine (M2M) technology and social media networks Twitter can be used as a medium for disseminating information about air quality to trigger public awareness of the condition of air pollution in the surrounding environment and increase the role of community functions in tackling the problem of air pollution.

Wave Height Prediction based on Wind Information by using General Regression Neural Network, study case in Jakarta Bay

Vita Juliani; Didit Adytia; A Adiwijaya

Information about ocean wave is very important for naval navigation, port operations, offshore or nearshore activities around the sea waters. Moreover prediction of wave condition is necessary for design of harbour, coastal and offshore structures. Variations in wave heights are caused by wind pressure on free waves which make it random and uncertain, so that become difficult to predict. In previous studies, wave prediction have been carried out by using semi-empirical methods and conventional methods that require high resolution simulations and high computation. In this paper, we propose a method for prediction wave height from wind data by using a variant of Artificial Neural Network (ANN) with single pass associative memory-forward, so called General Regression Neural Network (GRNN). To obtain a set of training data, we perform numerical wave simulation by using SWAN (Simulating Wave Nearshore) model by using wind data obtained from ECMWF ERA-5. As a study area, we choose a rather shallow bathymetry and complex geometry, in Jakarta Bay, Indonesia. Results of prediction by using GRNN show a good agreement with wave data.

Track 1B: DISASTER DATA SCIENCE AND MANAGEMENT

Automatic First Arrival Picking on P-Wave Seismic Signal Using Support Vector Machine Method

Muhammad Wahyu Putra Indi; Astri Novianty; Anggunmeka Luhur Prasasti

Automatic First Arrival Picking is a system that can get a P-Wave or the first wave that comes in an earthquake wave. Because of the P-Wave is the first wave to come, it needs research that can get the arrival of P-Wave automatically. The aim of this study is to create an Automatic First Arrival Picking system and to test the performance of methods that will later get P-Wave Picking results and also to get the accuracy of the Support Vector Machine (SVM) as its classification method. Earthquake sample data must go through the Feature Extraction stage first so that the feature results can be used as input to the SVM classification method. In this study sample data S-Wave and Noise are considered as No P-Wave, so there are only two classifications in SVM, namely P-Wave and No P-Wave. The results of this research was got an Automatic First Arrival Picking system with an accuracy performance of 88.00%, precision of 90.00%, recall of 73.50%, f1-score of 78.00% with certain time windowing, data partition, and regularization (C) parameter.

Implementation of Automatic First Arrival Picking on P-Wave Seismic Signal Using Logistic Regression Method

Yusuf Azam Sya'bani; Astri Novianty; Anggunmeka Luhur Prasasti

The development of automation technology is currently very fast and helps human work, one of them is used by BMKG to detect earthquakes. Automatic First Arrival Picking (AFAP) is a system that can detect primary waves at the first arrival or P-Wave that occurs in an earthquake seismic signal. This study aims to create an AFAP system and test the performance of the Logistic Regression method to classify this AFAP system in detecting primary waves at the first arrival or P-Wave. In this AFAP study, data samples taken on the IRIS (Incorporated Research Institutions for Seismology) website with 100 earthquake events taken from the three closest stations with magnitude 5-8 SR. Data samples will be processed using four Feature Extraction: Recursive STA / LTA, Classic STA / LTA, Carl STA / LTA and Delayed STA / LTA. Furthermore, the results of Feature Extraction that will be used as a dataset will be classified by the Logistic Regression method. From the test results of the AFAP system it is known that several parameters can produce the best system performance, that is 50 seconds for time windowing, 55%: 45% for a ratio training and testing, and a value of 100 for Inverse of Regularization. The results of the research conducted using the Logistic Regression method to detect P-waves in the AFAP system with a calibration scheme that carried out that obtained accuracy of 83%, Precision by 75%, Recall of 64% and F1-Score of 67%.

Sentiment Analysis during Jakarta Flood for Emergency Responses and Situational Awareness in Disaster Management

Warih Maharani

Social media provide valuable information for disaster risk reduction as well as a disaster emergency response. Previous studies claim that social media data can be used in the emergency response effort, which is worthwhile for the Government, BNPB, as well as the community, to get a direct and credible information about the ongoing disaster situations. However, the social media data has not been widely used for emergency response and situational awareness in Indonesia. Therefore, in this paper we implement BERT method applied to a set of tweets related to Jakarta Flood in early 2020. We have crawled the tweet dataset during the Jakarta flood disaster in early 2020 which had become a trending topic on Twitter. We aim to identify the

relevance tweets that may provide useful information related to emergency responses in disaster management. The experimental results indicate promising outcomes. However, the quality of the dataset greatly influences the system performance.

Impact Analysis on Disaster Data for Disaster Risk Reduction from Multiple Stakeholders Perspective

Syamil Zayid; Nur Azaliah Abu Bakar; Mageshwari Valachamy; Nur Shuhada Abdul Malek; Mohd bin Mahrin; Khamarrul Azahari Razak

Currently, the process in Disaster Risk Reduction (DRR) relies heavily on geospatial information defined as information contained in topographic maps, thematic maps, plans, charts and satellite images. The preparation and use of geospatial information involve parties such as custodians, data providers, users and vendors. However, nonspatial data also crucial in DRR. Due to different data formats, sizes and type of both spatial and nonspatial data, data processing becomes more complex and time-consuming. Furthermore, some supplied data are lack of specific reasoning behind it. As a result, a volume of spatial and nonspatial data keep piling up daily without any beneficial utilisation. Therefore, this paper aims to investigate the impact of disaster-related data of both spatial and nonspatial that contribute to DRR from multiple stakeholders' perspective. The research is conducted through a focus group discussion (FGD) interview with a total of 54 agencies that involve in DRR in Selangor State, Malaysia. Based on the findings, vulnerability data is the most impactful data for DRR, followed by base data, hazard data, exposure data and risk impact assessment data. The findings from this study will provide the DRR data priority list from various agencies perspective, which can help to anticipate disasters or at least reduce the risk of disaster. This could also assist the relevant agencies to prepare for DRR management in a more proactive way.

Data-Driven of Time Series Decomposition on Estimating Geodetic Secular Motion Around Palu- Koro Fault Zone

Cecep Pratama; Irwan Meilano; Euis Sunarti; Setya Haksama; Mahmud Dwi Sulistiyo

The 2018 Mw 7.5 Palu earthquake occurred along the Palu-Koro segment devastated Central Sulawesi, Indonesia. The Palu-Koro fault is considered as a plate boundaries between of three major tectonic plates. Couples space geodesy measurement has been conducted to characterize the crustal activity of the Palu-Koro fault based on secular velocities pattern. However, several non-secular deformation observed and need to be considered to obtained actual secular deformation. Here, we conducted data-driven time series decomposition of Global Positioning System (GPS) observation. We used earthquake catalogue data to drive decomposition recognize the co-seismic offset and respective post-seismic deformation. We obtained precise secular motion on WATP, P14P, PALP, and TOBP sites where the direction changing from eastward toward northeast.

Telkom University   MMU   Universitas Gadjah Mada

ICoICT

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

IEEE

Track 1C: DISASTER RISK SCIENCE AND ENGINEERING

Numerical Simulation of Tsunami Evacuation Route Planning in Padang Using Linear Programming

Rizal Dwi Prayogo; Siti Amatullah Karimah

This paper proposes an implementation of linear programming in tsunami horizontal evacuation routes decision making. A tsunami is a huge wave that travels with high speed towards a coastal area. Padang is the capital city of West Sumatera Province that is located in the coastal area as well as have a history of the tsunami disaster. The main problem is only a few minutes of the interval for the tsunami waves arrive at the coast after tsunami hazard warning. In the evacuation concept, the evacuees from the high-risk zone are moving to the shelter through a safe evacuation route. This research aims to determine the optimal evacuation routes with the constraints of a few minutes of the interval of evacuation time, the capacity of each shelter, and the number of evacuees. The evacuation time is an objective function that depends on the number of population, people density, road width, distance from the high-risk zone to the shelter, and velocity. The numerical simulation is done using linear programming with Matlab. The results show that all evacuees in each high-risk region are proportionally evacuated to available shelter areas within allocated evacuation time. The results of this research can be used for supporting tsunami evacuation plans and disaster resilience management by the authorities in Padang.

An Optimization Model of Vertical Evacuation Scenario on Tsunami Disaster Mitigation

Rizal Dwi Prayogo; Nurul Ikhsan

This paper proposes an optimization model to determine the best scenario of tsunami vertical evacuation. The purpose of this study is to mitigate the number of victims in evacuation zones within the available time before tsunami waves reach the coast. The tsunami is wave propagation at high speed as an impact after the earthquakes occurred under the sea. The population in the coastal areas are at risk from tsunami impact. In this study, Padang City is chosen as a case study. In the evacuation plan, the refugees are evacuated to the vertical evacuation structures that have enough height to raise refugees higher than the level of tsunami tide. An optimization model is formulated with linear programming using Matlab, by the objective function is to minimize the evacuation time with the constraints of the estimated time of tsunami arrival, the capacity of each vertical evacuation structures, and the number of refugees. The simulation results show that all refugees are successfully evacuated according to the proportions within available evacuation time. The results of this study can be implemented to support the tsunami disaster mitigation by the Government in Padang City.

A Blockchain-based Assistance Digital Model for First Responders and Emergency Volunteers in Disaster Response and Recovery

Pg. Hj. Asmali Pg. Badarudin; Au Thien Wan; Somnuk Phon-Amnuaisuk

Disasters are getting more frequent and unpredictable due to climate change and other factors. The tasks of first responders and community volunteers are getting more challenging as the frequency and intensity of disasters increase. This study explores how blockchain technologies using Ethereum can assist in increasing speed and level of availability of needed materials and services that may be required during or in the aftermath of disasters for rescue and recovery. The federated blockchain model also provides financial transactions securely and transparently by incorporating a donation mechanism for fund payment, monetary compensation or incentivization through the use of tokens and other digital assets to the materials and service providers. Inter-government agencies and co-operation and collaboration during disaster

response and recovery events can also be achieved by solving the financial budget issue.

Nonlinear SWE and Experimental Observation for Wave Simulation due to Bottom Motion

Astrid Velia Themba; Putu Harry Gunawan; Annisa Aditsania

Natural disasters can occur everywhere, causing geological and complex problems. One of the devastating natural disasters is the water wave disaster. Several factors can form a water wave disaster, one of them is due to the bottom motion of the water surface. This paper presents the simulation of numerical modeling waves due to the bottom motion using the 1D nonlinear SWE. Here, the staggered grid is used to help to discretize the model. Experiments are carried out eleven times to produce data for making wave simulations. The results of experiments and simulation results are compared and analyzed using the formula Root Mean Square Error (RMSE). This study aims to prove whether the nonlinear SWE model can simulate experimental waves accurately. The results showed that the shallow water equations model could represent the experimental results well with an error value of 0.000058.

Experimental and Simulation Approach for Water Bed Movements

Alya Alifia Anwar Jaya; Putu Harry Gunawan; Annisa Aditsania

This paper examines the simulation of a 1D half nonlinear shallow water model using a staggered grid scheme for comparing with experiment results. Here, the experiment of the moving bottom problem in one-directional horizontal is given. The experiment was built in a glass basin with an obstacle as the moving bottom. Indeed, the impact of moving the bottom in shallow water can generate surface waves with various elevation values. The results showed that numerical simulation using nonlinear shallow water equations is close enough with the experimental data. The comparison of water elevation from simulation results and experimental data is observed in three gauge which are shown as G1, G2, and G3. Using the initial condition of water elevation 0.1 m, then the error measurement of each gauge are obtained less than 10^{-3}.

Simulation of transport problem with clustering velocity-density function

Ferdian Akbar Daniswara; Putu Harry Gunawan

This paper discusses the use of K-Means clustering method in finding an estimate of the velocity-density function in the traffic flow model. Two clusters will be obtained using K-Means clustering process, which are jammed and light cluster. These two clusters will have different velocity-density function based on clustering result. Here, velocity-density function is obtained from linear regression of each data clusters. For measuring the velocity-density function, then this paper will provide the value of RMSE and R-Squared. The results show that RMSE is 2.3396 and R-squared is 0.3591 when no cluster is implemented in numerical simulation. Meanwhile, for light cluster, the RMSE is found 1.1795 and R-squared 0.1388. Moreover, for the second cluster, RMSE is 0.8723 and R-squared is 0.1357. Finally, the process of identifying traffic conditions in the numerical simulation is done by computing Euclidean distance from centroid of clusters.

Designing Green Procurement based on ERP for Leather Tanning Industry

Mahsya Fajriani; Ari Yanuar Ridwan; Muhardi Saputra

A high population and livestock production in Garut is the beginning of the development leather tanning industry, And now the leather tanning industry is the largest sector industry in Indonesia. A leather tanning industry has the potential to harm the environment. PT. Elco Indonesia Sejahtera is one of the Leather tanning industry in Garut. They do not have a system to support the activities and it is reported with a paper as documentation. This research will design a green procurement system to minimize hazardous waste.The green procurement system will able to monitor the material and the supplier by using KPI (Key Performance Indicator). To design this green procurement system is by implementing ERP (Enterprise Resource Planning) with SAP Activate method. The Result of this research is an ERP system that is to help all the procurement activity with a green system. And this system is integrated with production, sales and distribution, and reverse logistics. These are will help the industry to monitor the business process.

Track 1D: EMERGING TRENDS IN INFORMATION AND COMMUNICATION TECHNOLOGY

IoT Products Adoption for Smart Living in Indonesia: Technology Challenges and Prospects

Rahmat Yasirandi; Alvin Lander; Hana Rifdah Sakinah; Isa Insan

Internet of Things (IoT) Products have been popular in every country in the world nowadays. Indonesia has become one of the countries that have been affected positively by this technology. One of them is the realization of lifestyle paradigms, which is smart living. This research found that there are five main sectors in smart living, which are entertainment, health, energy management, security, and retail. IoT products functionality has become an important part of the impact of implementing smart living. But it was found that the existence of challenges and prospects from this technology adoption is not limited, mainly because Indonesia is a developing country that supports regulations related to the adoption of IoT technology. In results, there are data findings in this research that show facts related to the adoption of IoT Products for Smart Living in Indonesia.

Personalized E-learning Content Based On Felder-Silverman Learning Style Model

Jeremiah Hasudungan Sihombing; Kusuma Ayu Laksitowening; Eko Darwiyanto

A Personalization of E-learning can be done by personalize E-learning features, which are learning content and learning activities provided. In this study, E-learning content personalization was carried out based on the Felder Silverman Learning Style Model (FSLSM). FSLSM is a method of classifying learning styles into 4 dimensions, namely perception, processing, input and understanding. FSLSM classifies learning styles using the Index of Learning Styles (ILS) questionnaire, consisting of 44 questions. In the system that was built, the ILS questionnaire was digitized to map E-learning users, based on their learning style. Afterwards, content personalization algorithms were designed, so users could access content that were suitable to their learning styles while using the system, after that learning content was designed for each dimension of the FSLSM with ADDIE modelling, which was the stage for creating E-learning content. To test the designed algorithm, Delphi method was used, which is a method that collects expert opinion on a problem. For system test, System Usability Scale (SUS) method was used to measure acceptance of user. The results of this research, getting agreement on the accuracy of the design of content personalization algorithms from 3 E-learning experts, the system that was built got SUS 75.33 which was acceptable with grade B, means the system was accepted as a learning tools to help them in learning process based on SUS assessment.

Impact Evaluation of Procedurally Content Generated Against Immersion Games Using ANOVA

Hardianto Wibowo; Dimas Nurpratama; Wildan Suharso; Agus Eko Minarno; Galih Wasis Wicaksono; Dani Harmanto

This article explains the study of the impact of procedurally content generated on immersion games and has the quality of experience playing games. Therefore, experimental studies have been conducted in which players play two different versions of the game, procedurally generated content and human design. Using the questionnaire game immersion to measure the quality of the playing experience and will be compared into two groups. While there is a difference in total immersive, one-way ANOVA statistical analysis is suggested to analyze immersive total results. However, the statistical results of one-way ANOVA are not inclusive. For this reason, one-way ANOVA will be compared with two-way ANOVA, so that it shows conclusive results based on the

results of the analysis, P-Value value from the PCG game level and human design one-way ANOVA. From the participant's human design and 0.38 from PCG participants.

Image Retrieval using Multi Texton Co-occurrence Descriptor and Discrete Wavelet Transform

Agus Eko Minarno; Fauzi Dwi Setiawan Sumadi; Yufis Azhar; Yuda Munarko

This paper describes an efficient algorithm for Content-Based Image Retrieval (CBIR) based on Multi Texton Co-Occurrence Descriptor (MTCD) and Haar (Wavelet) namely MTCD-H. The problems from the previous research were the computational speed and the low value of precision. The data that was used consisted of 10000 Corel images and 300 batik images. MTCD used the RGB colour feature, the Sobel edge detection, and global feature using Gray Level Co-Occurrence Descriptor (GLCM). Wavelet was considered an approach that could increase the precision value as well as reduce the features. This paper combined the MTCD with Haar for the image extraction process in order to increase the computational speed and the precision value. The contribution of this paper was aiming for extracting the Wavelet feature on a grayscale image before extracting the feature using GLCM. The results showed an increase of precision value pointed at 3.36 for batik images and 5.11 for the Corel images. In addition, the computational speed for batik images was performed 84.35s faster as for the Corel images 2988 faster. Based on the specified results, it could be concluded that the MTCD-H were effective in reducing the computational speed as well as increase the precision.

Adaptive Attention Generation for Indonesian Image Captioning

Made Raharja Surya Mahadi; Anditya Arifianto; Kurniawan Nur Ramadhani

Image captioning is a topic that quite widely discussed. Most research on image captioning still uses English, while other languages also need to research. Indonesia, as the largest Southeast Asian country, has its language, which is Bahasa Indonesia. Bahasa Indonesia has bee taught in various countries such as Vietnam, Australia, and Japan. In this research, we propose the attention-based image captioning model, where ResNet101 as the encoder and LSTM with adaptive attention as the decoder for the Indonesian image captioning task. Adaptive attention can decide when to look at the images and which region should be attended to produce the next word. The model we used was trained with the MSCOCO and Flick30k datasets besides. Both datasets are translated using google translate and humans into Bahasa. The results of our research resulted in 0.678, 0.512, 0.375, 0.274, and 0.990 for BLEU-1, BLEU-2, BLEU-3, BLEU-4, and CIDEr scores respectively. Our model also produces a similar score for the English image captioning model, which means our model capable of being equivalent to English image captioning. We also propose a new metric score by conducting a survey. The results state that 76.8% of our model's caption results are better than validation data that has been translated using Google Translate.

