PROCEEDINGS

2016 2nd INTERNATIONAL CONFERENCE ON SCIENCE IN INFORMATION TECHNOLOGY (ICSITech)

"Information Science for Green Society & Environment"

Balikpapan, October 26th-27th 2016

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PROCEEDING

2016 2nd International Conference on Science in Information Technology (ICSITech)

"Information Science for Green Society and Environment"

26 - 27 October 2016
Balikpapan, Indonesia

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Foreword from Conference Chair

Welcome to the 2016 2nd International Conference on Science in Information Technology (ICSITech), held 26-27 October, 2016 at the Gran Senyiur Hotel, Balikpapan, East Kalimantan – Indonesia. The conference is organized by the **MULAWARMAN University** as a host, Universitas Pendidikan Indonesia, Universitas Ahmad Dahlan, UPN "Veteran" Yogyakarta, Universitas Muhammadiyah Surakarta, UTM Big Data Centre, Universiti Teknologi Malaysia, Universiti Putra Malaysia, Universiti Malaysia Sabah, and Universitas Budi Luhur. The conference is intended as a venue for presentation and discussion of research from both academia and industries, on a range of exciting and timely topics in information technology and computer science, computational intelligence based-on tropical rain forest, information system, data warehouse and related fields. This conference is IEEE conference so that papers accepted and presented will be forwarding for consideration to be published in the IEEE Xplore Digital Library. Thanks to Governor of East Kalimantan, Dr. H. Awang Farouk Ishak for coming and supporting this conference. Thanks are due to Keynote Speakers, Goutam Chakraborty (Professor, Dept. of Software & Information Science, Iwate Prefectural University, Japan). HeuiSeok Lim (Professor, Department of Computer Science and Engineering, College of Informatics, Korea University, Korea). Rayner Alfred (Assoc. Professor, Faculty of Computing and Informatics, Universiti Malaysia Sabah, Malaysia) and Rodziah Atan (Assoc. Professor, Faculty of Computer Science & Information Technology, Universiti Putra Malaysia, Malaysia).

This year, the 2nd ICSITech conference received 119 papers submissions from 14 countries such as, Indonesia, China, Malaysia, the Philippines, Thailand, India, Korea, Egypt, Vietnam, Australia, Sri Lanka, UK, USA, and Colombia. But only 68 papers were accepted for presentations for oral sessions (the acceptance ratio is 57.14%). We are very grateful for the extensive efforts of many individuals who worked diligently to ensure a successful and high quality conference. We would like to thank to IEEE Indonesia Section, RistekDikti, TPC Committee and MULAWARMAN University for supporting this event.

Once again we would like to say Welcome to Balikpapan for all. Congratulations for your papers have been accepted. We invite all participants to actively participate in the conference activities and the city tours, and to enjoy the opportunity to learn from one another. Thank you for choosing ICSITech as your conference reference. We hope to have your pleasant supports and participations in the next year 2017 3rd ICSITech at Universitas Pendidikan Indonesia, Bandung.

Thank you

General Chair
Ramadiani, Ph.D.
Faculty of Computer Science and Information Technology
MULAWARMAN University, East Kalimantan - Indonesia

Keynote Speakers Biography

Goutam Chakraborty, Ph.D. (Professor, Intelligent Informatics Lab., Faculty of Software and Information Science, Iwate Prefectural University, Japan)

Prof. Goutam Chakraborty received his Ph.D. in 1993 from Tohoku University, Japan. Before joining Tohoku University, he worked in Telecommunication Industry in India. Presently he is Professor and head of the Intelligent Informatics laboratory, Department of the Software and Information Science, Iwate Prefectural University, Japan. His research interests are Soft Computing algorithms and their applications to solve pattern recognition, prediction, scheduling and optimization problems including applications in wired and wireless Networks. Recently, he is interested in the analysis of various time-series signals, collected by sensors from Human body as well as machines.

Rayner Alfred (Assoc. Prof., Faculty of Computing and Informatics, Universiti Malaysia Sabah, Malaysia)

Assoc. Prof. Dr. Rayner Alfred was born in Kota Kinabalu, Sabah, Malaysia. He completed a PhD in 2008 looking at intelligent techniques to model and optimize the complex, dynamic and distributed processes of knowledge discovery for structured and unstructured data. He holds a PhD degree in Computer Science from York University (United Kingdom), a Master degree in Computer Science from Western Michigan University, Kalamazoo (USA) and a Computer Science degree from Polytechnic University of Brooklyn, New York (USA). He leads and defines projects around knowledge discovery and information retrieval at Universiti Malaysia Sabah. One focus of Assoc. Prof. Dr. Rayner's work is to build smarter mechanism that enables knowledge discovery in relational databases. His work addresses the challenges related to big data problem: How can we create and apply smarter collaborative knowledge discovery technologies that cope with the big data problem. He has authored and co-authored more than 75 journals/book chapters and conference papers, editorials, and served on the program and organizing committees of numerous national and international conferences and workshops. He is a Chief-Editor of International Journal of Computing and Informatics (IJCANDI). He is a member of the Institute of Electrical and Electronic Engineers (IEEE) and Association for Computing Machinery (ACM) societies.

Heuiseok Lim (Professor, Department of Computer Science and Engineering, Korea University, Korea)

Prof. Heuiseok Lim received his B.S., M.S. and Ph.D. degrees in Computer Science from Korea University, Seoul, in 1992, 1994 and 1997, respectively. He worked at SITEC of Samsung for two years after his PhD. He is a Professor in the Department of Computer Science and Engineering at Korea University in Korea. In 2012 year, He was a visiting scholar in the department of Computer Science of University of Colorado at Boulder. Now, he has been a

member of ACL and many other research groups. His research interests are in brain-neuro language processing, natural language processing, AI in education, and educational data mining.

Rodziah binti Atan (Assoc. Prof., Department of Software Engineering and Information Systems, Faculty of Computer Science and Information Technology, Universiti Putra Malaysia, Malaysia and Laboratory of Halal Policy and Management, Halal Products Research Institute, Universiti Putra Malaysia, Malaysia)

