



PROCEEDING

#3rd

ISRITI 2020

Yogyakarta - Indonesia
10 December 2020

**ARTIFICIAL INTELLIGENCE
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3rd ISRITI 2020

2020 3rd International Seminar on Research of Information Technology and Intelligent Systems (ISRITI) took place 10 December 2020 in Yogyakarta, Indonesia

IEEE catalog number:	CFP20AAH-PRT
ISBN:	978-1-7281-8404-3

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Astuti, Yenni	3B.1	642	<i>Comparison of Feature Extraction for Speaker Identification System</i>
Asyrofi, Rakha	2A.5	332	<i>Extraction Dependency Based on Evolutionary Requirement Using Natural Language Processing</i>
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Bejo, Agus	3B.1	642	<i>Comparison of Feature Extraction for Speaker Identification System</i>
	1B.3	52	<i>Speaker Recognition Using Mel Frequency Cepstral Coefficient and Self-Organising Fuzzy Logic</i>
Belangour, Abdessamad	3A.4	638	<i>A Kubernetes Algorithm for scaling Virtual Objects</i>
Borman, Rohmat	2E.5	520	<i>Indonesian Traffic Sign Recognition For Advanced Driver Assistent (ADAS) Using YOLOv4</i>

Budi Setiawan, Fajar	1E.8	215	<i>Performance Enhancement in Macro-Femto Network Using a Modified Discrete Moth-flame Optimization Algorithm</i>
Budiman, Edy	2D.7	482	<i>Dayak Onion (Eleutherine palmifolia (L) Merr) as An Alternative Treatment in Early Detection of Dental Caries using Certainty Factor</i>
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Darari, Fariz	2D.2	457	<i>Benchmarking Explicit Rating Prediction Algorithms for Cosmetic Products</i>
Delfianti, Rezi	3E.3	716	<i>Energy Management Efficiency and Stability Using Passive Filter in Standalone Photovoltaic Sudden Cloud Condition</i>
Dewantara, Mahardira	2C.1	400	<i>Minimization of Power Losses through Optimal Placement and Sizing from Solar Power and Battery Energy Storage System in Distribution System</i>
Dirgantoro, Burhanuddin	2E.4	514	<i>Speaker Recognition For Digital Forensic Audio Analysis Using Support Vector Machine</i>
Djawas, Faizah	2F.6	562	<i>Measuring Instagram Activity and Engagement Rate of Hospital: A Comparison Before and During COVID-19 Pandemic</i>
Dwijayanti, Suci	3A.1	621	<i>Facial Expression Recognition and Face Recognition Using a Convolutional Neural Network</i>
Dwiputra, Richard	1E.6	203	<i>Network Attack Detection System Using Filter-based Feature Selection and SVM</i>
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Ekaniza, Raki	1A.5	21	<i>PSO-Learned Artificial Neural Networks for Activity Recognition</i>
Eko Sulisty, Meiyanto	2C.6	428	<i>Design and Development of Bit Error Measurement using FPGA for Visible Light Communication</i>
El Khalyly, Badr	3A.4	638	<i>A Kubernetes Algorithm for scaling Virtual Objects</i>
Elsa, Corry	2G.1	577	<i>Case Study: AppDynamics Application as Business Intelligence to Support Digital Business Operations at PT PGD</i>
Emanuel, Andi Wahyu Rahardjo	1C.3	100	<i>Influence Distribution Training Data on Performance Supervised Machine Learning Algorithms</i>
Engel, Ventje	1E.6	203	<i>Network Attack Detection System Using Filter-based Feature Selection and SVM</i>
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Fadhilah, Amanda	1D.8	170	<i>Measurement of Information Security Awareness Level: A Case Study of Online Transportation Users</i>
Fahmi, Fahmi	2B.4	371	<i>Development of The Personnel Monitoring System Using Mobile Application and Real-Time Database During the COVID19 Pandemic</i>
Fahrudin, Tresna	2A.7	344	<i>Indonesian Stock Price Prediction including Covid19 Era Using Decision Tree Regression</i>
Fanani, M.	1C.7	117	<i>Implementation of Maximum Power Point Tracking on PV System using Artificial Bee Colony Algorithm</i>
Faraby, Muhira	2C.4	418	<i>The Single Tuned Filter Planning to Mitigate Harmonic Pollution in Radial Distribution Network Using Particle Swarm Optimization</i>
Fardan, Fardan	1D.3	140	<i>Experimental Security Analysis for Fake eNodeB Attack on LTE Network</i>
Farrell, Mochammad	2E.3	505	<i>Combined Firefly Algorithm-Random Forest to Classify Autistic Spectrum Disorders</i>
Fatichah, Chastine	3C.2	661	<i>The Use of Pre and Post Processing to Enhance Mandible Segmentation using Active Contours on Dental Panoramic Radiography Images</i>
Ferdiansyah, Indra	1C.7	117	<i>Implementation of Maximum Power Point Tracking on PV System using Artificial Bee Colony Algorithm</i>