Single Triaxial Accelerometer-Gyroscope Classification for Human Activity Recognition

Agus Eko Minarno; Wahyu Andhyka Kusuma, WAK; Hardianto Wibowo; Denar Akbi; Naser Jawas

Evaluated activity as a detail of the human physical movement has become a leading subject for researchers. Activity recognition application is utilized in several areas, such as living, health, game, medical, rehabilitation, and other smart home system applications. For recognizing the activity, the accelerometer was popular sensors. As well as a gyroscope, in addition to dimension, low computation, and can be embedded in a smartphone. Used smartphone with an accelerometer as a popular solution for recognized daily activity. Signal was generated from the accelerometer as a time-series data is an actual approach like a human activity pattern. Traditional machine learning method in mid of the modern method worth it considering. Single

position triaxial accelerometer-gyroscope Motion data have acquired in an of 30 volunteers. Basic actives (Laying, Standing, Sitting, Walking, Walking Upstairs, Walking Downstairs) were collected from volunteers. Decision Tree, Random Forest, Extra Trees Classifier, KNN, Logistic Regression, SVC, Ensemble Vote Classifier. The purposed method, logistic regression, achieves 98% accuracy. Furthermore, any feature selection and extraction method were not used.

NB-IoT Network Planning for Advanced Metering Infrastructure in Surabaya, Sidoarjo, and Gresik

Muhammad Imam Nashiruddin; Arrizky Ayu Faradila Purnama

Narrow Band Internet of Things (NB-IoT) technology is one of the Low Power Wide Area (LPWA) technologies by offering connectivity with low cost, low power consumption, and wide range. NB-IoT is support by cellular networks or Long Term Evolution (LTE) with 3GPP Release 13 standard, making NB-IoT is a technology that is very suitable for the development and needs of the Internet of Things (IoT) today. Precisely the requirements regarding Advanced Metering Infrastructure (AMI) such as electricity, water, gas, and fuel distribution. Connectivity is needed to guarantee the service connection, in which one of the technologies is Narrow Band Internet of Things (NB-IoT). In this study, an NB-IoT network design analysis conducted for AMI in Surabaya, Sidoarjo, and Gresik. From the analysis results, both in terms of coverage and capacity of the gateway requirements for Internet of Things (IoT) network planning using NB-IoT are 20 sites for the Surabaya area, seven sites for the Sidoarjo area, and five sites for the Gresik area. From the simulations undertaken, the average acceptable signal level is -57.9 dBm for Surabaya, -59.62 dBm for Sidoarjo, and -58.71 dBm for Gresik. And for RSSI value or sensitivity at the receiver for the three regions, the value above the standard sensitivity value for NB-IoT is -141 dBm, while the minimum sensitivity value for the Surabaya, Sidoarjo and Gresik areas is -100 dBm, -104 dBm, and -105 dBm.

Performance Comparison of Yolo Lite and YoloV3 Using Raspberry Pi and MotionEyeOS

Pertiwang Sismananda; Maman Abdurohman; Aji Gautama Putrada

This paper proposes system comparison on identifying and processing of human image based on YOLO-LITE and YOLOV3 algorithms. Computer Vision (CV) is a field of computer science where the focus is on learning how computers can be trained to identify and process image data as humans do. There are many open source CV frameworks have been proposed such as OpenCV. This paper shows a comparison between YOLO-LITE and YOLOV3 algorithms and analyzes their performance. We have implemented both algorithms in several test cases in the real time domain and carried out in the same test environment. The result shows that the Raspberry Pi camera worked at 15 fps on YOLO-LITE and 1 fps on YOLOV3. This indicates that YOLO-LITE has an average performance of 1 second faster while YOLOV3 has an average accuracy of 30% better.

IoT-Based Road Vehicle Counter Using Ultrasound Sensor and Cross-Correlation Algorithm

Deta Soundra; Maman Abdurohman; Aji Gautama Putrada

Traffic systems at this time have shown evolution as technology develops. Supported by a transportation system that is certainly sophisticated. The two systems are part of smart city that are applied in big cities. Basically, all communicate with each other to create an integrated smart city. However, the communication must be in real time domain so that all smart city components are connected. In this research case a vehicle counting system in real-time that can calculate vehicles passing on a road segment is designed. Applications used are ultrasound sensors, microcontrollers, and an Internet of Things Platform that are interconnected to monitor road conditions. Normalized Cross-Correlation algorithm is used to detect passing vehicles. The

concept that Normalized Cross-Correlation algorithm is an algorithm to determine the similarity in two frequency signals is used to detect ultrasound frequencies created by cars passing by the sensor. The system will detect by comparing input data from ultrasound sensors by making sample data first then the sample data is compared with the data after the sample data. After that the correlation value will come out which has been normalized on a scale of 0-1.0. From applying normalized cross-correlation method the threshold for the calculation of the vehicle is determined, which is <0.70. This threshold is determined as the optimum value after various tests. After testing the method in real environment the error rate of the method in counting passing vehicles is 10.1%.

Blood Detection in Infusion Hose Using Fuzzy System

Rizqillah Zahra Lestari; Siti Amatullah Karimah; Maman Abdurohman; Rizal Dwi Prayogo

The use of infusion in medical is an important thing since infusion fluid can replace the lost body fluids rapidly and the infusion fluid is easily absorbed by the body. In the use of infusion, it must be observed periodically to avoid run out of infusion fluid or the blood clotting in an infusion hose. In the case of blood clotting detected in the infusion hose, the blood can clog the blood capillaries in the lungs and causes an embolism in the lungs. A warning system is needed when the infusion is impaired to prevent the blood clotting due to depleted infusion fluid. In this research, we propose an infusion monitoring device by using a color sensor to monitor the blood rises to the infusion hose. If there is blood detected in the infusion hose, the sensor will notify the warning by the buzzer and LED light. The color detection by sensors uses a fuzzy logic method. The results show that the sensor sends a notification through the buzzer and LED light when blood is detected in the infusion hose with the average uptime of the buzzer and LED light is 5.6 seconds. The accuracy of this device is 100% to detect blood-red color.

EDGAN: Disguising Text as Image using Generative Adversarial Network

Anditya Arifianto; Made Raharja Surya Mahadi; Adriansyah Dwi Rendragraha; Malik Anhar Maulana; Triwidyastuti Jamaluddin; Muhammad Ferianda Satya; Rajabandanu Subhi

In the concept of data hiding, image is often used as a cover to hide sensitive data inside it. This approach is considered a good addition in securing information to cryptography which only hides the information and not the presence of the message itself. The combination of Deep Learning with Steganography and Cryptography is rarely done. By utilizing Deep Neural Networks to encrypt and hide the messages, it will be increasingly difficult to decrypt and track. In this study we developed an encryption mechanism to not only conceal messages, but transforming them into images. The image containing the hidden messages can later be decrypted and converted back into the original message. We use Generative Adversarial Network to develop the encryption and decryption models. Text data is converted into a word vector using word2vec model which then used as input for the encryption model to produce the word images. We use the MNIST dataset to train models which are able to produce images that encrypt 1000 word variations. Based on our experiments, we were able to produce robust encrypted images with 98\% accuracy of reversible words. We also show that our model is resistant to various minor image attacks such as scaling, noise addition, and image rotation.

Parallel Programming of Churn Prediction Using Gaussian Naive Bayes

Dandi Trianta Barus; Rafanzhani Elfarizy; Fikhri Masri; Putu Harry Gunawan

This paper presents churn predictions with the Gaussian Naive Bayes method. Churn prediction is forecasting method to predict customer decision in a company's service or product (churn). With high public enthusiasm and an increasing number of customers in the Big Data era, a fast computing process is needed to predict churn as quickly as possible. In this paper, computing is accelerated by OpenMP platform parallel algorithm. Churn prediction experiments are performed with different amounts of test data, ranging from 100, 300, 500, 700, to 900 data. The results obtained show that implementing OpenMP in predicting churn is faster than serial processing. The obtained speedup and efficiency reached more than 1.49 and 37%, even for test data of 300 and 500, based on the tests, the speedup and efficiency reached 1.99 and 50%.

Parallel Construction of Information Technology Value Model: Design-Science Research Methodology

Lukman Abdurrahman; Tatang Mulyana

To date, the study model of IT value usually takes the form of a serial construction relating its components. This paper tries to offer a parallel construction in modeling the IT value study. The applied methodology is the design-science research approach to create the construction relating its components. To perfect the construct, the paper applies the partial adjustment valuation that functions as an estimating technique to approximate and evaluate the mathematical magnitude of the performing returns of a component compared to the real figures. The developed pattern undertakes a case study with Mandiri's data, an Indonesian state-owned banking industry, shows that the estimated revenue of the parallel configuration has a deviation of only 0.28% when compared with the bank's real revenue during the period 2004-2014. Thus, the parallel configuration may appear as the alternative configuration in the study of IT value as a result of its authenticity academically as well as pragmatically.

Comparative Analysis of Decision Tree Algorithm for Learning Ordinal Data Expressed as Pairwise Comparisons

Nunung Nurul Qomariyah; Eileen Heriyanni

Decision Tree is a very mature machine learning method used to solve classification problems. In this paper, we show the review of Decision Tree implementation for learning user preferences data expressed in pairwise comparisons. Decision Tree can be considered as one of the suitable methods for this problem due to its white-box approach, so that we can evaluate the result and re-use the model for further analysis, such as giving a recommendation. We used 10-fold cross validation and hold out technique to evaluate the performance of four different decision tree algorithms. The result shows that some decision tree algorithms like J48 outperform the others for learning pairwise preferences on specific training split point. This paper has demonstrated, through use cases and experiments of pairwise preference problem, the effectiveness of decision tree method, and in particular of its novel use of learning ordinal data.

Hate Code Detection in Indonesian Tweets using Machine Learning Approach: A Dataset and Preliminary Study

Damayanti Elisabeth; Indra Budi; Muhammad Okky Ibrohim

The 2019 presidential election is one of the mandatory national agendas that is covered by all of the mainstream news media in Indonesia. The function of news media as an information provider reaps criticism because they are suspected of having polarity towards certain

candidates. In this paper, the polarity of news media is analyzed by performing sentiment assessment towards every news regarding each candidate. Since manual sentiment analysis is costly and time-consuming, because of the large amount of data that needs to be processed, we adopt a machine learning method to automate the sentiment analysis process. This research employs Artificial Neural Network (ANN) to classify scraped news texts from online media and TF-IDF weighting method for feature extraction. We found that the observed online media kompas.com, liputan6.com, republika.co.id, and tempo.co do not have significant polarity toward one of the candidates. In addition to ANN, we also compared other methods to investigate the appropriate methods for our dataset. Our experiment shows that on average, ANN obtains the best accuracy at 84.57%, compares to Decision Tree C4.5 (83.34%), Naïve Bayes (80.42%), and SVM (79.04%).

Sustainable Internet of Things: Alignment approach using enterprise architecture

Nunung Nurul Qomariyah; Anjar Priandoyo

Internet of Things (IoT) is a system of interconnected device that recently become popularized as one most important technology to enable sustainability. IoT can be implemented in various sectors from energy to water management. IoT provides an opportunity for sustainability. However, implementing IoT also has several challenges both on the impact on the environment or on business performance. Therefore an integrated framework is needed to align IoT and sustainability. The method of alignment between IoT and sustainability is based on TOGAF enterprise architecture framework. In this paper, the IoT principle is based on Permen BUMN 02/MBU/02/2018 while sustainability principle is based on POJK 51/POJK.03/2017. The result of this alignment is an integrated framework for Sustainable Internet of Things that can be used to ensure successful alignment and adoption.

Ensemble Learning in Predicting Financial Distress of Indonesian Public Company

Dyah Sulistyowati Rahayu; Heru Suhartanto

Predicting financial distress can avoid bankruptcy of firm. That is important issue in company sustainability and the economic growth matter. The bankruptcy of firm affect overall economic condition in different level. The ensemble learning which is built to achieve better performance of prediction can be implemented to forecast unhealthy conditions of the company. The random forest ensemble learning and AdaBoost have been proven superior to the single one. Those two method is applied to the data of Indonesia Public Company over 6 variables based on Altman Z-Score and one additional variable. The accuracy, precision, recall and f1-score have an average of 91% despite of the imbalance ratio. The scoring of ensemble determine its superiority to the single machine learning.

Opinion Mining Model System For Indonesian Non Profit Organization Using Multinomial Naive Bayes Algorithm

Cut Fiarni; Herastia Maharani; Gabriella Wisastra

Instagram is one of the popular social media being used to publish information and gain awareness of Nonprofit organization (NPOs). In the process of sounding through social media, the engagement formed in the comment section also should be monitored to help NPOs assess the effectiveness of using Instagram as a tool to introduce their program. Moreover, to built engagement with their audience and extract knowledge of the potential donor and volunteer. Unfortunately, this knowledge is still difficult to get because, one of challenge in this field is how to found relationship between content features and NPO audience engagement. The purpose of this research is to study, analyze and design model of Indonesian NPOs opinion mining from Instagram dataset. Also, it would focus on a modeling process of the opinion mining for NPOs

that concern with Indonesian child welfare. The proposed model also design to obtain 10 categories to represent audience opinion, which are gratitude, appreciation, encouragement wishes, empathy, suggesting, sharing, need more information, behavioral intention, engagement, agreement, and disagreement. The proposed system adopts Binarized Multinomial Naïve Bayes algorithm for caption aspects categorization and Normal Multinomial Naïve Bayes for comment aspect categorization. Based on the performance result, these proposed model proved successfully categorize the opinion, with the average precision value 96.67% and recall 96.4% of caption aspects. Meanwhile, Normal Multinomial Naïve Bayes also gives better performance result to categorize the comment aspect, with the average precision value 83.3% and recall 80.3%.

Fractal Batik Motifs Generation Using Variations of Parameters in Julia Set Function

R Rizal Isnanto; Achmad Hidayatno; Ajub Ajulian Zahra

The fractal concept is the generation of images graphically with self-similarity properties produced by recursive or iterative algorithms to produce a new image form. In this research, we designed a system that can generate batik fractal motifs using the Julia set. In this system, the process of generating fractal batik images consists of 3 (three) steps, namely: First, determining the shape of the Julia set function for some batik motifs. Second is computer programming with Python to visualize the results of the first step. Third, designing the fractal batik motifs using Julia set obtained in the second step. From the research, some conclusions were obtained as follows. First, for the greater number of iterations, the resulting image will be more detailed and the number of colors will increase. Second, the result image is influenced by the value of the complex c and the number of colors or gray-levels indicated by the number of iterations, i.e., the greater the number of iterations, the more colors are generated. Third, several variations of input parameters produce images that approach traditional batik motifs. In this research, traditional motifs that can be approached by Julia-set functions are: Parangkusumo, Nitik, Batik Liong, Mega Mendung, and Ceplok motifs. Fourth, changes in the number of iterations and the value of c applied to Julia set are better able to generate the variations of motifs. Thus, the Julia set function can help the batik designer in making fractal batik motifs.

Comparative Analysis of K-Nearest Neighbor and Decision Tree in Detecting Distributed Denial of Service

Parman Sukarno; Muhammad Arief Nugroho; Ilham Ramadhan

Distributed Denial of Service (DDoS) attacks are attacks made by several attackers by flooding the victim's device with a packet. The ease of making DDoS attacks has led to an increase of these attacks in network traffic. In contrast, the method of non-machine learning Intrusion Detection System (IDS) is now seen very inaccurate. There is a need then for an IDS method with machine learning (ML) that is more accurate in detecting attacks. Several previous studies have known that the K-Nearest Neighbor (KNN) and Decision Tree (DT) algorithms are two algorithms with high accuracy in detecting DDoS attacks. However, research comparing the two algorithms is not found so far. In this study, a comparative analysis was carried out between the two algorithms. The result of this study showed that DT had a higher accuracy with an accuracy value of 99.91% than KNN which only had an accuracy value of 98.94% in detecting DDoS attacks.

Can Information Security, Privacy and Satisfaction Influence the E-Commerce Consumer Trust?

Manuel Jesnico; Candiwan Candiwan; Ratih Hendayani; Yuvaraj Ganesan

E-commerce must face the risk of cybercrimes such as phishing and cracking that can cause complaints and reports from consumers who suffer losses due to insecurity of their information and privacy. The purpose of this study is to investigate the effect of information security and privacy on the level of customer satisfaction and trust in e-commerce. Data were collected using questionnaires distributed to 100 Bukalapak users as e-commerce users. In addition to using the PLS-SEM method to explain the relationship between constructs, this study also employs the Importance and Performance Matrix Analysis (IPMA) method to find out how important and how much influence the indicator variable has on latent variables. The result of this study shows that consumer trust can be achieved by consumer satisfaction and privacy. On the other hand, consumer satisfaction is influenced by information security and privacy. This research is expected to contribute insights to e-commerce players, especially Bukalapak, to focus on improving the privacy of their consumers. Future research can apply the same model to e-commerce players other than Bukalapak.

ECG Based Biometric Identification System using EEMD, VMD and Renyi Entropy

Sugondo Hadiyoso; Inung Wijayanto; Ervin Dewi

New biometric systems are being proposed to overcome the lack of conventional biometric systems especially in high security applications. One of potential modality is a biometric based electrocardiogram (ECG) signal. In this study a biometric system has been simulated using one ECG lead signal. A total of 110 ECG waves from 11 subjects have been simulated. Ensemble Empirical Mode Decomposition (EEMD), Variational Mode Decomposition (VMD) and Renyi Entropy are proposed methods for feature extraction. EEMD and VMD decompose ECG signals into 5 levels. Signal complexity analysis based on the Renyi Entropy approach was calculated for each decomposed signal. Signal complexity analysis based on the Renyi Entropy approach is calculated for each decomposed signal. This value becomes a feature set that is tested in the validation process. The highest accuracy of this proposed method in person identification is 96.4%, which was achieved by VMD and Cubic SVM.

Outdoor to Indoor Propagation Model of Glass Material Building at 26 GHz for 5G Mobile Technology

Trivia Anggita; Muhammad Suryanegara

This paper discuss the outdoor-to-indoor (O2I) propagation model of the 26 GHz 's 5G communications penetrated over the glass material building. The simulation is carried out using NYUSIM obtaining the received power and penetration loss for the conditions of line of sight (LOS) and non-line of sight (NLOS) environment. The simulations are conducted by 3 scenarios, i.e. measurement of LOS and NLOS condition without penetration loss (Scenario #1), with low penetration loss using standard glass and wood material (Scenario #2), and with penetration loss using infrared reflecting (IRR) glass and concrete material (Scenario #3). The results shows that received power is influenced by the distance between the outdoor transmitter and indoor receiver, and also type of glass material used in the building. It is shown that IRR glass and concrete material has the impact of highest penetration loss then generate the smaller received power.