Associate Professor Dr. Rodziah binti Atan is currently an academician at Faculty of Computer Science and Information Technology, and the Head of Lab to the Halal Policy and Management Laboratory, Halal Products Research Institute, Universiti Putra Malaysia. She specializes in the area of Software Engineering, Software process Modelling and Cloud Computing Services. Her current interest is on service level management monitoring and enforcement, and halal-related systems and technologies. She obtained her PHD in Software Engineering from Universiti Putra Malaysia in 2005. Lecturing and handling classes to more than 1000 undergraduate students and has had 8 PhDs and 8 Masters students graduated under her supervision. She also has published academic books, chapter in books, more than 100 journal publications and conference papers. She also has been appointed as keynote speaker for international conferences, colloquium invited speaker, panel assessor in academic workshop, subject matter expert, local and international journal and conference reviewer.
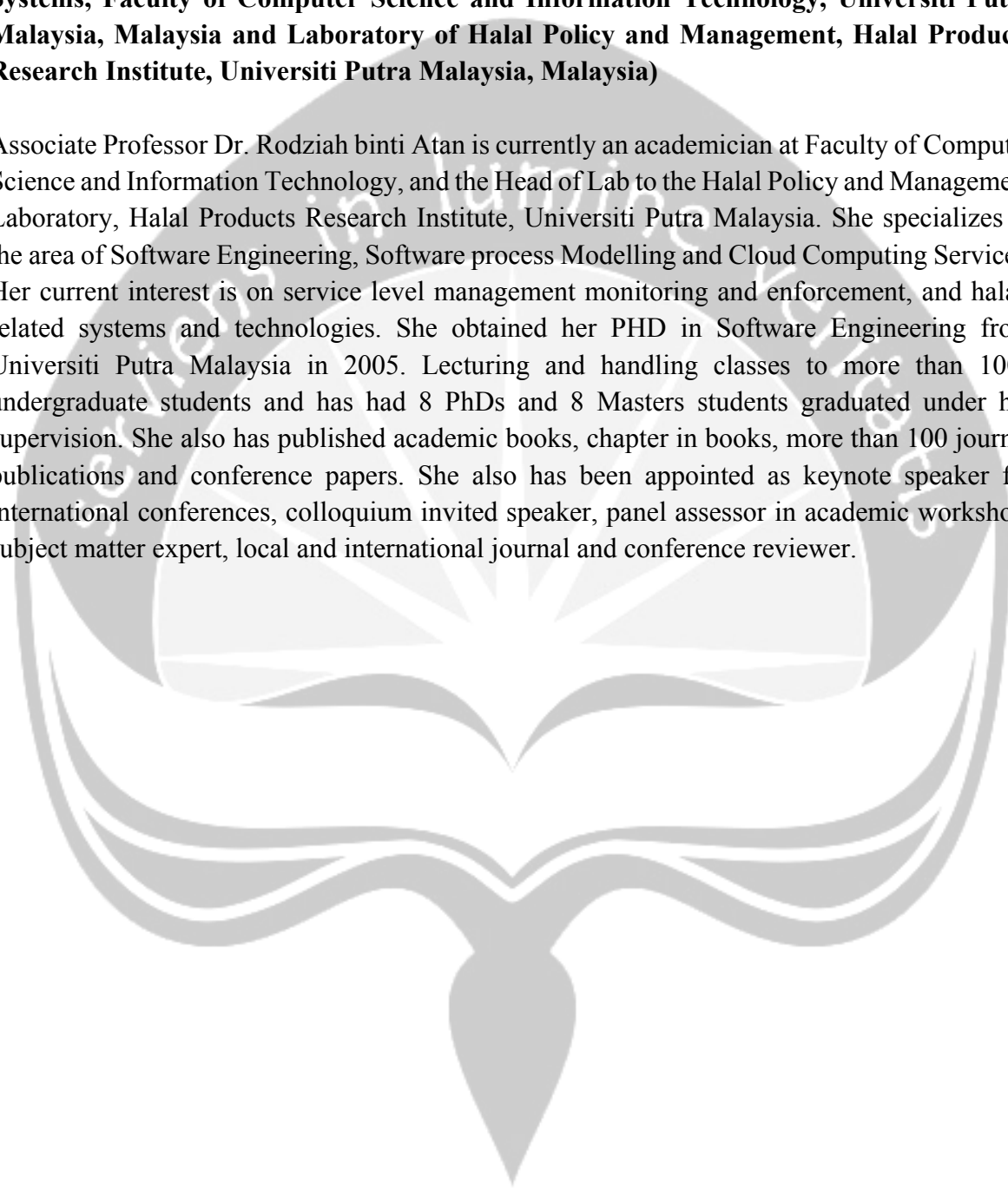
2016 2nd ICSITech Schedule

Day 1: Wednesday, October 26th, 2016

07:00 – 07:30   **Registration** – Room: Grand Ballroom (2nd Floor)

07:30 – 08:15   **Opening Ceremony** – Room: Grand Ballroom (2nd Floor)
07:30 – 07:45 **Pre-Opening Session**
Welcome Messages:
1.   07:45 – 07:50 ICSITech 2016 Chairman: Ramadiani, Ph.D.
2.   07:50 – 07:55 Dean of CSIT UNMUL : Dr. Nataniel Dengen, M.Si.
3.   07:55 – 08:05 Rector of UNMUL : Prof. Dr. H. Masjaya, M.Si
4.   08:05 – 08:15 IEEE Indonesia Section : Satriyo Dharmanto

08:15 – 08:45   **Invited Speech** by
Awang Faroek Ishak (Professor, Governor East Kalimantan, Indonesia)

08:45 – 09:00   **Coffee Break I** – Room: Grand Ballroom (2nd Floor)

09:00 – 10:40   **Keynote Speech Session 1** – Room: Grand Ballroom (2nd Floor)
Moderator : Dr. Ummi Rabaah Hashim

Time-Series Data Analysis – A few case studies with Bio-signals
by **Goutam Chakraborty**
(Professor, Intelligent Informatics Lab., Faculty of Software & Information Science, Iwate Prefectural University, Japan)

The Rise of Machine Learning to Unlock the Power of Big Data
by **Rayner Alfred**
(Assoc. Professor, Faculty of Computing and Informatics, Universiti Malaysia Sabah, Malaysia)

10:40 – 12:00   **Parallel Class Session I-A : Informatics Track** – Room : Grand Ballroom (2nd Floor)
Moderator : Dr. Mohammad Syafrullah

10:40 – 11:00   **(1570305408)** Vehicle Detection and Tracking Based on Corner and Lines Adjacent Detection Features
M.D. Enjat Munajat (Institute of Technology Bandung, Indonesia), Dwi H. Widyantoro (Institute of Technology Bandung, Indonesia), Rinaldi Munir (Institute of Technology Bandung, Indonesia)

11:00 – 11:20   **(1570308101)** Car Detection Based on Road Direction on Traffic Surveillance Image
Adhi Prahara (Universitas Ahmad Dahlan, Indonesia), Murinto (Universitas Ahmad Dahlan, Indonesia)

11:20 – 11:40   **(1570307547)** Dataset Feature Reduction Using Independent Component Analysis with Contrast Function of Particle Swarm Optimization on Hyperspectral Image Classification

Murinto (Universitas Gadjah Mada, Indonesia), Agus Harjoko (Universitas Gadjah Mada, Indonesia)

11:40 – 12:00   **(1570307646)** Comparison of Two Different Types of Morphological Method for Feature Extraction of Retinal Vessels in Colour Fundus Images
Hanung Adi Nugroho (Universitas Gadjah Mada, Indonesia), Tri Lestari (Universitas Gadjah Mada, Indonesia), Rezty Amalia Aras (Universitas Gadjah Mada, Indonesia), Igi Ardiyanto (Universitas Gadjah Mada, Indonesia)