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Firdaus, Diaz	2D.6	476	<i>Topic-Based Tweet Clustering for Public Figures Using Ant Clustering</i>
Fitria, Irma	1G.8	306	<i>Ship Heading Control Using Nonlinear Model Predictive Control</i>
Fitriati, Andi	2C.4	418	<i>The Single Tuned Filter Planning to Mitigate Harmonic Pollution in Radial Distribution Network Using Particle Swarm Optimization</i>
Frannita, Eka	2E.2	499	<i>Supervised Deep Learning for Thyroid Nodules Classification Based on Margin Characteristic</i>
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Harintaka, Harintaka	2G.5	604	<i>Comparison of the Latest DTM with DEM Pleiades in Monitoring the Dynamic Peatland</i>
Hartanto, Rudy	2B.1	354	<i>The User Experience effect of Applying Floating Action Button (FAB) into Augmented Reality Anatomy Cranium Media Learning Prototype</i>
	2G.3	593	<i>Multi-Point Travel Destination Recommendation System In Yogyakarta Using Hybrid Location Based Service-Floyd Warshall Method</i>
Hasibuan, Siti	1B.3	52	<i>Speaker Recognition Using Mel Frequency Cepstral Coefficient and Self-Organising Fuzzy Logic</i>
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Hastuti, Puji	2G.4	599	<i>Application For Detection Of Pedestrian Position On Zebra Cross</i>
Hermawan, Tofan	1F.3	233	<i>Android Forensic Tools Analysis for Unsend Chat on Social Media</i>
Hermawati, Hermawati	3A.1	621	<i>Facial Expression Recognition and Face Recognition Using a Convolutional Neural Network</i>
Herumurti, Darlis	3C.2	661	<i>The Use of Pre and Post Processing to Enhance Mandible Segmentation using Active Contours on Dental Panoramic Radiography Images</i>
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Hidayat, Firhat	1E.6	203	<i>Network Attack Detection System Using Filter-based Feature Selection and SVM</i>
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Hindrayani, Kartika	2A.7	344	<i>Indonesian Stock Price Prediction including Covid19 Era Using Decision Tree Regression</i>
Husin, Zaenal	3A.1	621	<i>Facial Expression Recognition and Face Recognition Using a Convolutional Neural Network</i>
Hutami, Augustine	2E.2	499	<i>Supervised Deep Learning for Thyroid Nodules Classification Based on Margin Characteristic</i>
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Irnawan, Roni	2C.1	400	<i>Minimization of Power Losses through Optimal Placement and Sizing from Solar Power and Battery Energy Storage System in Distribution System</i>
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Julzarika, Atriyon	2G.5	604	<i>Comparison of the Latest DTM with DEM Pleiades in Monitoring the Dynamic Peatland</i>
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Karna, Nyoman	1D.3	140	<i>Experimental Security Analysis for Fake eNodeB Attack on LTE Network</i>
Karo, Ferdinanta	1G.3	278	<i>5G New Radio (NR) Network Planning at Frequency 2,6 GHz in The Gold Triangle Area of Jakarta</i>
Khairunnisa, Syifa	2D.5	471	<i>Removing Noise, Reducing dimension, and Weighting Distance to Enhance k-Nearest Neighbors for Diabetes Classification</i>
Komarudin, Udin	2F.5	551	<i>Development of Temperature and Humidity Control System in Internet-of-Things based Oyster Mushroom Cultivation</i>
Kouty, Shreyus	2C.8	439	<i>Multilayer Secure Hardware Network Stack using FPGA</i>
Krisnadi, Dion	1C.1	89	<i>Website Design for Locating Tuna Fishing Spot Using Naive Bayes and SVM Based on VMS Data on Indonesian Sea</i>
Kristiani, Eveline	2G.1	577	<i>Case Study: AppDynamics Application as Business Intelligence to Support Digital Business Operations at PT PGD</i>