Deterministic Approach of Indoor Room THz Multipath Channel Model

Dwi Cahyono; Fawad Sheikh; Thomas Kaiser

The terahertz (THz) communications promise to be the next generation of wireless communication networks in the next five to ten years. Highly accurate and directive antennas are required in both transmitter and receiver sides to overcome the high propagation loss and reflection losses at THz band. One of the major objectives of this paper is to investigate the influence of multipath-channel on transmission aspects in an indoor office environment based on ray-tracing technique for line-of-sight (LoS) scenario. Moreover, the angle of arrival (AoA) and angle of departure (AoD) with respect to the relative received power, angular power profile, and time of arrival (ToA) are elaborated. The ToA and power delay profile (PDP) presenting the temporal characteristic, have also been investigated and described in this paper.

LoRaWAN Internet of Things Network Planning for Smart Metering Services in Dense Urban Scenario

Alvin Yusri; Muhammad Imam Nashiruddin

This research aims to conduct LoRaWAN network planning for Smart Meter in Jakarta, as representative of the Dense Urban Scenario. Smart Meter is a system that can measure, collect, analyze energy distribution and its consumption, and communicate with metering devices on schedule and on-demand, i.e., for electricity, water, and gas services. Since Smart Meter only uses 10 bytes per data transmission, then the Low Power Wide Area (LPWA) technology is considered to be the candidate network for Smart Meters because Smart Meters don't require high data rates and only use a small amount of power to operate. There are several LPWA technologies that available in the market, which is Long Range Wide Area Network (LoRaWAN), Narrow Band Internet of Things (NB-IoT), and Sigfox. LoRaWAN is considering as a suitable technology for Smart Meters because LoRaWAN has a long battery life and using ISM frequency. It indicates that LoRaWAN has less implementation cost rather than the other technology. From the coverage and capacity analysis, it concludes that the optimal LoRaWAN gateway requirements for Jakarta City were eleven gateways with Spreading Factor (SF) values of 10 and can serve at the level of receiver sensitivity > -132 dBm. Spreading Factor has a reversing ratio with sensitivity. Bigger SF means smaller sensitivity, broader coverage, lower data rate, and vice versa. From the results of simulations conducted, 8 gateways resulting average signal level of -81.35 dBm, an average of throughput distribution of 20.84 kbps, and average SNR of -8.11 dB.

Deep Learning Detected Nutrient Deficiency In Chili Plant

Arief Rais Bahtiar; Pranowo Pranowo; Albertus Joko Santoso; Jujuk Juhariah

Chili is a staple commodity that also affects the Indonesian economy due to high market demand. Proven in June 2019, chili is a contributor to Indonesia's inflation of 0.20% from 0.55%. One factor is crop failure due to malnutrition. In this study, the aim is to explore Deep Learning Technology in agriculture to help farmers be able to diagnose their plants, so that their plants are not malnourished. Using the RCNN algorithm as the architecture of this system. Use 270 datasets in 4 categories. The dataset used is primary data with chili samples in Boyolali Regency, Indonesia. The chili we use are curly chili. The results of this study are computers that can recognize nutrient deficiencies in chili plants based on image input received with the greatest testing accuracy of 82.61% and has the best mAP value of 15.57%.

Bone Scan Image Segmentation based on Active Shape Model for Cancer Metastasis Detection

Ema Rachmawati; Fazrian Ramadlan Sumarna; Jondri Jondri; Achmad Hussein S Kartamihardja; Arifudin Achmad; Rini Shintawati

Image segmentation is commonly used as a preliminary step before recognition or detection system. In the segmentation process, firstly we have to divide the image into several particular regions based on certain rules, while hoping the results highly represent the desired patterns. In the case of metastasis detection, bone scan image segmentation is a step that is necessary to be conducted before metastasis detection. The performance of this segmentation results will greatly influence the metastasis detection results. Therefore, in this paper, we propose a bone scan image segmentation based on Active Shape Model. In the segmentation process, we divide the bone scan image into 4 (four) different regions, namely (1) head and spine region, (2) upper arms and collarbone region, (3) chest region, and (4) pelvis and upper thighs region. In the annotation step, we use 200 landmark points in total, with each region is represented by 50 landmark points. This annotation step is necessary step of model building based on Active Shape Model. We evaluate our proposed system by using 3-cross validation method and obtain a low cumulative error distribution, that is 0.004694.

Classification of subjects of Mild Cognitive Impairment and Alzheimer's Disease through Neuroimaging modalities and Convolutional Neural Networks

Ahsan Tufail; Yongkui Ma; Qiu-Na Zhang

Alzheimer's Disease (AD) is an irreversible neurodegenerative disorder that is affecting the elderly population worldwide. The staggering costs associated with this disease merits further research in the diagnosis and prognosis of this disease. Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) are widely used modalities to capture the structural changes in the brain caused by AD in its early stages. Early diagnosis of AD is important from clinical perspective to improve the life of an individual who is at the risk of developing memory deficits. Deep learning architectures such as 2D and 3D Convolutional Neural Networks (CNNs) have shown promising performances in extracting features and building useful representations of data for computer vision tasks. This study is geared towards understanding the performance differences between these architectures. We used transfer and non-transfer learning approaches to study the underlying disease phenomenon. In our experiments on binary classification of early stages of AD, we found the performance of 3D architectures to be better in comparison to their 2D counterparts. Further, we found the performance of 3D architecture trained on PET neuroimaging modality data to be the best in terms of performance metrics which shows superior diagnostic power of this type of architecture.

Analysis of Learning Management System Features based on Indonesian Higher Education National Standards using the Feature-Oriented Domain Analysis

Galih Wasis Wicaksono; Ghina Juliani; Evi Wahyuni, EDW; Yus Cholily; Hari Asrini; Budiono Budiono

Various studies on the Learning Management System (LMS) have not examined the suitability of LMS features with the educational standards applicable in a country/region. This study aims to measure the suitability of LMS features with the National Higher Education Standards/ Standar Nasional Pendidikan Tinggi (SN-Dikti) in Indonesia using the Feature-Oriented Domain Analysis (FODA) method. This research identifies explicitly LMS features in the assignment and assessment functions. Besides, this study recommends previous LMS features for future LMS development based on the assessment standards applicable in Indonesia. The results of the analysis in this study found the suitability of the three LMS and recommended LMS features for

Lecturer and Student users.

Foot Plantar Pressure to Detect Obesity

Yulistia Nursida; Bayu Erfianto; Andrian Rakhmatsyah

A physical difference between obese and non-obese people can be seen from a fatter body posture. To categorize a person as an obese one can be done by calculating the Body Mass Index (BMI). This, however, still must be manually done as it needs to check weight and height first and calculate BMI according to the BMI formula. Hence, a system that can be used to automatically detect obesity is deemed necessary. This study aimed to create a system that is able to automatically detect obesity based upon the foot plantar pressure. A significant change in foot pressure between obese and non-obese people can be seen in foot plantar pressure. In obese people, the pressure will be further increased in the metatarsal foot, heel, and midfoot because the heel is a part of the foot as the main support of the bod. In the midfoot, the levels of leg curvature between obese and non-obese people are different. The system was built using fuzzy logic algorithm to make possible to provide an automatic output whether the person is categorized as thin, normal, or obese one.

Learning Content Recommendations on Personalized Learning Environment Using Collaborative Filtering Method

Adhyfa Fahmy Hidayat; Dawam Dwi Jatmiko Suwawi; Kusuma Ayu Laksitowening

Personal Learning Environment (PLE) is an e-learning concept that allows users to manage their learning environment both in terms of content and process. However, significant problems with PLE implementation in distance learning are excessive information and difficulties in finding the suitable learning content for learners. To overcome these problems, an experimental study was conducted to explore a learning content recommendation system for learners. The learning content recommendation system uses the Collaborative Filtering (CF) algorithm for the basis. CF is a method for filtering information by collecting ratings and combining it with similar information needs or interests of other users. This study intends to build the concept of PLE distance learning by applying the CF recommendation system to find learning content that is appropriate to the needs of learners. The test results reveal that the proposed PLE application is compliant with the PLE attributes. This study has also succeeded in applying a recommendation system using the CF algorithm with the concept of PLE in distance learning. Moreover, the Mean Absolute Error (MAE) calculation reveals that the best-obtained recommendation results reached by K=10. Based on the experimental data obtained, the greater the value of K used in the CF algorithm, the greater the average error.

Recognizing Personality from Social Media Linguistic Cues: A Case Study of Brand Ambassador Personality

Andry Alamsyah; Rafa Bastikarana; Alya Rysda Ramadhanti; Sri Widiyanesti

The burgeoning need of a brand ambassador (BA) as a company representative begin to rise in recent year. The phenomena followed by the increase of method to select the most suitable BA. The universal way of selecting one appropriate ambassador is by understanding their personality, therefore, measurement of a BA personality considered as one way to characterize a company credibility. This research proposes to design a method of measuring the BA personality from their social media data in Bahasa Indonesia. We enrich the methodology to measure human personality using the ontology modeling approach. The ontology model constructed under the ngram language model which provides a rapid and effective way of measuring a BA personality. The results of a BA personality measurement allow the utilization to portray of how an ambassador represent their brand and interact with their customer.

Chord Recognition using FFT Based Segment Averaging and Subsampling Feature Extraction

Linggo Sumarno

This paper proposes a feature extraction method for a chord recognition system, which gives a fewer number of feature extraction coefficients than the previous ones. The method of the proposed feature extraction is FFT (Fast Fourier Transform) based segment averaging and subsampling. The chords used in developing the proposed feature extraction were guitar chords. In a more detail, the method of the proposed feature extraction is basically as follows. Firstly, the input signal is transformed using FFT. Secondly, the half left portion of the transformed signal is then processed in succession using SHPS (Simplified Harmonic Product Spectrum), logarithmic scaling, segment averaging, and subsampling. The output of subsampling is the result of the proposed feature extraction. Based on the test results, the proposed feature extraction method was quite efficient for use in a chord recognition system. For the recognition rate category above 98%, the chord recognition system only required a number of 7 feature extraction coefficients. In addition, for the recognition rate category above 90%, the chord recognition system only required a number of 6 feature extraction coefficients.

Melanoma Classification Using Combination of Color and Shape Feature

Dimas Agusta Wiranata; Ema Rachmawati; D Utama

According to the WHO, about 132 thousand cases of melanoma occurred each year. British Association of Dermatologists also launched, 77% of people do not recognize the symptoms of malignant skin cancer. Melanoma has a deadly effect and including one type of silent killer, but this can be early detected to be cured entirely. To recognize melanoma early, we proposed melanoma classification using Histogram of Oriented Gradients and Color Histogram. Histogram of Oriented Gradients is used to extract the shape features, while Color Histogram is used to extract the color features in HSV color space. Using Random Forest as the classifier, we obtained F1-Score 93.3%, with the pixels per cell is 10x10 and cells per block is 1x1 for HOG and five bins for Color Histogram.

Fulfillment and Responsiveness on Online Travel Agencies Using Multiclass Classification

Nadya Putri; Andry Alamsyah; Sri Widiyanesti

In recent years, Online Travel Agencies (OTA) is widely used by people due to its simplicity and efficiency. Tight competition between industries makes companies must pay attention to the quality of their services since it is capable to enhance customer satisfaction. To evaluate its service, the company needs to comprehend their position as OTA providers. Users' opinion in social media is essential for recognizing the company performances. In this case, sentiment analysis and multiclass classification methods help the company to understand their service quality. As a case study, we use the most popular Online Travel Agencies (OTA) providers in Indonesia: Traveloka, Tiket.com, and Pegipegi. Based on our criterion, we examine fulfillment and responsiveness dimensions of these three OTA providers. We apply Naïve Bayes Classifier (NB) model to classify users' opinions. This model has accuracy around 75-85% for the three OTA providers. The result reveals that Pegipegi obtains better service quality with 57% positive and 43% negative sentiment than Traveloka and Tiket.com with 56% positive and 44% negative. The overall result shows general topics of fulfillment and responsiveness dimensions are related to the ticket availability and customer service performances.

Determining Annual Employee Salary Increases Of The Year And Reward Best Employee And Using The Fuzzy-TOPSIS Method

Fikri Kafabih; Utomo Budiyanto

Human resources (HR) is one of the survival factors of a company, one of the aspects determining the success of a company's work is the management of HR. To improve HR performance by the needs or desires of the criteria set by the company, the company provides bonuses such as salary increases or rewards, but the company has difficulty making selections of the employee's value because of the diversity that there is still a subjective element in granting an increase in value. Besides that, the company has difficulty in determining the best employees by the wishes of the company due to the similarity in the value of employees who have the highest final value. Therefore we need a decision support system to determine the weight of the most important criteria desired by the company. This study discusses the decision support system regarding employee performance appraisal for annual salary increases and the best employees using the Fuzzy-TOPSIS method for processing data and ranking employee value data. The results of this study Employees 21 number has received the highest value of 0.656. and the UTAUT model or system test produces a T-Statistics value on Effort Expectancy (EE) of 1,316 (p-values 0.189).

Leveraging Textural Features for Mammogram Classification

Sri Frenzilino Mahayyu Akbarisena; Ema Rachmawati; D Utama

Cancer is the body's tissue cells that continue to grow beyond normal and out of control so that cancer cells push normal cells and cause death in normal cells. One type of cancer is cancer that attacks breast tissue or is called breast cancer. The sooner breast cancer is detected, it will increase the chance the patient will survive. One of the techniques in the early detection of breast cancer is mammography screening. To minimize human error in checking the results of mammography, a CAD system is needed in checking the results of mammography. Therefore, in this research, a system that can classify breast tissue from mammogram into three classes, namely normal, benign, and malignant has been built. The performance of the system reaches F1-Score 74.02%, Recall 76.15% and Precision 74.02%. The system achieves this performance by combining the Uniform Local Binary Pattern and GLCM features and the Random Forest classification method.

MSOF-DT Strategy and Its Impact on Real-Time Systems Scheduling

Fazmah Arif Yulianto; Kuspriyanto Kuspriyanto; Richard Mengko

When managing Real-Time System execution, dynamic deadlines are problems that are not easy to handle. If a real-time computation is built using the traditional approach (Run-to-Completion), then there is no tolerance for the time of completion of the execution. Using the MSOF-DT computation strategy, the RT task can be more tolerant of the reduced processing time (deadline changes). Besides that, in this paper, we also propose a real-time process scheduling algorithm based on the MSOF-DT strategy, called EDSEF/MSOF-DT. The schedulability of the schedule produced by EDSEF/MSOF-DT can be better than the schedule generated by the EDF algorithm and also higher than using (Min_D + Min_C) policy alone without MSOF-DT, both in cases without interruptions or cases that contain interruptions.

Measuring the effectiveness of social media owned by local government leaders in communicating smart city programs Case study on the Mayor's Bandung Instagram

Grisna Anggadwita; Brady Rikumahu; Ratih Hendayani; Rayhan Raka Putra

Smart city is one of the innovation programs that is now being intensively developed in Indonesia as a step in the modernization and adoption of technology to a broader sector. Leadership in a city is an important factor in the success of a program. The purpose of this study is to measure the effectiveness of Instagram social media owned by Oded Muhammad Danial as mayor of Bandung in communicating government programs that focus on Bandung Smart City. This research method uses descriptive qualitative method with content analysis approach using Oded Muhammad Danial's personal Instagram account data during the period 18 September 2018 to 31 October 2019. The results of this study successfully revealed that each priority area of Bandung Smart City does not have balanced communication intensity. The implications of this study will be discussed further.

Designing NB-IoT (Internet of Things) Network for Public IoT in Batam Island

Shelasih Winalisa; Muhammad Imam Nashiruddin

One of the most widely use of IoT network connectivity technologies is Narrow Band Internet of Things (NB-IoT). This technology has advantages, such as faster and simpler deployment using the existing cellular network, wide coverage area, low cost, ten years battery life, and supported by 3GPP global standard. However, it is scarce for scholars to explore the NB-IoT network for multiple use cases as public IoT. This research explored NB-IoT network planning and simulation for public IoT services in Batam Island, as the representative of the urban area and special economic zone in Indonesia. The NB-IoT network planning methods used network capacity and coverage planning analysis, meanwhile, the network deployment simulations were carried out using the Forsk Atol 3.2.2 software. It is found that to serve a public IoT network in Batam Island, 11 NB-IoT gateways are needed. The coverage prediction simulation results in the average of best signal level received is -54.4 dBm, and the Radio Signal Strength Indicator (RSSI) value at the receiver is -65.67 dBm. While the Signal to Noise Ratio (SNR) simulation generated the average SNR level of 11.19 dB. It indicates that the design of the network meets the requirements.

Designing LoRaWAN Internet of Things Network for Smart Manufacture in Batam Island

Muhammad Imam Nashiruddin; Shelasih Winalisa

Today, the implementation of industry 4.0 is increasing in various parts of the world, and it is generating the use of Internet of Things (IoT) technology in manufacturing, also known as smart manufacturing. However, one of the main challenges faced is choosing the most appropriate network connectivity technology. One of the most widely used is LoRaWAN because it has several advantages with its long-distance advantage, low cost, interference resistance, and longer battery life, which could make it have a vast potential for smart manufacture implementation. This study elaborated on the radio network planning and simulation of LoRaWAN deployment using Software of Forsk Atol 3.3.2 for Smart Manufacture, which connecting the noise, temperature, carbon emission, and asset tracking device. Batam Island was chosen as the object of research because it is an exclusive economic zone with the largest integrated industrial estate in Indonesia. To deploy smart manufacture services in Batam Island that can connect 123,743 devices needs a minimum of 9 LoRaWAN gateways with a Spreading factor value of 7. From the simulation, the network designed was successful in covering all of the industrial estate areas for smart manufacture in Batam Island, with the average of the Receive Signal Strength Indicator Value (RSSI) > -123 dBm and SINR value of - 30 dB with an average throughput distribution of 18.82 kbps. Since Batam Island has a hilly contour area, additional

two gateways are needed to cover the entire island for future development.

Accuracy Improvement on Learning Vector Quantization (LVQ) Using Exponential Smoothing for Driving Activity Classification

Pitaloka Fortuna Dewi Setyorini; Haniah Mahmudah; Okkie Puspitorini; Nur Siswandari; Ari Wijayanti

Identification of driving activities is important in order to find out abnormal driving conditions such as accidents. In this work, the process of identifying driving activities is carried out using the LVQ (Learning Vector Quantization) algorithm. This algorithm creates a prototype that is easily interpreted for experts in each application domain. The dataset used for each driving activity is obtained from the accelerometer sensor and the android smart gyroscope. To improve the accuracy of classification results, the exponential smoothing method is used in the sensor dataset. The best accuracy is obtained from the classification of the gyroscope sensor dataset after smoothing with an accuracy of 90.429%.