10:40 – 12:00   **Parallel Class Session I-B : Informatics Track – Room : VIP CP I (1st Floor)**
Moderator : Dr. Aji Prasetya Wibawa

10:40 – 11:00   **(1570286251)** Implementation of Moving Average and Soft Computing Algorithm to Support Planting Season Calendar Forecasting System on Mobile Device
Fhira Nhita (Telkom University, Indonesia), Deni Saepudin (Telkom University, Indonesia), Danang Triantoro (Telkom University, Indonesia), Adiwijaya (Telkom University, Indonesia), Untari Novia Wisesty (Telkom University, Indonesia)

11:00 – 11:20   **(1570297470)** Agile Person Identification Through Personality Test and kNN Classification Technique
Rintaspon Bhannarai (Chiang Mai University, Thailand), Chartchai Doungsaard (Chiang Mai University, Thailand)

11:20 – 11:40   **(1570295341)** The use of Triple Exponential Smoothing Method (Winter) in Forecasting Passenger of PT Kereta Api Indonesia with Optimization Alpha, Beta, and Gamma Parameters
Wawan Setiawan (Indonesia University of Education, Indonesia), Enjun Juniati (Indonesia University of Education, Indonesia), Ida Parida (Indonesia University of Education, Indonesia)

11:40 – 12:00   **(1570306457)** Comparison of SARIMA, NARX and BPNN Models in Forecasting Time Series Data of Network Traffic
Haviluddin (Mulawarman University, Indonesia), Nataniel Dengen (Mulawarman University, Indonesia)

10:40 – 12:00   **Parallel Class Session I-C : Informatics Track** – Room : Lamaru Meeting Room (1st Floor)
Moderator : Dr. Lala Septem Riza

10:40 – 11:00   **(1570275378)** Application of The Modified EzStego Algorithm for Hiding Secret Messages in The Animated GIF Images
Rinaldi Munir (Institut Teknologi Bandung, Indonesia)

11:00 – 11:20   **(1570294628)** SMS Authentication Code Generated by Advance Encryption Standard (AES) 256 bits Modification Algorithm and One Time Password (OTP) to Activate New Applicant Account
Eddy Prasetyo Nugroho (Indonesia University of Education, Indonesia), Rizky Rahman J. P. (Indonesia University of Education, Indonesia), Judhie Putra (Indonesia University of Education, Indonesia), Iman Muhamad Ramadhan (Indonesia University of Education, Indonesia)

11:20 – 11:40 **(1570305026)** Privacy and Security of Sharing Referral Medical Record for Health Care System
Mike Yuliana (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Haryadi Amran Darwito (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Amang Sudarsono (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Gabymars Yofie (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)

11:40 – 12:00 **(1570279688)** Distributed infrastructure for efficient Management of Network Services. Case: Large Company in mining sector in Colombia
Leonel Hernández (Institucion Universitaria – ITSA, Colombia)

10:40 – 12:00 **Parallel Class Session I-D : Informatics Track** – Room : VIP CP II A (1ˢᵗ Floor)
Moderator : Dr. Krisna Adiyarta

10:40 – 11:00 **(1570307546)** Designing an Intelligent UI/UX System Based on the Cognitive Response for Smart Senior
You-Dong Yun (KOREA University, Korea), Chanhee Lee (KOREA University, Korea), Heui-Seok Lim (KOREA University, Korea)

11:00 – 11:20 **(1570285026)** Response Models for Series of Commands in Gaming Environment
Ida Bagus Kerthyayana Manuaba (Bina Nusantara University, Indonesia)

11:20 – 11:40 **(1570250672)** Virtual Player of Melodic Abstraction Instruments for Automatic Gamelan Orchestra
Khafiizh Hastuti (Dian Nuswantoro University, Indonesia), A. Zainul Fanani (Dian Nuswantoro University, Indonesia), Arry Maulana Syarif (Dian Nuswantoro University, Indonesia)

11:40 – 12:00 **(1570293169)** Location And Time Based Reminder System On Android Mobile Device
Nur Rokhman (Gadjah Mada University, Indonesia), Lubab Saifuddin (Gadjah Mada University, Indonesia)

10:40 – 12:00 **Parallel Class Session I-E : Information System Track** – Room : VIP CP II B (1ˢᵗ Floor)
Moderator : Dr. Rusydi Umar

10:40 – 11:00 **(1570244188)** Path Analysis Method to Identify Factors Affecting Consumer Interest on Online Shopping
Ratna Purwaningsih (University of Diponegoro, Indonesia), Belan Adison (University of Diponegoro, Indonesia)

11:00 – 11:20 **(1570251888)** Critical Success Factors for the Internet Technology Adoption by SMEs and Its Impact for The Performance
Aries Susanty (Diponegoro University, Indonesia), Diana Puspita Sari (Diponegoro University, Indonesia), Debby Anastasia (Diponegoro University, Indonesia)

11:20 – 11:40 **(1570284754)** Antecedents of the Adoption of Online Games Technologies:The Study of Adolescent Behavior in Playing Online Games
Bernardinus Harnadi (Soegijapranata Catholic University, Indonesia)

11:40 – 12:00   **(1570286598)** The Determinants Affecting E-Loyalty: Hospitality Industry in Indonesia
Viany Utami Tjhin (Bina Nusantara University, Indonesia), Reza Tavakoli (Bina Nusantara University, Indonesia), Shofwatunnikma (Bina Nusantara University, Indonesia), Robertus Nugroho Perwiro Atmojo (Bina Nusantara University, Indonesia)

10:40 – 12:00   **Parallel Class Session I-F : Information System Track** – Room : Meratus Board Room (1ˢᵗ Floor)
Moderator : Dr. Ramadiani

10:40 – 11:00   **(1570285340)** Thai Text Topic Modeling System for Discovering Group Interests of Facebook Young Adult Users
Rachsuda Jiamthapthaksin (Assumption University, Thailand)

11:00 – 11:20   **(1570307472)** A Proposed Method for Predicting US Presidential Election by Analyzing Sentiment in Social Media
Andy Januar Wicaksono (Universitas Atma Jaya Yogyakarta, Indonesia), Suyoto (Universitas Atma Jaya Yogyakarta, Indonesia), Pranowo (Universitas Atma Jaya Yogyakarta, Indonesia)

11:20 – 11:40   **(1570308121)** The Assessment of Hospitality and Tourism SMEs Awareness on the Use of Mobile Technology and Internet Services – A Case Study of Hotel Businesses in Thailand
Sakuna Anuvareepong (Assumption University, Thailand)

11:40 – 12:00   **(1570308596)** Bias Aware Lexicon-Based Sentiment Analysis of Malay Dialect on Social Media Data: A Study on The Sabah Language
Mohd Hanafi Ahmad Hijazi (Universiti Malaysia Sabah, Malaysia), Lyndia Libin (Universiti Malaysia Sabah, Malaysia), Rayner Alfred (Universiti Malaysia Sabah, Malaysia), Frans Coenen (University of Liverpool, United Kingdom)