Kunang, Yesi	1D.4	146	<i>Improving Classification Attacks in IOT Intrusion Detection System using Bayesian Hyperparameter Optimization</i>
Kurniawati, Yulia Ery	1B.1	42	<i>Papaya Disease Detection Using Fuzzy Naïve Bayes Classifier</i>
Kusnandar, Kusnandar	2F.5	551	<i>Development of Temperature and Humidity Control System in Internet-of-Things based Oyster Mushroom Cultivation</i>
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Mahardiko, Rahutomo	2G.7	615	<i>Validation of Information Technology Value Model for Petroleum Industry</i>
	2G.6	609	<i>Model Development of Information Technology Value for Downstream Petroleum Industry</i>
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Mardhotillah, Rinda	2E.4	514	<i>Speaker Recognition For Digital Forensic Audio Analysis Using Support Vector Machine</i>
Masngut, Ibnu	2B.2	360	<i>Development and Implementation of Kalman Filter for IoT Sensors: Towards a Better Precision Agriculture</i>
Maulana, Eka	1E.7	209	<i>Development of Smart Energy Meter Based on LoRaWAN in Campus Area</i>
Mawaldi, Ikkal	1D.3	140	<i>Experimental Security Analysis for Fake eNodeB Attack on LTE Network</i>
Mootha, Siddartha	3E.4	721	<i>A Stacking Ensemble of Multi Layer Perceptrons to Predict Online Shoppers' Purchasing Intention</i>
Mubarak, Husein	2B.5	377	<i>Prototype Design of IoT (Internet of Things)-based Load Monitoring System</i>
Muchtar, Akhyar	2C.4	418	<i>The Single Tuned Filter Planning to Mitigate Harmonic Pollution in Radial Distribution Network Using Particle Swarm Optimization</i>
Muchtar, Kahlil	2E.3	509	<i>Convolutional Network and Moving Object Analysis for Vehicle Detection in Highway Surveillance Videos</i>
Muflikhah, Laïlil	1A.8	37	<i>Prediction of Liver Cancer Based on DNA Sequence Using Ensemble Method</i>
Muharram, Muh.	2D.4	467	<i>Firefly Algorithm-based Optimization of Base Transceiver Station Placement</i>
Mujahidin, Irfan	1A.2	7	<i>Blackbox Testing Model Boundary Value of Mapping Taxonomy Applications and Data Analysis of Art and Artworks</i>
Muladi, Muladi	2B.4	371	<i>Development of The Personnel Monitoring System Using Mobile Application and Real-Time Database During the COVID19 Pandemic</i>
Mulyanto, Agus	2E.5	520	<i>Indonesian Traffic Sign Recognition For Advanced Driver Assistent (ADAS) Using YOLOv4</i>
Munadi, Rendy	1D.7	164	<i>DDoS Attack Detection in Software Defined Network using Ensemble K-means++ and Random Forest</i>
Mungkasi, Sudi	2A.2	321	<i>Some Numerical and Analytical Solutions to an Enzyme-Substrate Reaction-Diffusion Problem</i>
Mursanto, Petrus	2E.5	520	<i>Indonesian Traffic Sign Recognition For Advanced Driver Assistent (ADAS) Using YOLOv4</i>