Indonesian Graphemic Syllabification Using n-gram Tagger with State-Elimination

Rezza Nafi Ismail; Suyanto Suyanto

Syllabification can be approached using either grapheme or phoneme-based. Graphemic syllabification is simpler than phonemic syllabification since it does not require grapheme-to-phoneme conversion (G2P). Both phonemic and graphemic syllabification has been done on Indonesian words with average SER of 0.64% and 2.27%, respectively. The performance of Indonesian graphemic syllabification is considerably lower than the phonemic one. This research aims to improve Indonesian graphemic syllabification using a syllable boundary tagger based on the statistical n-gram model. Using fivefold cross-validation on 50k formal Indonesian words, the proposed model gives an average syllable error rate (SER) of 0.94% while the introduced state-elimination procedure reduces the SER to 0.92%, which is much lower than the previous Indonesian graphemic syllabification. Most syllabification errors come from derivative words and adapted foreign terms.

Improving the Capacity of Data Hiding by Modifying the Interpolation of Audio Samples

Ryan Setiawan; Tohari Ahmad

In the information technology, security has played a crucial role to protect data. One of methods can be used is by hiding the data in a cover file, such as audio. However, the use of this carrier has several limitations, namely the capacity of the secret message and the quality of the stego data, which should not be easily recognized at the time of delivery. Therefore, in this research, we focus on overcoming these problems by exploring the modified high-order Lagrange interpolation to the audio samples equation. It is to produce a new signal as a space to embed relatively big confidential data. Furthermore, the Reduced Difference Expansion and smoothing algorithms are considered to maintain the quality of the stego audio. The evaluation is carried out on 10 different sizes of payloads and 15 audio cover data. The results show that the use of the interpolation method is able to increase the capacity.

A Distributed Fuzzy Logic with Consensus for Exhaust Fan Controller

Misbakhul Munir; Bayu Erfianto

Recently, the deployment of several exhaust fans for indoor cannot perform smoke suction ditributedly with the different exhaust fan speed according to the spread of smoke concentrations. It is because of the commercial exhaust fans sold in the market only have a constant fan rotational speed (usually full speed). Therefore, in this paper, a distributed fuzzy logic exhaust fan controller system with consensus averaging is designed to control different fan speed based on the distribution of smoke concentration in a closed room. Smoke is detected by smoke sensor in the form of carbon monoxide (CO) gas from burning wood charcoal. Based on the experiment, after the fuzzy logic process, each controller can communicate and exchange fuzzy logic output with its adjacent controllers to execute average consensus algorithm to regulate fan speed with respect to smoke concentration.

Fintech Growth Impact on Government Banking Business Model: Case Study of Bank XYZ

Rizki Perdana Rangkuti; Muhammad Amrullah; Hafidz Januar; Aditya Rahman; Cristin Kaunang; Muhammad Rifki Shihab; Benny Ranti

The presence of fintech companies currently has a considerable impact on the movement of conventional banks, Bank XYZ is no exception. With advances in technology and disruption of fintech services, customers take the advantages of financial transactions, such as financing, payments and investments through fintech services. This will increasingly erode the number of banking customers. Therefore, Bank XYZ needs to make a change in order to maintain its market share. In this research, an analysis of Bank XYZ's response in dealing with these threats in terms of transformation and technological innovation and changes in business models. The results of this research show that Bank XYZ made several changes in its implementation and strategy, namely innovation and utilization of the latest technological trends such as Big Data to improve services to customers, work on the unbanked people market segment, reduce the level of fraud, and develop online investment products. The changes made by Bank XYZ focus on product integration and providing digital banking services that meet current market needs, with the aim of being able to survive in the face of competition.

Analysis of Web Content Quality Information on the Koseeker Website Using the Web Content Audit Method and ParseHub Tools

Deandra Abiantoro; Dana Sulistyo Kusumo

Content Quality is one of the most important dimensions in Website Quality. There are seven indicators to check the quality of the content. These indicators which would determine the part of the content that is of low quality. To facilitate quality checking, we can use content audit. However, there are currently not many standards for content auditing. So in this study, the author used website auditing framework and combine it with content quality indicators. With these methods the author can assess content in accordance with the indicators of content quality. To conduct an audit, we needed full information about the website. We used web scraping using Parsehub to get all these data. In this research, the case taken for quality checking is Koseeker. After conducting content audit in Koseeker, the results showed that Koseeker has suboptimal quality in three indicators, namely, Timely, Relevant, and Authority. After checking, it can be seen that the content audit design can assess the quality of Koseeker website content.

Telkom University • MMU Multimedia University • Universitas Gadjah Mada

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

iCoICT

IEEE INDONESIA SECTION

Analysis of the Generator and Consistency of General Web Page Layout Structure Using Matching Algorithm Based on Set Difference

Agniya Noor Ilhamiati; Dana Sulistyo Kusumo; Indra Lukmana Sardi

According to the website quality of the Organization dimension and website usability, the consistency of the layout of the web page is how the general layout elements format is common to all pages. Consistency can make it easier for users in terms of navigation. In this study, researchers used a case study on the East Kalimantan High Prosecutors' website (http://kejati-kaltim.go.id/). The inequality location of the layout makes inconsistency. In this research, web page layout structure data was collected using a Chrome Extension called HTML Tree Generator by adding additional functions according to semantic elements, so that automatically downloads HTML elements in the Document Object Model (DOM). Then, the general layout structure generator only took the semantic elements from the most common layout as its input. Matching Algorithm used to solve the problem of inconsistency in general layout structure, by looking for differences of structure using set difference. Combination functions are used to determine the comparison of each page. Set difference produce "false" if there are one or more differences. Research on the consistency of web page layout structure from case studies yields a consistency score of 92.1%. This score indicates an inconsistency in the web page layout. However, after fixed inconsistent pages, the recalculation score can produce a consistent web page layout.

Design and Implementation of NIDS Notification System Using WhatsApp and Telegram

Arif Rahman Hakim; Julio Rinaldi; Muhammad Yusuf Setiadji

Network Intrusion Detection System (NIDS) can help administrators of a server in detecting attacks by analyzing packet data traffic on the network in real time. If an attack occurs, NIDS provides an alert to the administrator so that the attack can be known and responded immediately. On the other hand, administrators cannot monitor the alerts all the time. Therefore, we need a system that automatically send notifications to administrators in real time by utilizing social media platforms. This paper provides an analysis of the notification system built using Snort as NIDS with WhatsApp and Telegram as a notification platform. There are three types of attacks that are simulated and must be detected by Snort, which are Ping of Death attacks, SYN flood attacks, and SSH brute force attacks. The results obtained indicate that the system successfully provided a notification in the form of attack time, IP source of attack, source of attack port and type of attack in real time.

Parallelizing Polarization Plate Design for Automating Quantum Key Distribution Device based on EDU-QCRY1

Rizka Khairunnisa; Dion Ogi; Anang Permana; Dian Sasetya; Agil MA; Izdihar Fakhriyah; Aulia Azizah; Jabang Saputro; Bintang Wahyudono; Yoga Pratama

Quantum cryptography learning is now more important as the threats toward secure communication system using quantum computing are increasing. EDU-QCRY is one of the quantum cryptography demonstration devices which implements BB84 protocol. EDU-QCRY is still run manually that make it has limited data processing capacity, large operating time, and low-level accuracy. Automation is done by parallelizing the process of selecting bases and states on the polarization rotator and integrating an Arduino-based controller module using demultiplexing techniques. EDU-QCRY1 automation changes the process to be more efficient and effective because the system works automatically by a controller module based on qubit data that is inputted by the sender and the receiver gets qubit data automatically. EDU-QCRY1 automation is expected to make a demonstration of secure communication using Quantum cryptography more reliable for implementation.

Object Tracking with Raspberry Pi using Histogram of Oriented Gradients (HOG) and Support Vector Machine (SVM)

Lukman Rosyidi; Adrianto Prasetyo

Current technological advances have made possible for object tracking activity to become more intelligent. In order to track objects, the camera must be equipped with a computing device that can process video images. A Raspberry Pi mini computer is chosen because of its smaller size, making it suitable to embed into devices such as camera surveillance. It is used to process the image recorded by the camera so that the camera angle can follow the movement of objects. The image processing is performed using the Histogram Oriented Gradients and Support Vector Machine method which is implemented in the Raspberry Pi. Based on test results, the best accuracy is achieved using the threshold at 175 with the best distance of 6 meters.

E-Initiative for Food Security: Design of Mobile Crowdfunding Platform to Reduce Food Insecurity in Indonesia Using The Wheel Methods

Auzi Asfarian; Renardi Purnama Putra; Arga Putra Panatagama; Yani Nurhadryani; Dean Apriana Ramadhan

Indonesia is a country with the fourth-largest economy power in the world. However, Indonesia is threatened by a severe problem, namely food insecurity. The aim of this research is to produce a mobile design of the e-initiative mobile application as a crowdfunding platform that can help overcome food insecurity and realize food security in Indonesia. The mobile apps designed using The Wheel method which focuses on the user experience of the application. This method is in the form of a cycle phase that starts from the analysis phase of user needs with the interview, questionnaire distribution, and competitive analysis. The design phase is by persona, sketch, storyboard, and wireframes. Then the results of the design phase are implemented in the form of a medium-fidelity prototype. At the evaluation stage of prototype medium-fidelity, usability testing is using the think-aloud method, and the results of the performance task with a success rate of 85.32% are obtained.

QSAR Study of Fusidic Acid Derivative as Anti- Malaria Agents by using Artificial Neural Network- Genetic Algorithm

Hamzah Azmi; Kemas Lhaksmana; Isman Kurniawan

Malaria is a disease that caused many adverse effects on humans. Various attempts have been done to find new anti-malaria agent due to the resistance problem of the existing drug. Fusidic acid is known as one of a compound that is promising to be used as an anti-malaria agent. However, this compound should be derived to obtain a new fusidic acid derivative that has better activity. The exploration of the compound in conventional style has a shortcoming in the term of time and cost. Therefore, an alternative method is required to accelerate the design. In this study, we applied quantitative structure-activity relationship (QSAR) to produce a predictive model. The produced model can be used to predict the activity of the compound as an anti-malaria agent. The development of the model was performed by using genetic algorithm (GA) for feature selection and artificial neural network (ANN) for model development. We developed five models by utilizing a different number of descriptor in each model. The validation process was performed by evaluating several validation parameters, such as accuracy. According to the results, we found that the model 3, which is comprised of seven descriptors, produce a better result with the accuracies of internal and external data set are 0.96 and 0.92, respectively.

Telkom University MMU Universitas Gadjah Mada

The 8th International Conference on Information and Communication Technology
Virtual Conference. 24-26 June, 2020
https://www.icoict.org/

iCoICT

IEEE

Thymun: Smart Mobile Health Platform for The Autoimmune Community to Improve the Health and Well-being of Autoimmune Sufferers in Indonesia

Yasmin Salamah; Rahma Dany Asyifa; Tsonya Yumna Afifah; Fajar Maulana; Auzi Asfarian

Autoimmune disease occurs when the autoimmune response or an immune system response attacks the body's tissues causing altered organ growth and function. Some autoimmune diseases are life-threatening, require a lifetime of treatment, and the cure to the autoimmune itself have not yet to be discovered. This condition interferes with daily activities and causes drawbacks in productivity, mental health, and their healing progress. In this paper, we introduce Thymun, smart health community platform to improve the wellness of autoimmune sufferers. This platform combines the data gathered from activity tracking, a mobile application for symptom tracking, and social media. A diet education and medicine reminder, mood tracking, and note writing are added to help the sufferer to manage their cognitive impairment. Through user and expert validation we can conclude that Thymun is needed by health specialists and patients itself because the existent of chronic illness management application is still very scarce this leads to a more significant amount of need of Thymun.

A Comprehensive Survey of Cellular Network Performance from User's Perspective: A Case Study in 0-km Spot of Yogyakarta

Widyasmoro Widyasmoro; Indar Surahmat

Smart city issues have been a trending topic since the last three decades. Some aspects support the development of smart city included information and communication infrastructures where cellular networks play important roles. Maintaining or improving performance of cellular networks is one of the importance keys to keep their existence. Therefore, it cannot be avoided that cellular-networks operators (CNO) must measure their network performance. In the case of user perspectives, CNOs usually measure the performance by doing field measurements in standard procedures. The procedures mostly in quantitative manners. It is rare, the performance is measured in qualitative manners. Therefore, this paper provides additional qualitative methods for having a more comprehensive measurement of quality of service (QoS) as well as the quality of experience (QoE) of the cellular networks. This paper starts with a simulation of coverage with a ray tracing software in specific parameters to be used for field measurement. For the qualitative methods, a survey through questionnaire has been done to know what user opinions are about obtained services. The study chose the 0-km-spot of Yogyakarta which is known as one of the favorite tourism objects. The result shows, even though the signal strength is maintained stable better than -80 dBm, SNR is fluctuating. While the survey shows that some potential network parameters still need to be upgraded to increase the user satisfaction level suggested by 25% of the respondents.

Academic Expert Finding in Indonesia using Word Embedding and Document Embedding: A Case Study of Fasilkom UI

Theresia V. Rampisela; Evi Yulianti

Expertise retrieval covers the problems of expert and expertise finding. In academia, expert finding can be beneficial in finding a research partner or a potential thesis supervisor. This research finds the experts in the Faculty of Computer Science in Universitas Indonesia (Fasilkom UI) using the thesis abstract and metadata of Fasilkom UI students. The methods that are used to represent the query and expertise of the lecturers are the combination of word2vec and doc2vec, which are word embedding and document embedding, respectively. Both embeddings are able to model semantic information, which is necessary for solving the problem of vocabulary mismatch in search problems. Our result shows that representing the expertise query with word2vec leads to better performance than using doc2vec. In addition, we also found that generally, the

performance of the embedding models is comparable to the standard retrieval model BM25 in retrieving experts using expertise queries in both Indonesian and English languages.

Classifying the Polarity of Online Media on the Indonesian Presidential Election 2019 Using Artificial Neural Network

Muhammad Afif Farisi; Kemas Lhaksmana

The 2019 presidential election is one of the mandatory national agendas that is covered by all of the mainstream news media in Indonesia. The function of news media as an information provider reaps criticism because they are suspected of having polarity towards certain candidates. In this paper, the polarity of news media is analyzed by performing sentiment assessment towards every news regarding each candidate. Since manual sentiment analysis is costly and time-consuming, because of the large amount of data that needs to be processed, we adopt a machine learning method to automate the sentiment analysis process. This research employs Artificial Neural Network (ANN) to classify scraped news texts from online media and TF-IDF weighting method for feature extraction. We found that the observed online media kompas.com, liputan6.com, republika.co.id, and tempo.co do not have significant polarity toward one of the candidates. In addition to ANN, we also compared other methods to investigate the appropriate methods for our dataset. Our experiment shows that on average, ANN obtains the best accuracy at 84.57%, compares to Decision Tree C4.5 (83.34%), Naïve Bayes (80.42%), and SVM (79.04%).

Analyzing TF-IDF and Word Embedding for Implementing Automation in Job Interview Grading

Annalisa Wahyu Romadon; Kemas Lhaksmana; Isman Kurniawan; Donni Richasdy

Selecting the best talents from a large number of job applicants is challenging, especially for big companies that usually receive tens of thousands of applicants for every job opening. One of the most costly and time-consuming applicant selection stages is the interview process, since it usually performs face to face meetings and involves third parties to do the interviews and analyze the result. To this end, Human Capital Directorate at Telkom Indonesia adopts AI technology to automate some stages of job applicant selection to reduce manual process and third-party involvement. In this paper, we investigate appropriate feature extraction methods to automate job interview grading for reducing bias and human errors. TF-IDF, one of the most popular feature extractions, is compared with word embedding to find the optimal method and parameters in classifying interview verbatims with ANN classifier. Based on the test results, the average accuracy for TF-IDF outperforms word embedding by 85.22% against 74.88%, respectively. Therefore, for the case of job interview grading using our dataset, TF-IDF performs better to reduce the number of dimensions.

The Analysis of User Intention Detection Related to Conventional Poster Advertisement by Using The Features of Face and Eye(s)

Yolanda Modesty; Dodi Wisaksono Sudiharto; Catur Wirawan Wijiutomo

There are official media to display conventional advertisements such as posters and billboards. However, those media cannot tell the owner related to the effectiveness of the advertisements directly. It can be recognized after the product items have been sold. Based on that problem, there is a requirement related to the media demonstrate an ability to instantly detect user intention. That function explained, generally, is held by a smart advertisement display. On that smart display, smart components can instantly detect the user intention, are attached to the monitor. It is utilized to show several promotional items dynamically. Unfortunately, for some companies, the monitor is still expensive to be performed. This condition makes a potential

desire to modify the existing smart advertisement system by gently moving the smart components (as an embedded system and a sensor) to other conventional displayed media such as posters. There is an underline state that has to be proven then that the smart modules attached on has to act similarly, likes when they are attached on the monitor. This study observes the ability of the smart components if they are attached to the posters to detect user intention directly. This study uses the previous observation result for elaborating user intention detection by using face and eye(s) features. The result gives a proven fact that smart parts attached to the posters produce the scoring that is relatively the same as the scoring by the smart display system in an arrangement, related to the effectiveness of the advertisement.

Comparison of Earliest Deadline First and Rate Monotonic Scheduling in Polling Server

Zeyhan Aliyah; Muhammad Pambudhi; Abdan Ahnafi; Hilal H. Nuha; Sidik Prabowo

Scheduling is an activity to complete the process on a real-time system. In this project, an analysis aimed to evaluate the scheduling of EDF and RMS algorithms in the case of a polling server. A number of comparisons were made to evaluate which algorithm was better for real-time scheduling as seen from the average of the Turn Around Time (TAT), Waiting Time (WT), and Utilization. From the experiments carried out, EDF produced an average of TAT values at a faster time compared to RMS. In other words, the scheduling of EDF will work faster than RMS. Meanwhile, the utilization value of the two algorithms produced the same results.

Investigating the Influence of Information Quality, Information Seeking, and Familiarity with Purchase Intentions: A Perspective of Instagram Users in Indonesia

Yekti Wirani; Latifa Diniputri; Muh Syaiful Romadhon

Instagram is a combination of commercial features with customer-oriented social computing that is often used by the Indonesian people to purchase products online. Instagram can be used by sellers and marketers to market and sell their products. This research proposed strategies that can support sellers and marketers by analyzing the factors that influence Purchase Intention on Instagram, including (1) Hedonic Motivation, (2) Review, (3) Information Quality, (4) Media Richness, (5) Trust, (6) Familiarity, and (7) Information Seeking. The data obtained in this study were processed with Partial Least Square-Structural Equation Modeling (PLSSEM). The results of this study are Information Quality, Information Seeking, and Familiarity were proven to influence Purchase Intention on Instagram users in Indonesia.

Face Recognition In Low Lighting Conditions Using Fisherface Method And CLAHE Techniques

Fauzan Rahman; Febryanti Sthevanie; Kurniawan Nur Ramadhani

Face recognition is a biometric identification system that uses face images as its input which is usually used in the field of human identity recognition. The output of this system is the face image is recognized or not by the system. However, the accuracy of this system still relies on good image quality, especially in image lighting conditions. Low-light images make faces difficult to recognize or even not recognizable at all, which can result in reduced accuracy. From the above problem, a research was made to create a face recognition system that can deal with faces in low light conditions, by adding image enhancement with contrast adaptive histogram equalization (CLAHE) contrast techniques to create good quality lighting images. Fisherface methods and image enhancements used in this study can improve faces well at the level of lighting / brightness on -80 images with 76.92% accuracy.