12:00 – 13:00   **Lunch Break** – Room : Ballroom (4th Floor)

13:00 – 14:50   **Keynote Speech Session 2**
Moderator : Dr. Aji Prasetya Wibawa

Introduction to an Intelligent UI/UX for aging people
by **HeuiSeok Lim**
(Professor, Department of Computer Science and Engineering, College of Informatics,Korea University, Kore)

Enhancing Service Quality Through Servive Level Agreement (SLA) Full Implementation
by **Rodziah Atan**
(Assoc. Professor, Faculty of Computer Science & Information Technology, Universiti Putra Malaysia, Malaysia)

14:50 – 15:10   **Coffee Break**

15:10 – 17:30   **Parallel Class Session II-A : Informatics Track** – Room : Grand Ballroom (2ⁿᵈ Floor)
Moderator : Dr. Mohammad Syafrullah

15:10 – 15:30   **(1570284736)** A New Framework for Measuring Volume of Axisymmetric Food Products using Computer Vision System Based on Cubic Spline Interpolation
Joko Siswantoro (Universitas Surabaya, Indonesia), Endah Asmawati (Universitas Surabaya, Indonesia)

15:30 – 15:50   **(1570308741)** Segmentation of Optic Disc on Retinal Fundus Images Using Morphological Reconstruction Enhancement and Active Contour
Hanung Adi Nugroho (Universitas Gadjah Mada, Indonesia), Ilcham (Universitas Gadjah Mada, Indonesia), Abdul Jalil (Universitas Gadjah Mada, Indonesia), Igi Ardiyanto (Universitas Gadjah Mada, Indonesia)

15:50 – 16:10   **(1570241804)** Marker-Based Tracking Using Temporal Coherence in Computer Facial Animation System
Samuel Gandang Gunanto (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia), Mochamad Hariadi (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia), Eko Mulyanto Yuniarno (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia)

16:10 – 16:30   **(1570293628)** Smart Poster Implementation on Mobile Bulletin System using NFC Tags and Salt Tokenization Case Study: Universitas Multimedia Nusantara
Audy (Universitas Multimedia Nusantara, Indonesia), Marcel Bonar Kristanda (Universitas Multimedia Nusantara, Indonesia), Seng Hansun (Universitas Multimedia Nusantara, Indonesia)

16:30 – 16:50   **(1570294442)** Automated Tool for the Calculation of Cognitive Complexity of a Software
Dinuka Rukshani Wijendra (Sri Lanka Institute of Information Technology, Sri Lanka), Kamalanath Priyantha Hewagamage (University of Colombo School of Computing, Sri Lanka)

16:50 – 17:10   **(1570294495)** Implementation of the Cellular Automata Algorithm for Developing an Educational Game
Nurul Fauzia (Universitas Pendidikan Indonesia, Indonesia), Dedi Rohendi (Universitas Pendidikan Indonesia, Indonesia), Lala Septem Riza (Universitas Pendidikan Indonesia, Indonesia)

17:10 – 17:30   **(1570295120)** UCPabc as an Integration Model for Software Cost Estimation
Renny Sari Dewi (Universitas Internasional Semen Indonesia, Indonesia), Grandys Frieska Prassida (Universitas Internasional Semen Indonesia, Indonesia), Sholiq (Institut Teknologi Sepuluh Nopember, Indonesia), Apol Pribadi Subriadi (Institut Teknologi Sepuluh Nopember, Indonesia)

15:10 – 17:50   **Parallel Class Session II-B : Informatics Track** – Room : VIP CP I (1st Floor)
Moderator : Prof. Dr. Munir

15:10 – 15:30   **(1570308794)** A New Approach on Prediction of Fever Disease by Using a Combination of Dempster Shafer and Naïve Bayes
Yani Mulyani (Universitas Pendidikan Indonesia, Indonesia), Eka Fitrajaya Rahman (Universitas Pendidikan Indonesia, Indonesia), Herbert (Universitas Pendidikan Indonesia, Indonesia), and Lala Septem Riza (Universitas Pendidikan Indonesia, Indonesia)

15:30 – 15:50   **(1570305265)** Implementation of Medical Error Prevention System for Hypertension Disease Based on Fuzzy
Reni Soelistijorini (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Mike Yuliana (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Ira Prasetyaningrum (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Lina Pratiwi (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia)

15:50 – 16:10   **(1570295233)** Integrated ANN And Bidirectional Improved PSO for Optimization of Fertilizer Doze On Palawija Plants
Imam Cholissodin (University of Brawijaya, Indonesia), Candra Dewi (University of Brawijaya, Indonesia), Eunike Endariahna Surbakti (University of Brawijaya, Indonesia)

16:10 – 16:30   **(1570241505)** Classification Method of Multi-class on C4.5 Algorithm for Fish Diseases
Sucipto (STMIK Amikom Yogyakarta, Indonesia), Kusrini (STMIK Amikom Yogyakarta, Indonesia), Emha Luthfi Taufiq (STMIK Amikom Yogyakarta, Indonesia)

16:30 – 16:50   **(1570286055)** Model Assessment of Land Suitability Decision Making for Oil Palm Plantation
Hamdani (Mulawarman University, Indonesia), Anindita Septiarini (Mulawarman University, Indonesia), Dyna Marisa Khairina (Mulawarman University, Indonesia)

16:50 – 17:10   **(1570260619)** A System to Diagnose Learning Disability in Children of Special Need
Munir (Universitas Pendidikan Indonesia, Indonesia), Rasim (Universitas Pendidikan Indonesia, Indonesia), Chepy Cahyadi (Universitas Pendidikan Indonesia, Indonesia), Lala Septem Riza (Universitas Pendidikan Indonesia, Indonesia)

17:10 – 17:30   **(1570291952)** Web Based Fuzzy Expert System For Lung Cancer Diagnosis
Rodiah (Gunadarma University, Indonesia), Emy Haryatmi (Gunadarma University, Indonesia), Fitrianingsih (Gunadarma University, Indonesia), Herio Susanto (Gunadarma University, Indonesia)

15:10 – 17:50   **Parallel Class Session II-C : Informatics Track** – Room : Lamaru Meeting Room (1st Floor)
Moderator : Dr. Ummi Rabaah Hashim

15:10 – 15:30   **(1570283964)** Cloud Computing Sensitive Data Protection using Multi Layered Approach
Haifaa Jassim Muhasin (University Putra Malaysia, Malaysia), Rodziah Atan (University Putra Malaysia, Malaysia), Marzanah binti A.Jabar (University Putra Malaysia, Malaysia), Salfarina binti Abdullah (University Putra Malaysia, Malaysia)