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	1E.7	209	<i>Development of Smart Energy Meter Based on LoRaWAN in Campus Area</i>
	1D.2	135	<i>Interference Mitigation in Cognitive Radio Network Based on Grey Wolf Optimizer Algorithm</i>
	2G.4	599	<i>Application For Detection Of Pedestrian Position On Zebra Cross</i>
Muthchamy Sellamuthu, Karthika Devi	3E.4	721	<i>A Stacking Ensemble of Multi Layer Perceptrons to Predict Online Shoppers' Purchasing Intention</i>
Muttaqin, Didik	2D.3	463	<i>Speech Emotion Detection Using Mel-Frequency Cepstral Coefficient and Hidden Markov Model</i>
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Nafi'iyah, Nur	3C.2	661	<i>The Use of Pre and Post Processing to Enhance Mandible Segmentation using Active Contours on Dental Panoramic Radiography Images</i>
Nagy, Adam	3A.3	632	<i>A bio-motivated vision system and artificial neural network for autonomous UAV obstacle avoidance</i>
Najmurokhman, Asep	2F.5	551	<i>Development of Temperature and Humidity Control System in Internet-of-Things based Oyster Mushroom Cultivation</i>
Nam, Andrew	1A.1	1	<i>Resource-Aware Pareto-Optimal Automated Machine Learning Platform</i>
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Nashiruddin, Muhammad Imam	1F.6	251	<i>Performance Evaluation of XGS-PON Optical Network Termination for Enterprise Customer</i>
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Nasr-Azadani, Mohamad	1A.1	1	<i>Resource-Aware Pareto-Optimal Automated Machine Learning Platform</i>

Nasri, Muhammad	2B.1	354	<i>The User Experience effect of Applying Floating Action Button (FAB) into Augmented Reality Anatomy Cranium Media Learning Prototype</i>
Nguyen-Quoc, Huy	2D.1	451	<i>Gender recognition based on ear images: a comparative experimental study</i>
Nivaan, Goldy Valendria	1C.4	106	<i>Analytic Predictive of Hepatitis using The Regression Logic Algorithm</i>
Noer, Astriany	1G.4	284	<i>Modification of 2.2 GHz S-Band Rectangular Patch Microstrip Antenna using Truncated Corner Method for Satellite Applications</i>
	1G.5	289	<i>Design of Optimal Satellite Constellation for Indonesian Regional Navigation System based on GEO and GSO Satellites</i>
NQ, Mohammad Arifin	3A.2	627	<i>Stemming Javanese: Another Adaptation of the Nazief-Adriani Algorithm</i>
Nugraha, Syechu	2C.3	412	<i>Design and Implementation of SVPWM Inverter to Reduce Total Harmonic Distortion (THD) on Three Phase Induction Motor Speed Regulation Using Constant V/F</i>
	2C.2	406	<i>Three Phase Induction Motor Dynamic Speed Regulation Using IP Controller</i>
Nugroho, Hanung	2E.2	499	<i>Supervised Deep Learning for Thyroid Nodules Classification Based on Margin Characteristic</i>
Nugroho, Lukito	2G.3	593	<i>Multi-Point Travel Destination Recommendation System In Yogyakarta Using Hybrid Location Based Service-Floyd Warshall Method</i>
	2G.4	599	<i>Application For Detection Of Pedestrian Position On Zebra Cross</i>
Nur, Darfiana	2A.1	310	<i>On Parameter Estimation of Stochastic Delay Difference Equation using the Two m-delay Autoregressive Coefficients</i>
Nurdewanto, B.	1A.2	7	<i>Blackbox Testing Model Boundary Value of Mapping Taxonomy Applications and Data Analysis of Art and Artworks</i>
Nurfadillah, Raditya	2D.2	457	<i>Benchmarking Explicit Rating Prediction Algorithms for Cosmetic Products</i>
Nurlina, Elin	2F.5	551	<i>Development of Temperature and Humidity Control System in Internet-of-Things based Oyster Mushroom Cultivation</i>