SigFox Network Planning for Smart Metering Based on Internet of Things for Dense Urban Scenario

Muhammad Imam Nashiruddin; Alvin Yusri

This study intends to do Sigfox network planning for the Smart Metering system in Jakarta City as dense urban representative. Smart Metering is a system that can operate in real-time and manage used energy usage. The energy that used is recorded by the Smart Meter device and send to the utility office to analyze. Smart Meter is a device that can record energy usage in real-time and send it to the utility office to be analyzed. Users get the analyzed data, including the pricing in real-time. The Smart Meter services used in this study are electricity, water, and gas. Sigfox uses the ISM frequency and using an Ultra-Narrow Band with a total of 192 kHz of bandwidth and a 100 Hz message per bandwidth. Because Sigfox is operating globally, it divides the globe into seven zones and radio configuration (RC). Indonesia and other Asia Pacific countries are in zone 4 categories. The RC is consists of the working frequency, recommended EIRP, etc. Planning on this study is basing on capacity and coverage and resulting in a minimum of 58 gateways to fulfill the network needs. A simulation conducted in two predictions, received signal level prediction and SNR prediction. Simulation generated highest signal level received of -70 dBm, lowest received signal level of -125 dBm, and an average received signal level of -74.79 dBm. The simulation generated highest SNR level of 30 dB, lowest SNR level -6 dB, and an average SNR level of 24.43 dB.

A Simplified Method to Identify the Sarcastic Elements of Bahasa Indonesia in Youtube Comments

WIlbert Wijaya; I Made Murwantara; Aditya R Mitra

Comments on Youtube media provides feedback to the content owner of how their video influence audience. However, some comments have intention to convey readers not to the original goals of the video content. Moreover, the sarcasm statements may also provide misleading that possibly put the conversation into a hatred comments. This paper presents a simplified method to identify sarcasm within comments in a youtube video channel, which enable the channel or video owner to identify and remove or eliminate some comments that may arise hatred between the audience. To identify sarcasm comments, we use Na¨ıve Bayes to find out which statements may have sarcasm elements. Our approach, specifically, designed to detect and explicate the elements of sarcastic words or statements in Bahasa Indonesia. To demonstrate our approach, an Indonesian political Youtube Channel comments for the range of 7 months prior to the 2019 Indonesian Presidential election has been collected and analysed. Our result shows that Na¨ıve Bayes identified 79% of sarcasm within the comments, with accuracy 0,802, precision 1.0 and recall 0,651.

End-to-End Speech Recognition Models for a Low-Resourced Indonesian Language

Suyanto Suyanto; Anditya Arifianto; Anis Sirwan; Angga P. Rizaendra

Recent automatic speech recognition (ASR) is commonly developed using deep learning (DL), instead of the Hidden Markov Model (HMM). Many researchers show that DL is much better than HMM in noisy environments. However, DL needs a huge speech corpus but does not require any dictionary as well as the concept of either phonemes or syllables. Many DL-based tools are developed and claimed as a language-independent ASR, such as Mozilla DeepSpeech (MDS) and Kaituoxu Speech-Transformer (KST). Both MDS and KST are classified as End-to-End ASR (E2EASR), but MDS uses a Recurrent Neural Network (RNN) while KST exploits a Transformer Network. In this paper, two Indonesian ASR (INASR) are developed using both MDS and KST to see their performances to handle a low-resourced language. Evaluation using a small speech corpus of Bahasa Indonesia containing 40 k utterances shows that KST is slightly better than

MDS, where it gives a word error rate (WER) of 22.00% while MDS produces a WER of 23.10%.

Applied Internet of Things (IoT): The Prototype Bus Passenger Monitoring System Using PIR Sensor

Alam Rahmatulloh; Firmansyah Maulana Sugiartana Nursuwars; Galih Febrizki; Irfan Darmawan

Monitoring passenger data in bus transportation fleets using the IoT concept. Factors that influence passenger monitoring are human counting errors and the accuracy of objects detected by sensors. The IoT system uses PIR (passive infrared) sensors and monitoring with mobile apps is a solution to overcome this, because the use of PIR sensors in the IoT system can only detect movements made by humans alone. The developed IoT system also implements a GPS module to be able to find out the location of the bus. Wemos D1 R2 will automatically send data collected from the results of detection by the PIR sensor and coordinates obtained by the GPS module to the Firebase database via the internet network. The monitoring application will display data stored on firebase on a mobile device. So that monitoring of bus passengers can be done quickly. Experiments on the research show that when the object's motion approaches the PIR sensor, it will not consistently detect the presence of passengers.

Smart Controlling System for Green Centralized Air Conditioner based on System Engineering Approach

Muhardi Saputra; Edi Sutoyo; Ahmad Almaarif

System monitoring and remote control is a necessity in order to achieve maximum service for service users. Because of shortcomings in the movement and control of Air Conditioner (AC), which still relies on manual systems, resulting in waste for AC energy released, in addition, there is no system that can monitor and control air conditioners remotely or centrally. Author tries to make the process of monitoring and controlling being centralized through the control room that can be used more easily for officers, specifically related to the AC control unit. In the other hand, energy from the AC can be more monitored. The temperature of the room will be monitored and controlled through a computer in the control room. That will make efficiency of energy used and become Green Air Conditioner, specifically in the use of centralized AC in office buildings. The concept of system that designed based on service-oriented by using the system engineering method as a benchmark in system design. Workflow of the system that created is temperature of the room will be taken by the sensor that installed in each room. Data from the sensor will be processed in the microcontroller and sent to the computer via the internet network, which will be showed in real time by using an internet connection, it will necessary to set the AC temperature from the control room automatically. In addition, web service programs are also used to monitor, control, and schedule centralized AC systems, it will m create more efficiency in the use of AC energy.

Synonyms-Based Augmentation to Improve Fake News Detection using Bidirectional LSTM

Ghinadya Ghinadya; Suyanto Suyanto

Fake news is the news which contains propaganda and not relevant to the actual news. Today, the news in social media are troubling internet user. Hence, a fake news detector is needed to solve the problem. In this research, a fake news detector system based on Recurrent Neural Network (RNN) is developed. The architecture is designed using Bidirectional Long Short-Term Memories (Bi-LSTM) with exploit stance detection for the headline and the body of the news. Evaluation on 50 k news articles from FNC-1 shows that the proposed method produces F1-score of 0.2423 in detecting the fake news.

Music Source Separation Using Generative Adversarial Network and U-Net

Muhammad Ferianda Satya; Suyanto Suyanto

The separation of sound sources in the decomposition of music has become an interesting problem among scientists for the last 50 years. It has the main target of making it difficult for components in the music, such as vocals, bass, drums, and others. The results of sound separation have also been applied on many fields, such as remixing, repanning, and upmixing. In this paper, a new model based on a Generative Adversarial Network (GAN) is proposed to separate the music sources to rebuild the sound sources that exist in the music. The GAN architecture is built using U-net with VGG19 as an encoding block, mirror from VGG19 as an encoder block on the generator, and three times combinations of Convolution, Batch Normalization, and Leaky Rectified Linear Unit (LeakyReLU) blocks. An evaluation using the DSD100 dataset shows that the proposed model gives quite high average source to distortion ratios (SDR): 7.03 dB for bass, 18.72 dB for drums, 20.20 dB for vocal, and 12.73 dB for others.

A Comparative Study of Internet Architecture and Applications of Online Music Streaming Services: The Impact on The Global Music Industry Growth

Ramy A. Rahimi; Kyung-Hye Park

On-demand music streaming has grown remarkably driving the growth in digital to compensate for the decline in downloads. Additionally, Technology and innovation has donated immensely to the Internet architecture and applications of audio streaming services. More recently, the rise in paid music streaming service companies such as Apple Music, MelOn, YouTube Music, Spotify, and SoundCloud was responsible for the increase of the on-demand music streaming services revenue. The rapid birth of these new audio streaming services relied on not only the mobile or online applications but also on the market penetration strategy of companies from different industries motivated to take part of the Music Industry. This comparative study of major music streaming services illustrates the significant impact of on-demand music streaming services on the global growth of the Recorded Music Industry. Additionally, the study underlines Internet technology advancement, connectivity including Wireless, and dynamic and diverse markets as the driving forces behind the rapid growth of on-demand music streaming services. From a practical perspective, this research study provides insights on the current state of the Music Industry and its future direction that can be valuable to new entrants, current market players, investors, stakeholders, and R&D.

Brand Awareness using Network Modeling Method

Muhamad Fulki Firdaus; Z. k. a. Baizal; Kevin Bratawisnu, Made; Hanafi Abdullah Gusman

The using of online social network has made powerful evolution in digital era. Nowadays, social network is a center of information exchange. Online social networks provide information in the form of user opinion about their brand awareness. The user's opinion represents the level of awareness of the user regarding the existence of the brand. The circulation of information on the social network is widely known as User Generated Content (UGC). Organizations can use the UGC data to assess their brand rankings. The proper method is needed to be able to process UGC so that it is able to generate insight for the organization. This study utilizes social network phenomena to measure brand ranking in analyzing human awareness of a brand using Social Network Analysis (SNA). SNA is an analysis method for observing social network (or social media) by graph modelling. We use network properties to measure interaction intensity on Traveloka.com, Tiket.com, and Pegi-Pegi.com. The results show that the brand awareness of Pegi-Pegi is superior compared to the others. Network property valuation can be used as an alternative for ranking the company's position based on UGC in social media, especially Twitter.

Syllable-Based Indonesian Lip Reading Model

Adriana Kurniawan; Suyanto Suyanto

Lip reading is a communication method by reading the lips movement of a speaker. It is also called visual speech recognition, which converts a video into a text. The text is consisting of some words or even sentences spoken by the speakers. One of the challenges often encountered in a lip reading is the high variances of inputs. The variances, like facial features and different speed of speech, can decrease the accuracy. Nowadays, deep learning provides promising results in extracting visual features. In order to be able to use a video as the input, a 3D Deep Learning architecture is exploited. Besides, the out-of-vocabulary (OOV) problem also makes the visual speech recognition system harder to apply in the real world. It can only predict the words appear in the dictionary. However, the vocabulary continues to grow each year, especially in the Indonesian language. It is hard to fit all possible words into the system. Hence, a syllable-based model is proposed in this research to handle such a problem. The syllable-based model gives a chance to build a new word that does not appear in the dictionary. The combination of the existing syllable is used to construct a new word. Since the data obtained too small for deep learning, the augmentation process is performed 40 times. Evaluation using the augmented data, the proposed model reaches a high accuracy of 100% for the testing set. An examination using ten OOV words informs that the developed model gives a lower accuracy of 80%.

IoT Subject Security towards The Sybil Attack using The Trustworthiness Management

Ridwan Hadiansyah; Vera Suryani; Aulia Arif Wardana

Internet of Things (IoT), commonly referred to a physical object connected to network, refers to a paradigm in information technology integrating the advances in terms of sensing, computation and communication to improve the service in daily life. This physical object consists of sensors and actuators that are capable of changing the data to offer the improvement of service quality in daily life. When a data exchange occurs, the exchanged data become sensitive; making them vulnerable to any security attacks, one of which, for example, is Sybil attack. This paper aimed to propose a method of trustworthiness management based upon the authentication and trust value. Once performing the test on three scenarios, the system was found to be capable of detecting the Sybil attack rapidly and accurately. The average of time to detect the Sybil attacks was 9.3287 seconds and the average of time required to detect the intruder object in the system was 18.1029 seconds. The accuracy resulted in each scenario was found 100% indicating that the detection by the system to Sybil attack was 100% accurate.

IoT Object Security towards On-off Attack Using Trustworthiness Management

Anggi Pratama Nasution; Vera Suryani; Aulia Arif Wardana

Internet of Things (IoT) can create the world with the integration of the physical things with the seamlessly network of information purposely to give a sophisticated and smart service for human life. A variety of threats and attacks to IoT object, however, can lead to the misuse of data or information to the IoT objects. One of the attacks is On-off Attack in which the attacker acts not only as an object with a good manner by sending the valid trust value but also sometimes as a bad object by sending invalid one. To respond this action, there is a need for the object security to such attacks. Here the writer used the Trustworthiness Management as a method to cope with this attack. Trustworthiness Management can use the aspect of trust value security as a reference for detecting an attack to the object. In addition, with the support of security system using the authentication provided by MQTT, it is expected that it can provide an additional security. The approach used in this research was the test on On-Off Attack detection directly to the object connected to the network. The results of the test were then displayed on the webpage made using PHP and MySQL database as the storage of the values sent by the object to the

server. The test on the On-off Attack detection was successfully conducted with the success level of 100% and the execution to detection took 0.5518318 seconds. This then showed that Trustworthiness Management can be used as one of the methods to cope with On-off Attack.

Optimizing BTS Placement Using Hybrid Evolutionary Firefly Algorithm

Dzakyta Afuzagani; Suyanto Suyanto

Internet is a short name for Interconnection-Networking, communication network between electronic device around the world. As time goes, internet has become one of the basic needs of today's society. Base Transceiver Station (BTS) is one of the components of the current internet provider. The large number of internet users causes the addition of BTS for each region. The construction of BTS certainly requires a lot of costs if the placement is not optimal and leads to futile placement of BTS. Therefore, BTS must be optimized for placement. In this research, we use Hybrid Evolutionary Firefly Algorithm (HEFA) which consists of several algorithms. The fitness value obtained from this research is 98.62% and optimizes BTS until almost half of the initial base stations.

An Evidence-Based Technical Process for OpenFlow-Based SDN Forensics

Satria Akbar Mugitama; Niken Cahyani; Parman Sukarno

Globally planning packets forwarding based on the operator's objectives by a centralized controller is possible in Software Defined Network (SDN). The chief purpose of the SDN architecture is to manage the network due to centralized control of the network easily. The SDN architecture does not focus on network security since the beginning of its emergence. That matter has created some vulnerabilities due to centralized control of the network. Vulnerability is caused by attacks causing the packet overload on the controller (such as DoS attack). Hence, the controller runs into a race condition. Another vulnerability existed in the controller is the topology poisoning attack utilizing spoofed packet and exploiting LLDP packets in the network. Forensics in a traditional network does not have the capability to deeply analyze the attack because the tools ignore evidence existed in the control and application layer of SDN. This research focuses on technical processes in running forensics on SDN architecture comprehensively and develops modules needed to retrieve log's evidence existed in the controller by applying forensics' principles. The result shows DoS attack and topology poisoning can be investigated by utilizing these technical processes. Evidence in the controller can be utilized to create analyses, attribution, and presentation. The technical processes of this study are expected to help forensic investigators in revealing crime incidents in the OpenFlow-based SDN environment.

Optimizing Data Storage in Handling Dynamic Input Fields with JSON String Compression

Irfan Darmawan; Alam Rahmatulloh; Iqbal Muhammad Fajar Nuralam; Rianto Rianto; Rohmat Gunawan

Dynamic input fields are a solution for managing multiple input values in a web-based application form. Dynamic multiple image upload is an implementation of the dynamic input field. Handling dynamic upload of multiple images by storing the image path will cause the existence of similar string data in one field in the table stored in the database. Creating a unique table in a database to store dynamic data is a workable solution. However, it is potentially a waste of tables and records, so that the database file size becomes larger and data access speeds are longer. To overcome this problem in this study, string data obtained from the dynamic input field are converted into JSON format and compressed with Zlib, before being saved into the database. The experimental results in this study indicate that the integration of JSON and Zlib can be applied to the handling of dynamic input field forms. The average speed of the data storage process by applying this technique is 50.36% faster than the conventional method. In comparison, the database file size decreased by about 37.58% smaller than using conventional techniques.

Implementation Of Data Mining For Drop-Out Prediction Using Random Forest Method

Meylani Utari; Budi Warsito; Retno Kusumaningrum

Accreditation is one of the quality measurements for a University. Some elements of these measurements are students and graduate students. Prevention of students to drop out is a problem that is considered very important for the university itself. High levels of drop out students will have a bad impact on the university, such as bad reputation or low-grade accreditation. This research presenting the results of a case study analysis in educational data, by analyzing the data using the data mining technique. The author using the classification method, that focuses on the drop of a prediction of undergraduate and diploma students at the ABC Faculty at XYZ University. To predict drop-out classification, academic data are needed. The raw data are student's academic data that enroll in university from 2008 to 2012. The raw data preprocessing then carried out to handle imbalanced data. This research uses synthetic minority oversampling technique (SMOTE) to handle imbalance dataset and random forest algorithm to predict drop-out within 2492 data. As a research result, the random forest algorithm accompanied by SMOTE can provide the best accuracy results by 93.43%. The main results of this research can be used to reduce drop-out levels by predicting potential drop out students and identifying potential factors related to drop out students.

Green Production Using ERP: Case Study in The Leather Tanning Industry

Ihwanul Ikhsan; Ari Yanuar Ridwan; Muhardi Saputra

Along with the times, information technology must be a public need that must be approved, including for companies. PT. Elco Indonesia Sejahtera is a company engaged in the trading of leather for the production of garment materials, gloves, and various other leather goods. Production processes that produce complex solid and liquid environments use clam fuel in the process. This will be dangerous for the environment. Green Production is one way to overcome the process of making goods that can support business processes at PT. Elco Indonesia Sejahtera.Therefore in this study will develop a Green ERP application in the production module to realize an environmentally friendly green industry. This research uses SAP Activate method that starts from the interview process, starts with observation, and analyzes business processes, and analyzes and discusses the system by configuring and discussing module production. This study uses a system that supports the business process of PT Elco Indonesia Sejahtera, Odoo.The results of this study are ERP systems that are supported by Odoo and have been adapted to the

company's business processes that have been redesigned andare expected to facilitate the company in carrying out business process activities specifically produced at PT. Elco Indonesia Sejahtera.

On The Feature Extraction For Sentiment Analysis of Movie Reviews Based on SVM

Fitri Eka Cahyanti; A Adiwijaya; Said Al Faraby

Watching a movie is one of the activities that reduce bored, so it is necessary to look for information about the movie, which is packaged in the form of a movie review to determine whether the movie considered for viewing or no. However, in searching for information through movie reviews, there are obstacles because there are many reviews conducted by reviewers. Therefore, sentiment analysis is needed aims to classify the movie review into positive and negative sentiments. Machine learning methods can use as a sentiment analysis classification because that can produce the best performance, the method called Support Vector Machine (SVM). That was a reason SVM classification used in sentiment analysis on movie review data. Use feature extraction of Term Frequency - Inverse Document Frequency (TF-IDF) was also carried out in the research this as a method of weighting words which then combined with the extraction of Latent features Dirichlet Allocation (LDA) as a method of modeling topics that can overcome the shortcomings of SVM. This research produced the best performance on a combination of TF-IDF and LDA, with 240 topics has 29792 features, which is 82.16%.