15:30 – 15:50   **(1570305703)** Wireless Communication with Batching Method Based on Xbee-PRO S2B Module for Sensing of Wind Speed
Nurul Hiron (Siliwangi University, Indonesia), Asep Andang (Siliwangi University, Indonesia)

15:50 – 16:10   **(1570307947)** Dynamic Bandwidth Management Based on Traffic Prediction Using Deep Long Short Term Memory
Tjeng Wawan Cenggoro (Bina Nusantara University, Indonesia), Ida Siahaan (Bina Nusantara University, Indonesia)

16:10 – 16:30   **(1570258159)** Energy Efficient Opportunistic Routing Algorithm for Underwater Sensor Network: A Review
Mohd Murtadha Mohamad (Universiti Teknologi Malaysia, Malaysia), Mohammad Taghi Kheirabadi (Islamic Azad University, Iran)

16:30 – 16:50   **(1570288850)** Development of Instrumentation, Control and Navigation (ICON) for ATGM (Anti Tank Guided Missile)
Herma Yudhi Irwanto (Indonesian National Institute of Aeronautics and Space, Rocket Technology Center, Indonesia)

16:50 – 17:10   **(1570304813)** Investigations of PV Balancer Architectures on Practical Solar Photo Voltaic System
Dokala Udaykiran (V R Siddhartha Engineering College, India), P.V.R.L. Narasimham (V R Siddhartha Engineering College, India), N. Gouthamkumar (V R Siddhartha Engineering College, India), Darisi Sudheerkumar (V R Siddhartha Engineering College, India)

17:10 – 17:30   **(1570305927)** A Wireless Sensor Networks Localization using Geometric Triangulation Scheme for Object Tracking in Urban Search and Rescue Application
Prima Kristalina (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia), Aries Pratiarso (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia), Tessy Badriyah (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia), Erik Dwi Putro (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia)

17:30 – 17:50   **(1570285604)** Profile of a typical mobile SMS user in emergency situations (empirical study in an urban flood prone area)
Dinar Mutiara Kusumo Nugraheni (Flinders University, Australia, Diponegoro University, Indonesia), Denise de Vries (Flinders University, Australia)

15:10 – 17:30   **Parallel Class Session II-D : Informatics Track** – Room : VIP CP II A (1st Floor)
Moderator : Dr. Krisna Adiyarta

15:10 – 15:30   **(1570303586)** Knowledge of Extraction from Trained Neural Network by Using Decision Tree
Soleh Ardiansyah (Kalimantan Institute of Technology, Indonesia), Mazlina Abdul Majid (Universiti Malaysia Pahang, Malaysia), Jasni Mohamad Zain (Universiti Malaysia Pahang, Malaysia)

15:30 – 15:50   **(1570306281)** A Framework of Fuzzy Partition Based on Artificial Bee Colony for Categorical Data Clustering
Iwan Tri Riyadi Yanto (Universitas Ahmad Dahlan, Indonesia), Younes Saadi (University of Malaya, Malaysia), Dedy Hartama (Tunas Bangsa AMIK and STIKOM, Indonesia), Dewi Pramudi Ismi (Universitas Ahmad Dahlan, Indonesia), Andri Pranolo (Universitas Ahmad Dahlan, Indonesia)

15:50 – 16:10 **(1570307816)** Enhancing Modified Cuckoo Search Algorithm by using MCMC Random Walk
Noor Aida Husaini (Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia), Rozaida Ghazali (Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia), Iwan Tri Riyadi Yanto (Universitas Ahmad Dahlan, Indonesia)

16:10 – 16:30 **(1570308074)** Modelling of Network Traffic Usage Using Self-Organizing Maps Techniques
Haviluddin (Mulawarman University, Indonesia), Hendra Yuni Irawan (SMK Negeri 7 Samarinda, Indonesia), Achmad Fanany Onnilita Gaffar (State Polytechnic of Samarinda, Indonesia), Arda Yunianta (Mulawarman University, Indonesia), Awang Harsa Kridalaksana (Mulawarman University, Indonesia), Zainal Arifin (Mulawarman University, Indonesia), Mulaab Mulyo (Trunojoyo University, Indonesia), Andri Pranolo (Universitas Ahmad Dahlan, Indonesia), Bayu Kresnapati (Mulawarman University, Indonesia), Fauzi Rahman (Mulawarman University, Indonesia)

16:30 – 16:50 **(1570308081)** Soft Maximal Association rule for web user mining
Iwan Tri Riyadi Yanto (Ahmad Dahlan University, Indonesia), Arif Rahman (Ahmad Dahlan University, Indonesia), Youes Saaadi (University of Malaya, Malaysia)

16:50 – 17:10 **(1570285611)** Parallelized GA-PSO Algorithm for Solving Job Shop Scheduling Problem
Paulus Mudjihartono (Assumption University, Thailand, Universitas Atma Jaya Yogyakarta, Indonesia), Rachsuda Jiamthapthaksin (Assumption University, Thailand), Thitipong Tanprasert (Assumption University, Thailand)

17:10 – 17:30 **(1570286325)** State-of-the-Art Vietnamese Word Segmentation
Song Nguyen Duc Cong (Assumption University, Bangkok, Thailand), Quoc Hung Ngo (University of Information Technology, Ho Chi Minh City, Vietnam), Rachsuda (Assumption University, Bangkok, Thailand)

15:10 – 17:50 **Parallel Class Session II-E : Information System Track** – Room : VIP CP II B (1st Floor)
Moderator : Dr. Rusydi Umar

15:10 – 15:30 **(1570240800)** Innovation and practice in the teaching of digital media technology major
Song Jinyu (Zhejiang Sci-Tech University, China), Zhang Xinyu (Zhejiang Sci-Tech University, China)

15:30 – 15:50 **(1570293662)** User Difficulties in E-Learning System
Ramadiani (University of Mulawarman, Indonesia), Rodziah binti Atan (Universiti Putra Malaysia, Malaysia), Mohd. Hasan Selamat (Universiti Putra Malaysia, Malaysia), Rusli Abdullah (Universiti Putra Malaysia, Malaysia), Noraini Che Pa (Universiti Putra Malaysia, Malaysia), Azainil (University of Mulawarman, Indonesia)

15:50 – 16:10 **(1570308055)** Enhancing E-Learning System to Support Learning Style Based Personalization

Kusuma Ayu Laksitowening (Telkom University, Indonesia), Amarilis Putri Yanuarifiani (Telkom University, Indonesia), Yanuar Firdaus Arie Wibowo (Telkom University, Indonesia)

16:10 – 16:30   **(1570265788)** Push Notification System to Mobile Game Player Using Distributed Event-Based System Approach
Fiona Yunisa (Bina Nusantara University, Indonesia), Suharijto (Bina Nusantara University, Indonesia)

16:30 – 16:50   **(1570307558)** A Survey On Data-Driven Approaches In Educational Games
Danial Hooshyar (Korea University, South Korea), Chanhee Lee (Korea University, South Korea), Heuiseok Lim (Korea University, South Korea)