Nurmaini, Siti	1D.4	146	<i>Improving Classification Attacks in IOT Intrusion Detection System using Bayesian Hyperparameter Optimization</i>
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Nurwarsito, Heru	1E.1	176	<i>Performance Analysis of Temporally Ordered Routing Algorithm Protocol and Zone Routing Protocol On Vehicular Ad-Hoc Network in Urban Environment</i>
Nusantara, Damai	2C.5	423	<i>Analysis of Performance Index in Transmission Expansion Planning of Sulawesi's Electricity System</i>
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Oktian, Yustus	1E.3	187	<i>TwoChain: Leveraging Blockchain and Smart Contract for Two Factor Authentication</i>
Osman, Safaa	1B.7	68	<i>Risk Prediction of Major Depressive Disorder using Artificial Neural Network</i>
P A B C D E F G H I J K L M N O P Q R S T U V W X Y Z			
Perkasa, Gregorius	1D.2	135	<i>Interference Mitigation in Cognitive Radio Network Based on Grey Wolf Optimizer Algorithm</i>
Permana, Indra	2F.1	534	<i>Effect of Android and Social Media User Growth on the Financial Technology Lending Borrowers and its Financing</i>
Permanasari, Adhistya	2B.1	354	<i>The User Experience effect of Applying Floating Action Button (FAB) into Augmented Reality Anatomy Cranium Media Learning Prototype</i>
Petho, Mate	3A.3	632	<i>A bio-motivated vision system and artificial neural network for autonomous UAV obstacle avoidance</i>
Prakoso, Rahardi	1D.8	170	<i>Measurement of Information Security Awareness Level: A Case Study of Online Transportation Users</i>
Pramono, Subuh	2C.6	428	<i>Design and Development of Bit Error Measurement using FPGA for Visible Light Communication</i>
Prasetya, Suisbiyanto	1G.4	284	<i>Modification of 2.2 GHz S-Band Rectangular Patch Microstrip Antenna using Truncated Corner Method for Satellite Applications</i>
Prasetyawan, Purwono	2E.5	520	<i>Indonesian Traffic Sign Recognition For Advanced Driver Assistent (ADAS) Using YOLOv4</i>

Prasetyo, Wisnu	2A.8	348	<i>Students Academic Performance Prediction with k-Nearest Neighbor and C4.5 on SMOTE-balanced data</i>
Prasojo, Radityo Eko	2D.2	457	<i>Benchmarking Explicit Rating Prediction Algorithms for Cosmetic Products</i>
Pratama, Denni	1A.4	17	<i>Comparison of PSO, FA, and BA for Discrete Optimization Problems</i>
Pratama, Gilang	2B.2	360	<i>Development and Implementation of Kalman Filter for IoT Sensors: Towards a Better Precision Agriculture</i>
Pratama, Raditya	2G.3	593	<i>Multi-Point Travel Destination Recommendation System In Yogyakarta Using Hybrid Location Based Service-Floyd Warshall Method</i>
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W 5 A B C D E F G H I L M N O P Q R S T U V W

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Analytic Predictive of Hepatitis using The Regression Logic Algorithm

Goldy V Nivaan
Magister Informatika
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
valendria17@gmail.com

Andi W. R. Emanuel
Magister Informatika
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
andi.emmanuel@uajy.ac.id

Abstract—Hepatitis is an inflammation of the liver which is one of the diseases that affects the health of millions of people in the world of all ages. Predicting the outcome of this disease can be said to be quite challenging, where the main challenge for public health care services itself is due to a limited clinical diagnosis at an early stage. So by utilizing machine learning techniques on existing data, namely by concluding diagnostic rules to see trends in hepatitis patient data and see what factors are affecting patients with hepatitis, can make the diagnosis process more reliable to improve their health care. The approach that can be used to carry out this prediction process is a regression technique. The regression itself provides a relationship between the independent variable and the dependent variable. By using the hepatitis disease dataset from UCI Machine Learning, this study applies a logistic regression model that provides analysis results with an accuracy rate of 83.33%.