Analysis of Feature Correlation for Music Genre Classification

Manuel Theodore Leleuly; Putu Harry Gunawan

Music genre classification has been widely discussed by some researcher. There are various methods used to classify many types of music genres, however only a small part of them considered the importance of feature correlation. This feature correlation is to select features to increase the accuracy of classification process. In this paper, we investigate the big role of features correlation where features are obtained from entropy of root mean square and frequency. Moreover we use probabilistic neural network (PNN) as the classifier. In this paper, results showed that accuracy using all feature (without considering feature correlation) is obtained 70%, meanwhile using selected features from correlation score, accuracy is conducted 90%. The selected features from this high accuracy are minimum and average RMS entropy of all RMS entropies in each music frame, and minimum and average frequency entropy of all entropies in each music frame.

Time Series Prediction on College Graduation Using KNN Algorithm

Alfin Salim; Kusuma Ayu Laksitowening; Ibnu Asror

The KNN algorithm is an algorithm for classifying data based on learning data taken from k of its closest neighbors. Classification using the K-Nearest Neighbor (KNN) algorithm can be used to predict whether a student will graduate on time or even be at risk of dropping out. This research implemented KNN algorithm because of its effectiveness in training large and robustness on noisy data. The input used is in the form of student academic data and produces output, namely the accuracy of the KNN algorithm. Data will be divided into time series into four parts, namely 1st-year, 2nd-year, 3rd-year, and 4th-year. The time series prediction aims to find out the exact time to make predictions. Testing was conducted using K-Fold Cross Validation by dividing the set of data into several folds, one-fold as test data and the other fold as training data. The results of this test are the accuracy of the predictions of each year experiencing increase and prediction in time series can be used for early detection.

A Strategy Framework For Incorporating Sustainability Into Enterprise Architecture

Erda Guslinar Perdana; Benhard Sitohang; Husni Sastramihardja; Muhammad Zuhri Catur Candra

Enterprise is expected to have awareness and play an active role in achieving sustainability or sustainable development goals. This encourage enterprises to be more sustainable in every aspect. Technological developments open opportunities for enterprises to coping with sustainability issues. Enterprise requires digital transformation to optimize the role of this technology. Enterprise Architecture is the right tool in implementing digital transformation towards sustainable enterprise. The problem is, sustainability has not been explicitly and systematically addressed within the EA itself. Therefore we need joint and ongoing efforts to incorporate the concept of sustainability into EA's. Various strategies can be used as an option for incorporation. There are at least 2 types of incorporation, which are augmentation (non-organic) and organic. And there are at least 4 areas as objects of incorporation consisting of Foundation, Model / Framework, Method, language levels.

User Interface Design Of Learning Applications For Balinese Traditional Dance using Goal-Directed Design

Ni Nyoman Sri Ayu Asvini Dyatmika; Danang Junaedi; Veronikha Effendy

One of Indonesia's cultural diversity that needs to be preserved is a traditional dance. Regeneration needs to be done on Indonesian teenagers to strengthen Indonesian cultural identity and continue to preserve Indonesian culture. By contributing to learning traditional dance with dance teachers are one of the efforts to preserve culture. Some dance students choose to learn by self-education due to lack of time flexibility. However, the disadvantage of self-taught learning is that no one can correct the mistakes made during the exercise movement. So, we need a media that can help dance students when doing traditional self-taught dance exercises. Microsoft Kinect is a sensor that can detect motion. This device is used to detect dance movements and correct dance movements. It is known that the user has a purpose when doing the learning to be achieved, therefore in this research, the Goal-Directed Design method is used. Then the research testing is done by using SUS because SUS covers aspects of system usability that are appropriate in this study. The results of this study are a User-Interface model in the application of traditional Balinese dance learning. The test results that have been carried out using SUS are in Grade B.

Predicting Users' Revisitation Behaviour Based on Web Access Contextual Clusters

Hapnes Toba; Christopher Starry Jomei; Lotanto Setiawan; Oscar Karnalim; Hui Li

Most modern browsers record all previously visited web pages for future revisitation. However, not all users utilise such feature. One of the reasons is that the records are displayed at once as a single list, which may overwhelm the users. This paper proposes a predictive model to decide whether a web page will be re-visited in the future based on a particular visit. The model can be used to filter web records so that only web pages that may be re-visited are presented. According to our evaluation, the model is considerably effective. It can generate 53.195% accuracy when measured with 10-fold cross validation and 95% meaningful topic identification. Further, attributes rooted from the same website' access frequency are the most salient ones for prediction. In addition, contextual similarities based on k-means clustering and contextual similarity (which are used for defining some attributes) are considerably effective.

Biometric Identification Based on EEG Signal with Photo Stimuli Using Hjorth Descriptor

Inung Wijayanto; Sugondo Hadiyoso; Fauzia Sekarningrum

Biometric techniques are methods for recognizing a person based on physiological or behavioral characteristics. The advantage of biometric techniques is difficult to modify. In the last few years bio signal-based biometrics have been developed, one of which is biometric electroencephalogram (EEG). In this research, a biometric identification framework based on EEG signals with photo stimuli was proposed. Data was collected for 5 participants with 5 times recording using Muse Headband EEG Monitor. In this study, the EEG characterization of each individual was calculated using the Hjorth Descriptor method. Validation of the proposed system using K fold and backpropagation. A total of 25 validated data, consisting of 10 test data and 15 training data. The system that has been proposed achieves 100% accuracy.

How Can Fingerprint Improves The Payment Experience of a Drink Vending Machine?

Satria Hutomo; Parman Sukarno; Rahmat Yasirandi

Many examples of technology on the payment scheme already help and facilitate transactions in Indonesia such as internet banking, ATM or debit cards, e-money, and also mobile banking. Included on drink vending machine, it is a sale that utilizes machines. Today's commonly, drink vending machines still use coins or smart cards, which based on the Legal and Ethical Experience this factor is still have many weaknesses and threats, that can occur in this payment system. So the payment authentication factor is needed to pay more attention to user experience components, some of which are ownership, privacy, and security.So that in this study, the implementation of the fingerprint authentication scheme was made as an epayment factor based on user experience. This study uses a mixed-method in analyzing every pain problem of the research. Where to conduct exploratory studies through literature review and direct observation in the case of the application of the vending machines, especially in developing countries such as Indonesia. This research shows that the payment authentication system can solve the problem of the risk of system attack, the risk of topping up fails, it can harm the user (R1), if the user loses a smart card, the smart card is at risk of being used by not the owner (R2), if the data on the smart card is cloned, it can poses a risk to the system (R3). The conclusion of the proposed payment system can overcomes the existing problems obtained from the system security testing scenario. In addition, user agreement testing (R4 and R5) are also done by providing a questionnaire comparing the level of satisfaction of the existing and proposed payment systems, the results of this test shows that the user feels comfortable with the proposed payment system.

Tracking, Arrival Time Estimator, and Passenger Information System on Bus Rapid Transit (BRT)

Hafiizh Nur M. A; Sugondo Hadiyoso; Fefa Belladina; Dadan Nur Ramadan; Inung Wijayanto

Bus Rapid Transit is one of public transportation in the city of Bandung. Safety, comfort and low cost are their advantages. This is also a supporting factor for management to maintain service quality. However, information systems related to buses are still lacking and far from expectations. That includes the timeliness of bus departures and arrivals at bus stops that cannot be ascertained. Therefore, in this work as an integrated online system was implemented that can provide information, including bus arrival time, bus position and number of passengers on the bus. This information system is a website application that is connected to the Firebase real time database so that all data can be accessed in real-time and then displayed at the bus stop. The hardware system consists of an infrared detector to count the number of passengers and a GPS module for bus tracking. From the bus position information, the system can estimate the arrival time at the nearest bus stop.

Knowing Opposing Arguments in Persuasive Essays Using Random Forest Classifier

Daulat Rachmanto; Ibnu Asror; Anisa Herdiani

Argumentation mining is a relatively new field of research in the perspective of computational linguistics. It can be used to improve the quality of arguments in persuasive essays by detecting whether in a persuasive essay there are opposing arguments or not. This is because the importance of opposing arguments in persuasive essays that can improve the quality of arguments, precision and author's claims. This research adapted the research conducted by Stab and Gurevych who used the SVM classification method with an accuracy 75,6% and macro F1-score 0,734. While in this research used the Random Forest method and get accuracy of 85,125% and macro F1-score of 0,841 by using three features, namely unigram, production rules, and adversative transitions.

The Concave n-Square Salient Wood Image-based Quality Assessment

Risnandar Risnandar; Esa Prakasa; Iwan Erwin

We make an offer of a state-of-the-art method of the deep salient wood image-based quality assessment (DS-WIQA) for no-reference image appraisal. We explore a five-layer deep convolutional neural network (DCNN) for the salient wood image map. The DS-WIQA uses the concave n-square method. The outcomes allow that DS-WIQA model has a greater achievement on Zenodo and Lignoindo datasets, respectively. We appraise a salient wood image map by extracting in small wood image patches. The DS-WIQA has an admirable performance of other recent methods on Zenodo and Lignoindo datasets, respectively. DS-WIQA outdoes other recent techniques by 14.29% and 19.96% more advanced than other techniques with respect to SROCC and LCC measurement, respectively. DS-WIQA shows up to be more significant than the other DCNN methods.

Language Modeling for Journalistic Robot based on Generative Pretrained Transformer 2

Raihan Hamid Suraperwata; Suyanto Suyanto

The language model is typically represented as an unsupervised distribution estimate from a set of examples, each consisting of symbol sequences, and it could predict over sequences of words. We demonstrate the language model based on Generative Pretrained 2 will have a readable generated article for the journalistic robot. Nowadays, there is some trending of journalistic in Indonesia, freedom of the press, and it enables every journalist to make unprofessional news on the media. The problem affects the raise of journalist numbers who have lack journalistic knowledge and increases the amount of inappropriate news content in Indonesia. Therefore, to improve the quality of news produced by the mass media in Indonesia, a journalistic robot is needed to produce news content by the guidelines and the journalistic code of ethics. This research uses language modeling based on GPT-2 to generate articles. The program has four primary steps; building dataset, finetuning GPT-2, modeling the trained data, and create articles. Furthermore, this research will add Bahasa Indonesia's model for GPT-2 since the main purpose of this research is Indonesia's articles. This paper proposes GPT-2 to be applied to news contents and calculate the result with BLEU scores to check if the results are readable content. These findings show that the proposed model is capable of generating a readable article after trained by 110 Indonesian articles with an excellent score of BLEU.

The Influence of Website-Based and Company-Based Quality toward Loyalty with Perceived Website Trust as Antecedents

Indrawati Indrawati; Arlinda Shabila

Traveloka provides a wide range of travel needs. A rapid change of digital business transformation has brought Traveloka to become the first startup company that has gained the status as unicorn among the other four tech startups in Indonesia. One of the challenges faced by Traveloka is predicting their customer loyalty in using Traveloka's website. Since the exposure of startups unicorn is relatively new in Indonesia, there is a need to investigate the market's preference to continue using such startups by conducting research related to the consumer-generated media and measuring the customer's loyalty in supporting Traveloka to become one of the startups' unicorn. This investigation applies the antecedents and consequences of trust model, which describes the constructs of information quality, perceived website quality, and user satisfaction with previous experiences toward loyalty with the dimensions of referral, repurchase intention, and reject others through perceived website trust as an intervening variable. The data were collected from 445 valid respondents with a non-probability purposive sampling technique. Data analysis conducted using the SmartPLS 3.2.9 software and the results show that the factors that have positive significant influence on customer loyalty of using Traveloka's Website through Perceived Website Trust from the highest to the lowest particularly are User Satisfaction with previous experiences, Information Quality, and Perceived Website Quality. This antecedents and consequences of the trust model can be used to utilize further studies with the extensions of unexplored factors.

EEG Signal Classification for Alcoholic and Non-Alcoholic Person using Multilevel Wavelet Packet Entropy and Support Vector Machine

Cahyantari Ekaputri; Rahmat Widadi; Achmad Rizal

EEG signal provides information about brain conditions such as brain activity or consciousness level of a person. The consciousness level of a person can also be determined by alcohol. The use of alcohol for a long time can raise specific patterns in EEG signals. Several studies have shown a pattern of differences in EEG signals between alcoholic and non-alcoholic subjects. In this study, EEG signal for alcoholic and non-alcoholic was classified using Multilevel Wavelet Packet Entropy (MWPE) method in the feature extraction stage. MWPE was used to measure the signal complexity at different wavelet decomposition levels. These features are used as Support Vector Machine (SVM) input. The results of the test showed the highest accuracy of 77.8% with quadratic SVM. These results indicated that signal complexity could be used as a differentiator of EEG signals for alcoholic and non-alcoholic persons.

Inventory Budgeting and Purchasing Optimization in ERP System for Health Industry: Conceptual Model for Accounts Payable

Hafida Noor Azizah; Warih Puspitasari; Muhardi Saputra

Hospital supports the increase and maintenance of health in a region. Rumah Sakit Umum Daerah XYZ or RSUD XYZ is one of the public hospitals that is classified as Class C Hospital. With a lot of patients and employees, RSUD XYZ has not been supported by a good information system. There is no integrated system that helps the exchange of data between each sector in the hospital. Data exchange is done manually using paper as a physical document. The archives of document cost a lot and spend wide space that makes the rooms are filled by a pile of archives because of the lack of space in the hospital. This research is focusing on designing an ERP system in the finance sector of RSUD XYZ using the OpenERP accounting module and QuickStart method. The result of this research is an ERP system that is concerned with inventory budgeting, purchasing, and medical service in the accounting module. It is integrated with the inventory

module, purchasing module, and human resources module. The system will help the finance sector in processing the data of inventory budgeting, automated purchasing, and medical service payment to pursue RSUD XYZ as an integrated hospital.

Computational Parallel of K-Nearest Neighbor on Page Blocks Classification Dataset

Damar Zaky; Putu Harry Gunawan

K-Nearest Neighbor (KNN) is considered as one of the simplest machine learning algorithms. While the implementation is quite simple, KNN is actually computationally expensive that makes it take a lot of time when it tries to predict. KNN has been known to be a lazy learning machine learning method that means that this method doesn't generalize the data, instead it has to memorize the training data, even when testing. This paper aims to optimize the KNN classifier to solve page blocks classification by making the algorithm parallel. The part of the KNN algorithm that is changed to become parallel is the outer part where the task for each test data is divided according to the number of processors. In this work, we use parallel KNN to classify page blocks. Page blocks are any blocks of a page layout that are detected by using a segmentation technique, the KNN is trained to classify whether a block is a vertical line, picture, text, horizontal line or graphic. The experiment shows that the KNN classifier obtains an accuracy of 93.51% and by using parallel KNN, a speedup of 4.64 times faster and an efficiency of 57.96% can be obtained by using 8 processors and an increasing number of grids up to 6040 while it obtains the same accuracy as serial.

A Data Anonymization Method to Mitigate Identity Attack in Transactional Database Publishing

Dedi Gunawan

Publishing transactional database becomes more recognized for many institutions such as retails and groceries. Many of them share or publish their data to other institutions as an effort to gain more revenue for their business. However, publishing such a database is problematic since irresponsible parties may associate records in database with specific individuals to disclose personal identity known as identity attack. Data anonymization is an effective technique to protect database from the threat. Unfortunately, applying data anonymization method in transaction database using generalization and suppression based techniques may reduce data utility significantly and cause severe distortion to database properties. A solution to mitigate such drawbacks has been proposed by replacing item with another item instead of applying those techniques. However, selecting an item to replace another item causes other problems specifically when the selected item for the replacement process is not the optimum one. Therefore, in this paper we propose a data anonymization method which performs item replacement that utilizes weighted scoring method to select an optimal item with respect to minimize information loss and maintaining database properties. Experimental results show that the proposed method successfully generates an anonymized database while at the same time it maintains data utility by minimizing information loss and data property of the anonymized database.

Human-Like Constrained-Mating to Make Genetic Algorithm More Explorative

Achmad Choirul Rizal; Suyanto Suyanto

Genetic algorithm widely used to solve optimization problems. This algorithm does not promise accurate results but provides an acceptable approach. The more complex issues that are applying to genetic algorithms sometimes make the given solution trapped at the optimum premature or local convergence. Improved parent selection provide significantly more performance improvements. The crossover with human-like constrained-mating has a role in

avoiding inbreeding depression. It affects the ability exploration of genetic algorithms and keeps genetic diversity. Thus, impacting exploration capabilities in complex search spaces.

Security Functional Requirements for The Development of a Biometrics Attendance System

Rahmat Yasirandi; Parman Sukarno; Emiya Fefayosa Br Tarigan

The traditional validation process of the attendance system today still has myriad threats in its use. One of that is popularly known as the manipulation of attendance data (especially if using paper-based). This study aims to improve security during the validation system by designing a security document that can be used as a guide when developing an attendance system. After following each step in the common criteria framework, a security document will be generated later. The document is also commonly referred to as the Protection Profile (PP) of the document. PP documents can be used as a basic guide when a developer will build a product. Generally, products related to security aspects need this kind of guidance. By describing 6 threats which are divided into 6 Security Objectives (SO). 11 Security Functional Requirements (SFR) are needed to deal with the threat. And at the end of the section, it is illustrated the correlation each SFR has been able to overcome all threats. With every threat, SO, and SFR mapped.

Experimental Exploratory of Temporal Sampling Forest in Forest Fire Regression and Classification

Yee Jian Chew; Shih Yin Ooi; Ying Han Pang

Temporal Sampling Forest (TS-F) has been devoted to tackle the sequential data classification problem. It extends the robustness of random forest (RF) in handling the sequential data classification. However, it has not been used in the area of forest fire detection. Forest fire can be seen as a temporal phenomenon where it does not form in one day, but subsequently occurred due to the sequential changes of climates, human factors, and other affecting factors. Therefore, this paper is aim to tackle the data of forest fire from two perspectives, which are regression analysis and classification problem by using TS-F.

Deep Analysis for Smartphone-based Human Activity Recognition

Chew Yong Shan; Ying Han Pang; Shih Yin Ooi

Wearable-based approach and vision-based approach are two of the most common approaches in human activity recognition. However, the concern of privacy issues may limit the application of the vision-based approach. Besides, some individuals are reluctant to wear sensor devices. Hence, smartphone-based human physical activity recognition is a popular alternative. In this paper, we propose a deep analysis to interpret and predict accelerometer data captured using a smartphone for activity recognition. The proposed deep model is able to extract deep features from both spatial and temporal domains of the inertial data. The recognition accuracy of the proposed model is assessed using UCI and WISDM accelerometer data. Empirical results exhibit a promising performance.