16:50 – 17:10   **(1570286443)** Game Play Analytics to Measure the Effect of Marketing on Mobile Free-To-Play Games
Tuang Dheandhanoo (Thammasat University, Thailand), Sittichai Theppaitoon (GAMEINDY Co., Ltd., Thailand), Pisal Setthawong (Assumption University, Thailand)

17:10 – 17:30   **(1570244610)** An Empirical Evaluation of ERP Values Using RBV Approach in Indonesia
Dwi Hastuti (University of Lambung Mangkurat, Indonesia), Juhriyansyah Dalle (University of Lambung Mangkurat, Indonesia), Husnul Khatimi (University of Lambung Mangkurat, Indonesia)

15:10 – 17:50   **Parallel Class Session II-F : Information System Track** – Room : Meratus Board Room (1st Floor)
Moderator : Dr. Fahrul Agus

15:10 – 15:30   **(1570307907)** Certificate Policy and Certification Practice Statement for Root CA Indonesia
Arfive Gandhi (Universitas Indonesia, Indonesia), Yudho Giri Sucahyo (Universitas Indonesia, Indonesia), Tomi Sirait (Universitas Indonesia, Indonesia)

15:30 – 15:50   **(1570241891)** IT Governance and Business Alignment in Support of a Divestment Strategy
Annamaré Wolmarans (University of Pretoria, South Africa), Neels Kruger (University of Pretoria, South Africa), Neil Croft (University of Pretoria, South Africa)

15:50 – 16:10   **(1570307147)** E-Gov Readiness Assessment To Determine E-Government Maturity Phase
Aji Supriyanto (Gadjah Mada University, Indonesia), Khabib Mustofa (Gadjah Mada University, Indonesia)

16:10 – 16:30   **(1570308006)** Automatic Generation of Content Security Policy to Mitigate Cross Site Scripting
Samer Attallah Mhana (Universiti Putra Malaysia, Malaysia), Jamilah Binti Din (Universiti Putra Malaysia, Malaysia), Rodziah Binti Atan (Universiti Putra Malaysia, Malaysia)

16:30 – 16:50   **(1570295022)** The Effect Of Task Technology Fit Toward Individual Performance On The Generation X (1956-1980) Using Information Technology

Putut Pamilih Widagdo (Mulawarman University, Indonesia), Ramadiani (Mulawarman University, Indonesia), Tony Dwi Susanto (Institute of Technology Ten November, Indonesia)

16:50 – 17:10 **(1570295470)** PLAKDA - An IoT Platform for the Production of Mekong Basin Styled Fermented Fish (Plara)
Tuul Triyason (King Mongkut's University of Technology, Thailand), Pisal Setthawong (Assumption University, Thailand)

17:10 – 17:30 **(1570295659)** Big Data Properties Designed for Customer Engagement Information via Multi-Channel Digital Services
Panant Krairojananan (Assumption University, Thailand), Sakuna Anuvareepong (Assumption University, Thailand)

17:30 – 17:50 **(1570307651)** Measuring Quality of Service for Mobile Internet Services
Edy Budiman (Universitas Mulawarman, Indonesia), Oki Wicaksono (Universitas Mulawarman, Indonesia)

17:50 – 19:00 **Break**

19:00 – 20:30 **Gala Dinner**

20:30 – 21:30 **Closing Ceremony**
1. Welcome speech by Governor of East Kalimantan
2. Welcome speech by Rector of Mulawarman University
3. Best Paper Award
4. Memorandum of Understanding Signing Ceremony
5. Invitation to 2017 3rd ICSITech by Rector of Universitas Pendidikan Indonesia
6. Miscellaneous Information
7. Closing

Day 2: Thursday, October 27th, 2016

08:00 – 16.00 **City Tour**

A Proposed Method for Predicting US Presidential Election by Analyzing Sentiment in Social Media

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Abstract—**US Presidential election is an event anticipated by US citizens and people around the world. By utilizing the big data provided by social media, this research aims to make a prediction of the party or candidate that will win the US presidential election 2016. This paper proposes two stages in research methodology which is data collection and implementation. Data used in this research are collected from Twitter. The implementation stage consists of preprocessing, sentiment analysis, aggregation, and implementation of Electoral College system to predict the winning party or candidate. The implementation of Electoral College will be limited only by using winner take all basis for all states. The implementations are referring from previous works with some addition of methods. The proposed method still unable to use real time data due to random user location value gathered from Twitter REST API, and researchers will be working on it for future works.**

Keywords—US Presidential election, sentiment analysis, social media

I. INTRODUCTION

Every four years, United States (US) held political event to elect a new president. This event known as US presidential election. The process to run the US presidential election is called electoral college. This event eagerly anticipated not only by US citizens, but also people around the world [1]. The popularity of predicting the US presidential election has been growing, especially in the academic realms [2].

Internet provides enormous data about any kind of topic. Previous research found that gathering data from internet can prove extremely useful for certain domains, including politics [3]. Social media is a part of internet, and it contributes most data in internet. Social media generates large-scale data that shown in a form of millions of users [4]. In this paper, we suggested to use social media as dataset, because social media is widely accessible and up to date [5]. Regarding the use of social media as dataset to predicting the winner of US Presidential election, no one can predict the real intention of user made the post about criticize, praise, or neutral about presidential candidates [6].

This paper proposes a method to predict the winning party or candidate in US presidential election in November 8th, 2016. The data gathered from social media will be processed in four phases: pre-processing, sentiment analysis to classify the sentiment of tweets by using Binary Multinomial Naïve

Bayes Classifier, sentiments aggregation to collect the votes, and implementation of Electoral College to predict the chosen party or candidate. Data are collected from Twitter REST API by applying queries about parties and candidates. It must be written in English.

However, there is a problem of using social media as dataset that can make data analysis more complicated [7]. Sometimes user wrote their post in daily structured language (e.g. emoticons, slangs, and abbreviation), since the proposed method analyze the data using textual analysis, it can lead to ambiguous extracted information [8]. As a limitation, the proposed method will only get the meaning of abbreviations only. Also, the proposed method only uses 'winner take all' basis for calculating the electors for all states (all electoral votes in a state will be given to candidate which get the majority).

II. LITERATURE REVIEW

Previously, there are some researches have been conducted to predict the US Presidential election, e.g. [1], [2], [4]. Some are using sentiment analysis to represents the casted vote. Each of them were using different data source, methods, and models.

Measuring the popularity of US Presidential candidates [1] might be a way to predict the US Presidential election, because it can represent the users interest about the candidates. The candidates analyzed in this researches are Barack Obama and Mitt Romney from US Presidential election 2012. This paper use Web 2.0 (i.e. Blogger, Google News, Twitter, Myspace, YouTube, and Facebook) as a data store, because it contains large amount of information from different users. One way to collect the linguistic dataset is by crawling the Web 2.0 contents. There are three steps of method used in this research: pre-processing, sentiment analysis using SentiWordNet, aggregate by candidate, and visualization presents the popularity graphs of the candidates.

Online search traffic can be a data source to predict US Presidential elections [2]. Online search is an information that presumes the searcher knowledge and motivation. Data are collected from Google Trends by using presidential candidate queries and issue queries, because it's freely available for

download. This paper use baseline model to predict the percentage popular vote of each party in each state. The problem is the search queries does not provide information about political ideology, age, gender, and user behavior. Furthermore, a query can show many unrelated topics that do not fit with presidential election.

Research [4] provides a systematic link between data grabbed from social media with real-world political behavior. Dataset are collected from Twitter, the Federal Election Commission, and the US Census Bureau. After dataset are collected, this research conducting some variables to find vote share for each district, then analyzing the variables by estimate the effect of Twitter on electoral outcomes using three ordinary least squares algorithm (OLS) models. This paper proves that social media can be a reliable data source about political behavior.

The other use of sentiment analysis is to determine the sentiment of product review [9]. This research proposed a method to do the sentiment analysis using advanced Naïve Bayes algorithm. 400 reviews are collected from three different people. The result shows that out of 400 reviews, 52% were labeled positive and 48% were labeled negative. Precision and recall are used to measure the accuracy.

The methods proposed in this paper is created by referring to mentioned previous researches. In this research, some features are contributed to optimize the prediction result. The main difference between this research and previous researches is that this research implementing the electoral college to decide the winning party or candidate, whereas the previous research use popularity votes to decide the winning party or candidate. By implementing the electoral college system, author hopes that the prediction result can be more accurate, because the methods used to adjust the actual situation or system. This research also contributes a feature to expand any abbreviations found in tweets to optimize the generated keywords, because some abbreviations have a certain quality keyword that could determine the sentiment of text.

III. THEORETICAL BASIS

A. Sentiment Analysis

Sentiment analysis is a technique for analyzing a large number of documents to obtain writer's sentiment on a topic [10]. Sentiment analysis uses Natural Language Processing (NLP) to collect opinion and examine opinion or sentiment words [11]. Based on [12], there are 2 important tasks in sentiment analysis. First, identify the opinion targets (aspects, entity, and topics). Second, construct the opinion lexicon (e.g. good, excellent, etc.). There are several methods to classify the sentiment of text, e.g. lexicon-based methods and learning-based methods. The example of lexicon-based methods is SentiWordNet and AFINN-111. Both SentiWordNet and AFINN-111 are a text lexicon that contains keyword or synset with its positive and negative sentiment score. Learning-based methods for sentiment analysis is a method that need to train its algorithm and use the knowledge to classify the sentiment.

The example of learning-based methods is Vector Space Model (VSM) and Naïve Bayes Classifier. There is various model of Naïve Bayes Classifier, e.g. Multinomial Naïve Bayes, Binary Multinomial Naïve Bayes, and Bernoulli Naïve Bayes.

B. Electoral College

Electoral College is a process to decide a president by gathering 538 (435 representatives, 100 senators, and 3 electors given to the District of Columbia) votes from electors for each state. The electors are selected by political parties and assigned into 50 states equal to its congressional representation [13]. Each state has different numbers of electors. Electors can vote their party or candidate if those electors win the popularity vote in its state. The electoral votes will be summed up to decide the winning party and candidate. Though a candidate lose the popular votes in a state, that candidate still have a chance to win the electoral college (happened to George W. Bush in 2000) [14], [15]. The proposed method uses 'winner take all' basis to decide the winning party or candidate. `Winner take all` will give all the casted electoral votes to the party or candidate which get the majority votes.

IV. RESEARCH METHODOLOGY

This paper proposed two stages in research methodology, i.e. data collection and implementation. The description of both stages in research methodology are explained bellow.

A. Data Collection

In this research, data are grabbed from Twitter REST API and must be written in English. The collected data must contain tweet status/text (excluding retweets), post time, username, and user location. Tweet status should mention any keyword about parties or candidates that participating in the US presidential election 2016 (e.g. republican, democrat, Hillary Clinton, Donald Trump). The tweets will represent the vote casted for its keyword related candidate. User location must be in one of 51 states that listed in Electoral College.

Corpus is needed to do learning-based sentiment analysis method such as Binary Multinomial Naïve Bayes. This research using Sentiment140 tweet corpus [16] that contains a total of 1,600,000 data train (divided into 800,000 data training for each positive and negative sentiment) and 497 data test (divided into 181 positive data, 177 negative data, and 139 neutral data). To minimize the processing time yet still generating good results, this research limits the data training used to 10,000 positive data and 10,000 negative. As for the data test, 181 positive data and 177 negative data (because data training only provide positive and negative data) were analyzed to test the performance of sentiment analysis method.

Abbreviations dictionary is needed to expand the abbreviations found in tweet status. The dictionary must contain the acronym and its meaning, e.g. LOL means laughing out loud, B/C means because, GF means girlfriend, CMIIW means correct me if I'm wrong. This dictionary are

gathered by from [17] content. Acronyms that only have a character (e.g. u for you, d for the, c for see) and have the same characters with English word (e.g. HOPE for Have Only Positive Expectation) do not included. Moreover, the acronyms that have multiple meaning (e.g. LML can means Laughing Mad Loud and Love My Life) do not included to prevent ambiguity.

Contraction dictionary is an array that contains list of contractions (e.g. I'm means I am, don't means do not, won't means will not, etc.). The contraction dictionary are made by referring from Cambridge Dictionary [18].

Stop words are common words that carry less important meaning than keywords [19]. This research use the free English stop words list downloaded from [20].

B. Implementation

The implementation consists of pre-processing, sentiment analysis, aggregation, and implementing electoral college to predict the winning candidate or party. Fig. 1 shows the part of implementation in sequence.
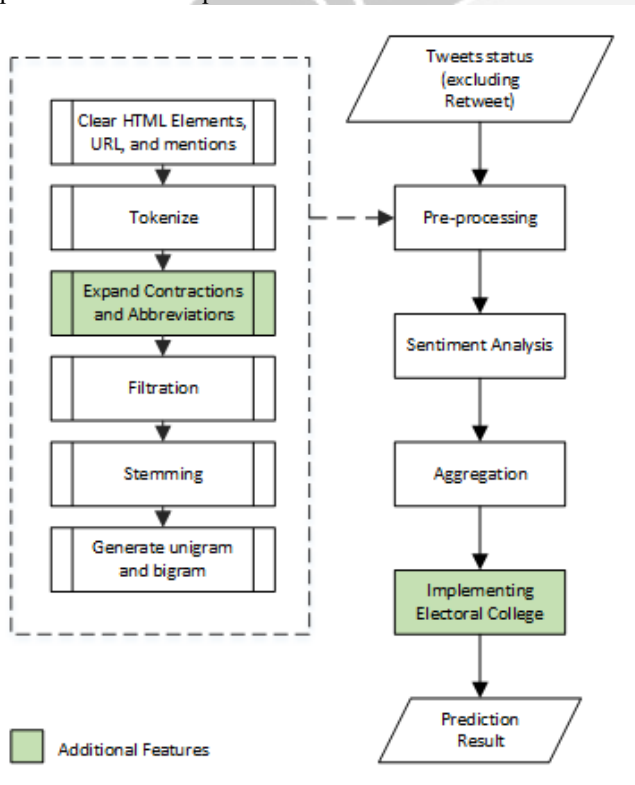
Fig. 1. Implementation flow chart