Discriminative Spectral Regression Metric Learning in Unconstrained Face Verification

Siew Chin Chong; Ong Thian Song; Lee Ying Chong

This paper presents the robustness of the proposed metric learning formulation, dubbed Discriminative Spectral Regression Metric Learning in offering a simplistic solution for measuring the Mahalanobis metric to solve unconstrained face verification problems. It takes advantage of distance metric learning on pairs of doublets by adopting the merit of the quadratic kernel function in verification task. To be specific, the spectral graph analysis and the linear discriminant analysis are unified into the distance metric learning process for better exploitation of the intrinsic discriminant structure of face data. The proposed formulation is evaluated with four benchmarked constrained and unconstrained face datasets, with different tuning parameters under the restricted protocol. The promising result evinces the effectiveness and feasibility of the proposed formulation in unconstrained face verification compared to the state-of-the-art methods.

A Review of Routing Protocols for Vehicular Ad-Hoc Networks (VANETs)

Sumendra Yogarayan; Siti Fatimah Abdul Razak; Afizan Azman; Mohd Fikri Azli Abdullah; Siti Zainab Ibrahim; Kirbana Jai Raman

In recent years, Vehicular Ad Hoc Networks (VANETs) development is becoming a significant research area. The crucial motive of VANET deployment is to enhance road safety and reduce fatalities. Routing in VANET is a stimulating development due to nodes that are in high-speed, which results in frequent topology transitions and transmission of packet within a marginal time. Existing protocols on routing were not enough to comply all routing issues. Thus, a review of routing protocols is essential to identify an applicable routing protocol in VANET environment. Firstly, the basic VANET and mode of communication are described. Secondly, various existing routing protocol and research works of VANET are discussed. Finally, a wide range of challenges and open issues in relation to VANET are addressed.

Track 1E: ICT FOR AGRICULTURE RESILIENCE

WSN Based Agricultural Bird Pest Control with Buzzer and a Mesh Network

Achmad Ramadhan; Maman Abdurohman; Aji Gautama Putrada

Indonesia with the majority of livelihoods as rice farmers certainly wants to get good quality and quantity of crops. Farmers are faced with problems that hinder the expected yield of bird pests. Bird pest is one of the problems faced by farmers due to their existence which can cause a decrease in the quality and quantity of birds. The implementation of the Wireless Sensor Network (WSN) in rice fields is an effective solution for monitoring and controlling birds. PIR sensors which are the main sensors in detecting bird pests have a large area that can reach all areas of rice fields and using buzzers for repelling bird pests. The use of mesh topology is used in building the system so that each sensor can communicate in two directions and know each other about the conditions of each sensor. The results obtained shows that the PIR sensor system provides adequate accuracy in detecting bird pests and the use of buzzers show significant reduction in amount of bird pests.

Method of Systematic Literature Review for Internet of Things in ZigBee Smart Agriculture

Taufik Hidayat; Rahutomo Mahardiko; Sianturi Tigor Franky D

Lately, utilization of Wireless Sensor Network (WSN) technology is increasing and widely applied in various fields. One field using WSN is Internet of Things (IoT)-based agriculture. In IoT-based agriculture, an example of WSN is ZigBee. ZigBee itself provides irrigation control systems, climate monitoring and food chain control systems. IoT in ZigBee supports communication among available sensors. From ZigBee functionality, the ZigBee system is expected to improve productivity and to predict agriculture problem. Authors will use Systematic Literature Review (SLR) to give an overview that IoT in agriculture has potential. This is because IoT can help every farmer during operational on food and livestock production.

Radial Basis Function Neural Network in Identifying the Types of Mangoes

Faisal Thaib; Golda Tomasila; Goldy Valendria Nivaan; Albertus Joko Santoso

Mango (Mangifera indica L) is part of a fruit plant species that have different color and texture characteristics to indicate its type. The identification of the types of mangoes uses the manual method through direct visual observation of mangoes to be classified. At the same time, the way humans work is often inaccurate and different in their determination. Therefore in the use of information technology, it is possible to classify mangoes based on their texture using a computerized system. In its completion, the acquisition process is using the camera as an image processing instrument of the recorded images. To determine the pattern of mango data taken from several samples of texture features using Gabor filters from various types of mangoes and the value of the feature extraction results through artificial neural networks (ANN). Using the Radial Base Function method, which produces weight values, is then used as a process for classifying types of mangoes. The accuracy of the test results obtained from the use of extraction methods and existing learning methods is 90%.

Micro-Climate Control for Hydroponics in Greenhouses

Bayu Erfianto; Andrian Rakhmatsyah; Endro Ariyanto

Greenhouse is a building which one of them functions for cultivation. Greenhouse can help the plant growth process, but there can be differences climate that affect plant growth. By knowing the distribution of temperature and humidity, it can help the cultivation process. The next problem is how to control greenhouse conditions or commonly called micro-climate so that temperature and humidity can be maintained. To solve these problems, a system is used to determine the temperature and humidity distribution in a greenhouse and generate it in the form of a two-dimensional distribution map in the form of heatmap so that users can know the spread of temperature and humidity through the image. Based on temperature and humidity data can be used to control the micro-climate in a greenhouse so that the temperature and humidity of the greenhouse are maintained according to the needs of the plant. This system is built using a sprinkler to reduce the temperature and increase the humidity in the greenhouse, where the micro-climate control uses Fuzzy logic controller. The main results of this experiment are the temperature and humidity of the greenhouse can be controlled according to the needs of the plant.

IoT Based Smart Poultry Farm in Brunei

Muhammad Hambali; Ravi Kumar Patchmuthu; Au Thien Wan

Most of the poultry farms in Brunei are manually monitored and controlled. Temperature, humidity, air quality level, lighting, ventilation and food feeding are the important factors that are needed to be monitored and controlled. These factors are directly related to the poultry production. Currently, the mortality rate of broiler chicken in Brunei is higher than the normal rate. This research project is aim to produce healthy chickens and reduce the mortality rate of chicken to improve the productivity in Brunei by automating the process of monitoring and maintaining the temperature, humidity, air quality level and food feeder effectively using Internet of Things (IoT) and Wireless Sensor Networks (WSN). A prototype was created using IoT and WSN technologies and the above parameters were tested against threshold values. When these parameters exceeded the threshold values, corrective processes are initiated automatically that can help to reduce the mortality rate of chickens in the farm. This system also sends automatic alert notification to the user through SMS, Email and WhatsApp. A Web interface is also created to monitor and display these parameters.

Methods for Determining Nitrogen, Phosphorus, and Potassium (NPK) Nutrient Content Using Scale-Invariant Feature Transform (SIFT)

Raden Sumiharto; Ristya Putra; Samuel Demetouw

Nutrient Content NPK is macronutrient content that important for the growth of a plant. The measurement of NPK conducted periodically, but the measurement using laboratories test need a relatively long time. This Research is conducted to determine the nutrient content of the soil, consisting of nitrogen, phosphor, and calcium (NPK) using digital image processing based on Scale-Invariant Feature Transform (SIFT) and backpropagation artificial neural network. The data sample in this research taken from the rice field soil in Daerah Istimewa Yogyakarta province where the soil has taken at the length of 30 cm to 110 cm with l20 cm interval, and -30° to 30° degree with interval 10°. The model from this measurement system based on texture's characteristic that extracted using Scale Invariant Feature Transform from soil's image that already passed the pre-processing process. The characteristic result will be the input from the artificial neural network with a variation on the parameter's model. The model tested for the purpose of knowing the influence of the distance and degree where the image was taken and the

influence of the parameter's artificial neural network. The result from the research, is an accurate value of the measurement for each nutrient in the soil, nitrogen (94.86%), phosphor (58.93%) and calcium (63.57%), with the mean 72,46%. The corresponding result obtained from the image taken with an optimal height of 70 cm and degree 0o.

Macroscopic Wood Blurred Image Analysis to Determine The Factors of Causing Blur

Dandi Trianta Barus; Putu Harry Gunawan; Esa Prakasa

This paper presents an analysis of what factors cause blur on an image, especially macroscopic images of wood. The image is divided into 6x6 sub-images (blocks), which will then be determined factors causing blur based on patterns and variations of Laplacian calculated from each block. Validation is conducted using two different datasets. The first dataset is Wood Species Dataset that is given a median blur, and testing is performed to validate the proposed algorithm. The second dataset is a dataset collected directly using a smartphone camera, and testing is carried out to determine what factors influence the occurrence of blur in wood macroscopic images. The test results show the proposed algorithm produces a pattern that can determine the factors causing blur.

Track 1F: STRUCTURAL HEALTH AND MONITORING

Mobile-Based Hospital Recommendation According To Patient Needs Using SAW Method
(Case Study: Banda Aceh)

Raedi Isril; Danang Junaedi; Anisa Herdiani

To get the appropriate treatment, there are still obstacles in determining which hospital should be chosen, because it often does not suit the needs/conditions of the patient. Also, more time is needed to determine the hospital. So, a tool is needed to choose a hospital by considering the patient's needs and speeding up the process of determining the destination hospital. Several criteria are taken into consideration in choosing a hospital, namely: facilities, insurance, fees, availability of specialist doctors and distance. Simple Additive Weighting is used because it can make recommendations from several criteria and has a faster processing time than other methods. This system is built on a mobile basis because most people already have a smartphone, in addition to getting information on the value of the distance from the user's location to the hospital. Based on the results of testing, the average time needed by the system to produce hospital recommendations is 28.99 seconds. Based on the comparison of recommendations from experts and systems for 51 test cases, the similarity level was 88.24%. With these results, the system managed to provide hospital recommendations based on patient needs.

Track 1G: TRENDING TECHNOLOGIES IN NATURAL DISASTER RISK REDUCTION

A Fire Detection System Using Multi-Sensor Networks Based on Fuzzy Logic in Indoor Scenarios

Fathur Zaini Rachman; Gamantyo Hendrantoro; Iwan Wirawan

This paper presents the development of a fire detection system using a wireless multi-sensor network based on fuzzy logic rules. Until recently, the fire detection systems have been limited to the coverage area and installation of the device so that the sensitivity of the sensor becomes limited indoor. This research is proposed to detect indoor phenomena by using multi-sensors. The Fuzzy logic method is used to process data on multi-sensors and cluster head (CH). The result of multi-sensor data processing is the condition level on end device (ED). The test results show that the data processing using fuzzy logic for the measurements from distributed sensor reduces the data storage and computing complexity at the fusion center (FC). Fire detection application (FDA) displays the status condition (SC), where data sources from multi-sensor nodes are displayed as room conditions.

Implicit aspect extraction in product reviews using FIN algorithm

Diah Hevyka Maylawati; Warih Maharani; Ibnu Asror

Online transactions are growing very rapidly right now. Every online transaction is often accompanied by a review. Product reviews from buyers can be used by sellers as feedback. Product reviews provide information as a consideration for decision making for potential buyers to find out the strengths and weaknesses of the product. Identifying specific product features from reviews written by buyers becomes a solution to make it easier to find information. Aspect-based extraction in sentiment analysis is divided into two, explicit aspects and implicit aspects. The explicit aspect is the explicit aspect in the sentence while the implicit aspect is the aspect that is implied in the sentence. The extraction carried out in this study is based on implicit aspects to determine its features because the majority of existing studies extract explicit aspects. Implicit extraction aspects of product reviews using the FIN algorithm in association rule mining. The dataset is in English text where to extract features using TF-IDF and select features using Particle Swarm Optimization. Selected features are grouped using k-means. After features are grouped based on their value, an associative rule is made using the FIN algorithm. The minimum support value applied and the number of sentence variations cause the accuracy value obtained by 0.678.

Performance Boost of Attribute-aware Semantic Segmentation via Data Augmentation for Driver Assistance

Mahmud Dwi Sulistiyo; Yasutomo Kawanishi; Daisuke Deguchi; Ichiro Ide; Takatsugu Hirayama; Hiroshi Murase

This paper is an extension of our work in developing an attribute-aware semantic segmentation method which focuses on pedestrian understanding in a traffic scene. Recently, the trending topic of semantic segmentation has been expanded to be able to collaborate with the object's attributes recognition task; Here, it refers to recognizing a pedestrian's body orientation. The attribute-aware semantic segmentation can be more beneficial for driver assistance compared to the conventional semantic segmentation because it can provide a more informative output to the system. In this paper, we conduct a study of the data augmentation usage as an effort to enhance the performance of the attribute-aware semantic segmentation task. The experiments show that the proposed method in augmenting the training data is able to improve the model's

performance. We also demonstrate some of qualitative results and discuss the benefits to a driver assistance system.

Design and Characterization of Mobile Landslide Monitoring System

Suryadi Suryadi; Adrin Tohari; Edi Kurniawan; Purnomo Sidi Priambodo

Landslides are natural disasters which have forced us to prepare with major mitigation efforts. One such effort is the development and implementation of the landslide monitoring system (LMS). Most LMSs are installed permanently in landslide-prone locations for long-term monitoring purposes. In this paper, the design of a mobile LMS with high flexibility feature is presented. The proposed system comprises a mobile gateway, mobile tiltmeter sensors, and mobile extensometer sensors, in which they are configured to form a wireless sensor network. In this work, the sensor's behavior and communication performance between sensors and gateway are characterized. Experimental results show the linear responses of both tiltmeter and extensometer sensors. While reliable communication between sensors and gateway are obtained for the maximum range of 168 m on the line-of-sight condition, and 160 bytes data payload.

Radial Basis Function Neural Network in Identifying The Types of Mangoes

1st Faisal Thaib
Magister Informatika
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
faisalthaib2019@gmail.com

2nd Golda Tomasila
Magister Informatika
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
tomasilagolda@gmail.com

3rd Goldy Valendria Nivaan
Magister Informatika
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
195303066@students.uajy.ac.id

4th Albertus Joko Santoso*
Magister Informatika
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
albjoko@staff.uajy.ac.id

Abstract— **Mango (Mangifera Indica L) is part of a fruit plant species that have different color and texture characteristics to indicate its type. The identification of the types of mangoes uses the manual method through direct visual observation of mangoes to be classified. At the same time, the more subjective way humans work causes differences in their determination. Therefore in the use of information technology, it is possible to classify mangoes based on their texture using a computerized system. In its completion, the acquisition process is using the camera as an image processing instrument of the recorded images. To determine the pattern of mango data taken from several samples of texture features using Gabor filters from various types of mangoes and the value of the feature extraction results through artificial neural networks (ANN). Using the Radial Base Function method, which produces weight values, is then used as a process for classifying types of mangoes. The accuracy of the test results obtained from the use of extraction methods and existing learning methods is 100%.**

Keywords—Mangoes, RBFNN, classifying, ANN

I. INTRODUCTION

The potential and opportunity of the horticultural commodity market, especially in fruits, is currently skyrocketing, along with the high level of consumption of fruits. Mango is one of the most potential horticultural commodities in Indonesia because it is one of Indonesia's tropical fruits that can compete in the national and international markets. It can be seen based on fruit productivity data in Indonesia in 2014 - 2018, mango fruit commodity ranks 7th with an average growth of 18.07% ton ha^{-1} (Ministry of Agriculture, 2017). Mangoes have different textures, shapes, and sizes to indicate the type of fruit [1], so it is essential to ensure and identify the types of mangoes in a more modern way. So that they are not doing manually, which may be inconsistent or inaccurate in classifying the types of mangoes. With the application of information technology, the process for identifying computerized fruit based on the characteristics or characteristics of the texture using the Gabor filter method. As a first step, the acquisition process uses the camera as an image capture instrument for later processing with computer software. So that in this scientific work, the author combines artificial intelligence with image processing to mimic the structure of work similar to the human brain to learn patterns and recognize objects[1][2], by applying the learning method of the Radial Basis Function of Artificial Neural Networks (ANN). This method consists of supervised training and unsupervised training. The network trained to get a balance between the ability of the network to recognize patterns used during training, and the ability of the network to respond correctly to these patterns. This research was conducted as an effort to answer how to classify the types of mangoes in Indonesia through its characteristics using Artificial Neural Networks (ANN) as well as solutions with MATLAB programming so that it can determine the type of mangoes clearly and precisely.

II. LITERATURE REVIEW

Recognizing fruit types based on their color, texture, and shape characteristics, using the fusion feature method, is an effective way of identifying fruit types [3]. In making algorithms automatically classify leaf types through applications with different features, extraction is also another exciting part to be investigated [4]. Besides, automatic harvesting with the help of tools (robots) for selecting and picking fruits quickly, based on color and shape characteristics or features of fruit that have been classified [5] also detects bananas based on color and texture characteristics by the multi-scale method, which this algorithm method can produce high accuracy values [6] is another research that can be taken into consideration in the selection of research methods.

Determining the level of maturity of mangoes can be done with the approach of image analysis techniques through 6 (six) classifications or stages of the maturation process [7]. Other studies use MATLAB as programming in identifying and classifying the level of maturity and the presence of defects or damage to mangoes based on features, shapes, and colors [8]. How to detect mangoes from images through the extraction of fruit shape characteristics, using the Backpropagation method and the results of the experimental presentation shows that the detection rate of mangoes is up to 90%[9]. Development of an assessment model, in determining the quality of the fruit or how to estimate the mass of mangoes, there are three different models, namely simple linear regression (SLR), multiple linear regression (MLR) and artificial neural network (ANN) [10].

Fourier descriptors and size-shape parameters are used to describe the shape of the mango. Estimating the maturity of the mango by the disk method based on several features, this system can analyze, estimate the mass and or sort the mango, which is healthy and defective [11]. Detecting the maturity level of mango from color features with Artificial Neural Networks (ANN), this system can detect or sort raw or ripe mangoes [1]. By using the Fuzzy Inference Algorithm method to predict maturity or maturity of mangoes based on skin color, but the results or the level of accuracy achieved is still relatively low because it does not reach 90%[12]. Differentiating stages of mango fruit maturity based on Fruit Aroma with the E-nose microbalance (QCM) quartz method, to increase consumer acceptance [13].

The application transfer is learning to train deconvolution neural networks in identifying types of pest damage in plants [14]. Plant identification of leaf vein patterns using convolutional neural networks can produce high accuracy, relevant, and easy to understand values for pattern classification [15]. Identifying plants with an image processing approach or segmentation-based process [16]. Disease or pests on plants is a problem that must be overcome to increase yields and expected yields, so in research made systems or applications that can identify diseases in plants, the method used can reach an accuracy level of up to 96, 67% [17]. Gabor Filter and Gray Level Co-occurrence Matrix (GLCM) is a model used in research to classify and recognize plant leaves from various features using two classification methods, namely multi-layer perceptron (MLP) and neuron-fuzzy (NFC) [18].

Other studies also use texture-based feature extraction with the same method GLCM to classify various types of breast cancer. The learning algorithm used is the Radial Basis Function Neural Network, which is considered better than Backpropagation in the computational process, with an accuracy of 93.98%. [19]

Based on previous research and reference to various extraction features and learning methods that exist in the process of image recognition, the author uses the Radial Base Function as a learning algorithm to classify the types of mangoes based on their texture characteristics using the Gabor filter which is expected to obtain a high level of accuracy.