- *Pre-processing:* Tweets status must be pre-processed to get the valuable keywords or tokens. The HTML elements, URLs, and mentions (e.g. @username) should be removed from tweets status. Then, the 'clean' tweets status are tokenized into array of tokens or keywords (bag of words). All contractions and abbreviations found in the tokens will be expanded in accordance with its meaning as it exists in the abbreviations and contractions dictionary. Afterward,

remove the non-alphanumerical characters in tokens and remove every tokens that contained in stop words list to return the most relevant result [19]. The remaining tokens will be reduced to its base word (stem) using Porter Stemmer algorithm. This stage will end after the system generates the unigram and bigram from the tokens. This research only limits the n-gram to unigram and bigram to maximize the analysis process results, yet the process time won't be too long.

- *Sentiment Analysis:* The purpose of this stage is to classify the sentiments of tweets by calculating the sentiment score using Binary Multinomial Naïve Bayes Classifier. This classifier will generate positive and negative score for each tweet. Sentiment score is the subtraction of negative score from positive score. If the sentiment score is positive, then the tweet is classified as positive, and vice versa. There is a possibility for classifier to give zero sentiment score, if that happen, then the tweet is classified as neutral. Researchers have conducted a test using 3 type of sentiment classifiers, i.e. Binarized Multinomial Naïve Bayes Classifier, SentiWordNet, and AFINN-111. The purpose of the test is to measure precision, recall, accuracy, and F1 score for each sentiment between mentioned sentiment classifiers. Data test used to test those methods are 181 positive data and 177 negative data provided by Sentiment140. TABLE I shows the score of precision, recall, accuracy, and F1 score for each sentiment by using mentioned classifiers.

TABLE I. SENTIMENT ANALYSISIS METHOD TEST RESULT

Score/Method	AFINN-111	SentiWordNet	Binarized Multinomial NB
POSITIVE SENTIMENT DATA			
Precision	0.763889	0.656085	0.668246
Recall	0.604396	0.681319	0.774725
Accuracy	0.703911	0.656425	0.689944
F1-Score	0.674847	0.668464	0.717557
NEGATIVE SENTIMENT DATA			
Precision	0.881188	0.730159	0.722973
Recall	0.502825	0.519774	0.60452
Accuracy	0.72067	0.667598	0.689944
F1-Score	0.640288	0.607261	0.658462

Both AFINN-111 and Binary Multinomial Naïve Bayes deliver a good score. However, author decided to use Binarized Multinomial Naïve Bayes because it generates higher F1-score than AFINN-111.

- *Aggregation:* The purpose of this stage is to aggregate the sentiments of tweets to decide the winning electors for each state. The tweets sentiment will be used to represent the vote casted by the user who wrote the tweet status. If the sentiment of a tweet is positive, then the vote is given to the mentioned party or candidate. But, if the sentiment of a tweet is negative, the vote is given to the opposite of mentioned party or candidate. The electors chosen in a state are decided by popularity vote. The winning electors are the one who has the most votes.

- *Implementing Electoral College:* The electors who win the popularity vote in its state, must cast their electoral votes to the party that appointed them. The number of electoral votes are distributed according to the allocation of electors for each state. The party or candidate who get the most electoral votes is predicted to be the winner of US presidential election 2016.

V. Results and Discussion

This section explains the test results conducted by author by using the proposed method mentioned in research methodology. Researchers have made an application to test pre-processing and sentiment analysis (Fig. 2).

Fig. 2. Result of pre-processing and sentiment analysis using Binary Multinomial Naïve Bayes

As illustrated in Fig. 2, input text given is "@Haunted_Backlog @MrBCWalker @realDonaldTrump Yeah, for example: I'm an X Democrat now Independent who will be voting Republican. ;)" and the result of pre-processing is "yeah exampl x democrat independ vote republican yeah_exampl exampl_x x_democrat democrat_independ independ_vote vote_republican". The sentiment of pre-processed will be classified using Binary Multinomial Naïve Bayes Classifiers, the output positive and negative score is 9.62773742180278E-64 and 6.00664819642314E-66. By subtracting negative score from positive score, we found the sentiment score is 9.56767093983855E-64 that indicates the input classified into positive sentiment.

For further research, a test was conducted using real data collected from Twitter REST API by applying keywords about candidates and parties, i.e. "Donald Trump", "Hillary Clinton", "democrat", and "republican". A dataset that contains 400 tweets were collected. Researchers pick 100 tweets for each keywords and manually correct the location provided from the Twitter REST API response to match the preferred location in electoral college before saving it to database. Those tweets are collected from August 7, 2016 to August 15, 2016. The mentioned data already contains tweets

status, username, and user location as listed in electoral college. The purpose of this test is to clarify the implementation stage in research methodology. The result of this test is displayed in Fig. 3.

Fig. 3. Prediction result using data real

As illustrated in Fig. 3, the prediction result shows that Hillary Clinton (Democrat) win the election with total of 253 electoral votes, since Donald Trump (Republican) only got 219 electoral votes. Sum of both electoral votes are 472, whereas the total electoral votes for all states must be 538. It happened because the data real collected from Twitter only shows 48 states (total of states listed in electoral college is 51). States that are not included are Delaware (3 electoral votes), Montana (3 electoral votes), and West Virginia (5 electoral votes). The rest of the drawbacks is because the votes for both candidates are tie (e.g. Alabama in Fig. 3 has 3 votes for both democrat and republican).

VI. Conclusion

This paper proposes a method for predicting the US presidential election by using two stages: data collection and implementation. Previously, several research has been conducted to predict the US presidential election. The proposed method is created by referring the previous researches and adding some value (i.e. data collection technique, abbreviations and contractions dictionary, and the implementation of electoral college) to make the prediction more accurate and also adjust to the actual situation. There are some deficiencies found during research, i.e. there is a possibility that the tweets used as dataset were written by same user, in actual situation a person can only cast one vote. The proposed method can't decide the winning party or candidate if the votes is tie, because there are regulations about tiebreaking vote that decided by the senates that cannot be implemented in system. The implementation of electoral college unable to process real time data due to the random value of user location provided from Twitter REST API. For future work, it will be implemented using real time data. The

proposed method also can be used as a reference to do similar research about election in other country.

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