III. MATERIAL AND METHOD

There are several essential steps to be carried out, namely image acquisition, pre-processing [16], by extracting features on the original image or RGB image, then extracting the texture features using the Gabor filter. Feature extraction on mango images aims to obtain information contained in digital image objects. After obtaining color and texture information from the image of the mango, then for the classification process of the types of mango images using a Radial Basis Function (RBFNN) Neural Network, which starts from setting training targets to the process of testing the data.

The proposed system workflow can be seen in the following figure[20]:
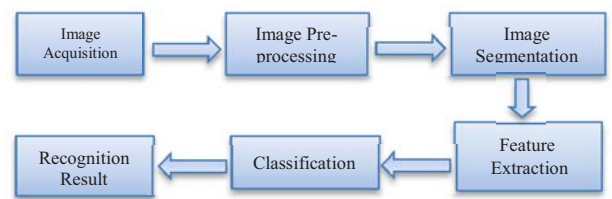

Fig. 1.   Image Processing Stages

A. Image Acquisition

The process of image acquisition here is the process of capturing or scanning an analog image so that a digital image is obtained. In this study, the image acquisition equipment used was a smartphone camera. The input image taken is the image of five types of mangoes, namely budiraja mangoes, Harum Manis mangoes, honey mangoes, gedong gincu mangoes, and manalagi mango.

The following sample test images from this study:

Fig. 2.   Sample images for each type of mangoes

B. Pre-processing

At the pre-processing stage, the original image or the RGB image will be extracted color characteristics, to obtain the value of the intensity of each color red (R), Green (G), and Blue (B). Information on each color feature that will be used to identify the image, then the texture feature extraction stage is carried out.

C. Feature Extraction

At this stage, the image will be extracted to get its texture characteristics, the texture itself shows the gray degree of each pixel in the image, where the image pixels show the similarity criteria and the closeness of the pixel value, to separate the background from the image. By extracting textural features in digital images, we can find out the characteristics of image textures (homogeneity, contrast, and the presence of structures in images). The texture feature extraction used in this study is the Gabor Filter. The filter is an image filtering technique to improve image quality, and this filter is specifically used for image analysis to segment features [21]. Because Gabor Filters are widely used for applications related to texture classification. Gabor filter is a sinusoid wave with a certain frequency, modulated by the Gaussian function. In other words, that is a sine and/or harmonic function multiplied by Gaussian [21][22][23].

Gabor Filters focus on a specific frequency range, which addresses two texture areas in different images.

The following is the formula for the Gabor 2-D function:

$$g(x,y) = \exp\left(-\left(\left(\frac{a}{2\sigma}\right) + r^2\left(\frac{b}{2\sigma}\right)^2\right)\right) * x\cos\left(\frac{2\pi}{\lambda}(x\cos\theta + y\sin\theta) + \emptyset\right) \quad (1)$$

Where :

a = (x Sin θ + y sin θ)²
b = (-x Sin θ + y sin θ)²
σ = Bandwidth gives the value of the image width effect
λ = Lambda expresses the wavelength of an image.
θ = Theta states the angle of an image.
ϒ = Gamma expresses the lighting of an image
Φ = phase states the shape of the image

D. Radial Basis Function (RBFNN) Learning Method

The Radial Basis Function (RBFNN) artificial neural network method is an artificial neural network method consisting of supervised and unsupervised training. Guided training, which is known as output training, while unsupervised training is training that did not previously have a target output. RBF Neural Network Method is not much different from the artificial neural network method in general, which has an input layer, hidden layer, and output layer[24]. Where the input layer represents feature elements, the hidden layer consists of Radial Base Function Neurons (RBFNs), and the output layer consists of Linear Neurons (LNs) [25][19]. The output of the RBF Neural Network depends on the activation function and the weight contained in the hidden layer.

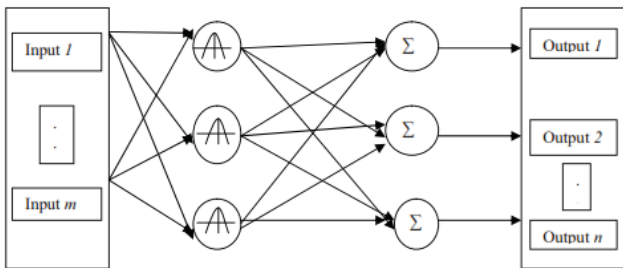Following is the architecture of the Radial Basis Function (RBFNN) Artificial Neural Network :

Fig. 3. Artificial Neural Network of RBF[25]

The output can be written using the formula:

$$F_{j(x)} = \sum_{i=1}^{n} Wij^r \, i^{(x)} \quad (2)$$

With the statement: r1, r2, ... rn is a radial basis function, then Fj is the output and w is the weight.

The RBFNN has the best approximation, in the sense that it can be trained with much faster procedures and with a simple structure, this is what makes it able to increase accuracy and reduce the complexity of training time. Also, the training algorithm on RBFNN varies. The adaptive center training algorithm only adjusts weights, centers, and deviations. In other words, adapt the weights between the hidden layer and the output[26][27]. Each hidden node consists of a base function ϕ or called a central function base in the RBF network, which provides non-linear activation depending on the distance between the input (t) and the prototype vector[26].

IV. RESULT AND DISCUSSION

For this study, we recognized five types of mangoes with 50 images of training data consisting of 10 images per type, and for the test data as many as twenty-five images with each type being five images.

From the texture feature extraction process using a Gabor filter, obtained the mean value, entropy, and variance of the existing image. This value is then used to conduct training and testing using the radial artificial function neural network (RBF NN). It can be seen in the following stages:
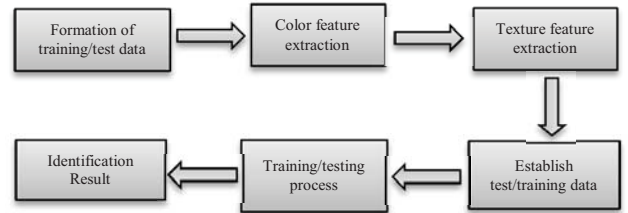

Fig. 4. Stages of the identification process

1) Formation of training/test image data: At this stage, the image used in the training and testing process is determined. In the training process, 50 training images are placed in a folder that will be called in the training process for initial image recognition. Likewise, the test image placed twenty-five images of 5 types of mangoes that will be tested in identification.

2) Color Feature Extraction Process: In the process of color feature extraction, the results of pre-processing and segmentation of training images and test images are then taken from each value of the color space Red (R), Green (B), and Blue (B).

3) Texture Feature Extraction: Before using the equation in the Gabor Filter, the values of the R, G, B color spaces in the image are then converted to grayscale. With Gabor filter, the mean, entropy, and variance of the magnitude imagery can be obtained.

4) Establish training/test targets: After the process of forming image data and initializing the extraction of color and texture feature extraction results using the Gabor filter, the training/test target will be determined. In this process also initialized processes in the artificial neural network.

5) Training / Testing Process: In this stage, the results of the previous processes up to the formation of targets then trained/tested using a radial basis function neural network algorithm that has been initialized previously.

6) Identification Results: From the training/testing process, the test results are obtained, which then becomes the result of identification by finding the accuracy level of the test/training data image by the specified target.

TABLE I. THE RESULTS OF THE TEST DATA OBTAINED:

Char	1	2	3	4	5	6	7	8	9	10	11	12	13
R	0.8648	0.8561	0.7332	0.9036	0.7846	0.9871	0.9873	0.972	0.971	0.964	0.635	0.701	0.697
G	0.9117	0.8412	0.7806	0.9302	0.8157	0.9412	0.9421	0.931	0.929	0.918	0.678	0.792	0.793
B	0.736	0.6667	0.6205	0.7822	0.6978	0.8273	0.8277	0.795	0.792	0.788	0.51	0.532	0.6
Mean	0.1397	0.148	0.1679	0.1406	0.1949	0.1241	0.1239	0.127	0.126	0.125	0.108	0.128	0.134
Ent	4.3283	3.9482	4.6459	3.6869	4.1756	2.6495	2.6454	2.927	0.933	0.854	4.533	4.597	4.646
Var	0.0102	0.0135	0.0167	0.008	0.0224	0.0028	0.0027	0.004	0.004	0.004	0.006	0.006	0.006

Char	14	15	16	17	18	19	20	21	22	23	24	25
R	0.7016	0.7716	0.8147	0.8341	0.8524	0.8553	0.8341	0.816	0.767	0.82	0.774	0.815
G	0.7859	0.8273	0.8456	0.8756	0.8985	0.8892	0.8756	0.858	0.827	0.858	0.814	0.858
B	0.6367	0.6824	0.778	0.7965	0.8129	0.7885	0.7965	0.748	0.7	0.755	0.713	0.748
Mean	0.1258	0.1227	0.1431	0.1358	0.135	0.1365	0.1358	0.142	0.129	0.126	0.133	0.141
Ent	4.1086	3.884	3.0987	3.0602	2.9848	3.0899	3.0602	3.141	3.563	3.084	3.487	3.125
Var	0.0047	0.0035	0.0071	0.0055	0.0049	0.0054	0.0055	0.006	0.005	0.004	0.006	0.006

Table 1 above shows the results of the testing process of the test images of 25 images of the five types of mango. The overall values shown in columns 1 to 25 represent the results of the number of images tested. Meanwhile, the values in lines one through three are the color space values of R, G, and B. For the fourth to sixth rows, and they show the results of the texture extraction process with Gabor filter, namely the mean, entropy and variance values.

From the results of the test data, the testing process is then carried out using the RBFNN learning algorithm, which was previously initialized in the formation of the training target first. After the process of forming training targets and artificial neural networks, then enter the training and identification process.

The identification results of the introduction process using RBFNN on the training network shown in Figure 5 below are the 50 input image processes, where 47 images are recognized while three images are not recognized. In the test data, of the 25 input images used, all images were recognized.
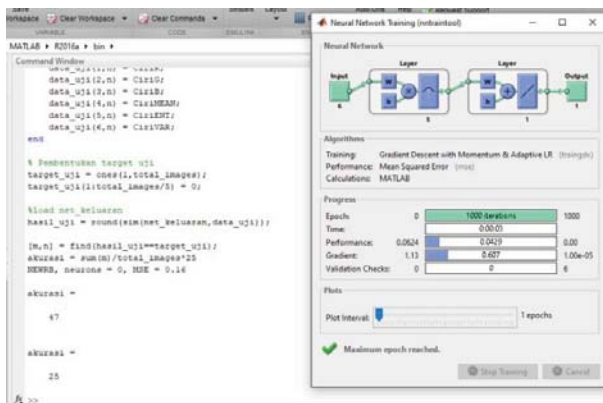

Fig. 5. The results of the training use RBFNN

In determining the accuracy of the identification process results using the Radial Basis Function Neural Network method, the authors use the following equation:

$$\frac{The\ number\ of\ images\ identified}{total\ retrieval\ of\ all\ data} \ x\ 100\% \qquad (3)$$

The following are the success rates in the process of identifying test images.

TABLE II. THE LEVEL OF ACCURACY OF THE RESULTS OF TESTING THE IMAGE THAT HAS BEEN TRAINED PREVIOUSLY.

Types of mangoes	Number of Samples	Matching	Error	Accuracy level
Harum manis mangoes	5	5	0	100%
Honey mangoes	5	5	0	100%
Gedong gincu mangoes	5	5	0	100%
Budiraja mangoes	5	5	0	100%
Manalagi mangoes	5	5	0	100%

From equation 3, obtained the level of accuracy of the results of testing data on 25 test images that can be seen as follows:

$$\frac{25}{25}\ x\ 100\% = 100\%$$

The overall identification results obtained 100% accuracy. Of the five types of mangoes that are represented in each of the 5 test images.

V. Conclusion

Based on experiments conducted, it can be concluded that:

1) The process of identifying the types of mangoes can be done using Gabor filter in the texture feature extraction and RGB color space of mangoes.
2) The use of RBFNN in the identification process provides a high level of accuracy. But the amount of test data also affects the level of accuracy. In this case, the initial test data of 10 images with each type of mango 2 images obtained an accuracy of 90%, whereas when the test data was added to 25 images with each of 5 images per mango type, the accuracy was 100% with the same amount of training data ie as many as 50 images.

For future work, feature extraction based on other features, such as wavelet or curvelet, can be used in the classification process, and can also be developed by looking at all the visual possibilities on each type of mango such as variations in maturity, normal fruit and diseased, etc. to increase accuracy.

VI. Acknowledgment

References

[1] E. H. Yossy, J. Pranata, T. Wijaya, H. Hermawan, and W. Budiharto, "Mango Fruit Sortation System using Neural Network and Computer Vision," *Procedia Comput. Sci.*, vol. 116, pp. 596–603, 2017.

[2] B. Şekeroğlu and Y. Inan, "Leaves Recognition System Using a Neural Network," *Procedia Comput. Sci.*, vol. 102, no. August, pp. 578–582, 2016.

[3] I. J. Image, M. San, M. M. Aung, and P. P. Khaing, "Fruit Recognition Using Color and Morphological Features Fusion," no. October, pp. 8–15, 2019.

[4] A. Aakif and M. F. Khan, "Automatic classification of plants based on their leaves," *Biosyst. Eng.*, vol. 139, pp. 66–75, 2015.

[5] S. Jana, S. Basak, and R. Parekh, "Automatic fruit recognition from natural images using color and texture features," *Proc. 2nd Int. Conf. 2017 Devices Integr. Circuit, DevIC 2017*, pp. 620–624, 2017.

[6] L. Fu *et al.*, "Banana detection based on color and texture features in the natural environment," *Comput. Electron. Agric.*, vol. 167, no. July, p. 105057, 2019.

[7] F. S. Mim, S. M. Galib, M. F. Hasan, and S. A. Jerin, "Automatic detection of mango ripening stages – An application of information technology to botany," *Sci. Hortic. (Amsterdam).*, vol. 237, no. September 2017, pp. 156–163, 2018.

[8] D. Sahu and R. M. Potdar, "Dameshwari Sahu, Ravindra Manohar Potdar. Defect Identification and Maturity Detection of Mango Fruits Using Image Analysis," *Am. J. Artif. Intell.*, vol. 1, no. 1, pp. 5–14, 2017.

[9] K. Nanaa, M. Rizon, M. N. A. Rahman, Y. Ibrahim, and A. Z. A. Aziz, "Detecting mango fruits by using randomized hough transform and backpropagation neural network," *Proc. Int. Conf. Inf. Vis.*, pp. 388–391, 2014.

[10] K. Schulze, M. Nagle, W. Spreer, B. Mahayothee, and J. Müller, "Development and assessment of different modeling approaches for size-mass estimation of mango fruits (Mangifera indica L., cv. 'Nam Dokmai')," *Comput. Electron. Agric.*, vol. 114, pp. 269–276, 2015.

[11] M. F. Ibrahim, F. S. A. Sa'ad, A. Zakaria, and A. Y. M. Shakaff, "In-line sorting of harumanis mango based on external quality using visible imaging," *Sensors (Switzerland)*, vol. 16, no. 11, 2016.

[12] S. N. and B. Patel, "Thermal imaging with fuzzy classifier for maturity and size based non-destructive Mango (Mangifera Indica L.) grading," pp. 15–20, 2017.

[13] N. Debabhuti *et al.*, "Discrimination of the maturity stages of Indian mango using QCM based electronic nose," *2019 IEEE Int. Symp. Olfaction Electron. Nose*, pp. 1–2, 2019.

[14] A. Ramcharan, K. Baranowski, P. McCloskey, B. Ahmed, J. Legg, and D. P. Hughes, "Deep learning for image-based cassava disease detection," *Front. Plant Sci.*, vol. 8, no. October, pp. 1–7, 2017.

[15] G. L. Grinblat, L. C. Uzal, M. G. Larese, and P. M. Granitto, "Deep learning for plant identification using vein morphological patterns," *Comput. Electron. Agric.*, vol. 127, pp. 418–424, 2016.

[16] E. Hamuda, M. Glavin, and E. Jones, "A survey of image processing techniques for plant extraction and segmentation in the field," *Comput. Electron. Agric.*, vol. 125, pp. 184–199, 2016.

[17] S. Arivazhagan and S. V. Ligi, "Mango Leaf Diseases Identification Using Convolutional Neural Network," *Int. J. Pure Appl. Math.*, vol. 120, no. 6, pp. 11067–11079, 2018.

[18] T. Munisami, M. Ramsurn, S. Kishnah, and S. Pudaruth, "Plant Leaf Recognition Using Shape Features and Colour Histogram with K-nearest Neighbour Classifiers," *Procedia Comput. Sci.*, vol. 58, pp. 740–747, 2015.

[19] M. Pratiwi, Alexander, J. Harefa, and S. Nanda, "Mammograms Classification Using Gray-level Co-occurrence Matrix and Radial Basis Function Neural Network," *Procedia Comput. Sci.*, vol. 59, no. Iccsci, pp. 83–91, 2015.

[20] G. G. Hungilo, G. Emmanuel, and A. W. R. Emanuel, "Image processing techniques for detecting and classification of plant disease – A review," *ACM Int. Conf. Proceeding Ser.*, no. October, pp. 48–52, 2019.

[21] A. Premana, A. P. Wijaya, and M. A. Soeleman, "Image segmentation using Gabor filter and K-means clustering method," *Proc. - 2017 Int. Semin. Appl. Technol. Inf. Commun. Empower. Technol. a Better Hum. Life, iSemantic 2017*, vol. 2018-Janua, pp. 95–99, 2017.

[22] S. R. Farhan Riaz, Ali Hassan and National, *Texture Classification Framework Using Gabor Filters and Local Binary Patterns*, vol. 858. Springer International Publishing, 2019.

[23] S. Karkra and J. Kaur, "Compound Facial Expression Recognition through Gabor Filter and RBF Network," vol. 5, no. 5, pp. 576–583, 2016.

[24] P. S. A. Devi and M. G. Mini, "An Iris Texture Feature Based Radial Basis Neural Network Classifier with Enhanced Performance," *Procedia Technol.*, vol. 24, pp. 996–1001, 2016.

[25] X. Zeng, Z. Zhen, J. He, and L. Han, "A feature selection approach based on sensitivity of RBFNNs," *Neurocomputing*, vol. 275, pp. 2200–2208, 2018.

[26] C. Sbarufatti, M. Corbetta, M. Giglio, and F. Cadini, "Adaptive prognosis of lithium-ion batteries based on the combination of

particle filters and radial basis function neural networks," *J. Power Sources*, vol. 344, no. April 2000, pp. 128–140, 2017.

[27]   A. Jenkins, V. Gupta, and M. Lenoir, "General Regression Neural Networks, Radial Basis Function Neural Networks, Support Vector Machines, and Feedforward Neural Networks," 2019.