Keywords—Hepatitis, Prediction Analysis, Regression Techniques, Public Health, Big Data

INTRODUCTION

Hepatitis is a chronic disease where when the person has been infected, the condition is still healthy and has not shown the typical symptoms and signs, but the transmission continues. This is what causes viral hepatitis referred to as an iceberg phenomenon, where registered patients or those who come to health services are fewer than the actual number of sufferers. Hepatitis can occur due to viruses, bacteria, drugs, alcohol consumption, excess fat, and autoimmune diseases[1], which has caused around 1.5 million deaths every year worldwide[2]. Hepatitis itself is divided into five types, namely hepatitis A, B, C, D, and E [1] [3][4] where the hepatitis is not related to one another.

Predicting hepatitis which is a global public health problem is challenging to do. In addition to being able to help in answering the need for a diagnosis at an early stage for decision making about health care as to what needs to be given, predictions can also provide a picture of an unknown future condition. The many techniques used in predictive analytic processes[5], with the help of variables used for measurement, the probabilities that emerge are expected to give reliable results.

In this study, a regression technique in machine learning used is logistic regression for the prediction of hepatitis by using a dataset obtained from the UCI Machine Learning Repository. This method looks at the relationship between independent variables or so-called predictors with the

dependent variable (target) of existing data[6]. Therefore, logistic regression can be used for datasets that have categorical variables and are used to solve classification problems, so this study aims to see how this logistic regression method can be used in predicting hepatitis using existing datasets and see what factors affect patients to be able to survive, and how the level of accuracy and predictive analysis provided. It is expected that later in this study can provide reliable predictive results and prove the use of appropriate methods.

RELATED WORKS

Machine learning is one of the effective ways that can be used in the biomedical world. This is seen from how machine learning approaches an approach to making good and automatic algorithms that can be used in the process of diagnosis or disease prediction for the decision making process [7] looking at the amount of data generated in the health field, and also the difficult data management process, various approaches are offered using existing machine learning methods[8].

Some research was carried out by looking at some parameters such as Age, Sex, Steroids, Antivirals, Fatigue, Malaise, Anorexia, Liver Big, Liver Firm, Spleen Palpable, Ascites Spiders, Arices, Bilirubin, Alk 'Phosphate', Sgot, Albumin, and Protine and Histology, to see the advantages of ensemble learning. Where the proposed method is the Neuro-Fuzzy Inference system with a better accuracy rate of 93.06%[2]. Another method that is also used is the Autoregressive integrated moving average (ARIMA) model and the generalized neural network (GRNN)[9], by analyzing data and initiating predictions of cirrhosis of the liver (chronic hepatitis C) namely Esophageal varices using various machine learning approaches available [10].

Looking at the performance analysis of several methods in machine learning for the process of diagnosis and predictive analysis [5] one of them with the highest accuracy of 84.52% given by the Naive Bayes method [6]. A hybrid artificial intelligence classifier is also proposed by applying the geometric margin maximization criteria of the LSVM (Lagrangian Support Vector Machine)[11] where this is to predict whether the patient will survive or die. By comparing the performance of logistic regression with some commonly used machine learning techniques[12], the study was conducted in addition to using existing datasets, also considering discussions with specialists in their fields[1], so that diagnosis and prediction are also made in patients with Necroinflammation with chronic hepatitis B (CHB) who do not experience clear clinical symptoms[3].

So by looking at various existing studies, then in this study used a logistic regression method that can provide accurate results and predictive analysis that can be relied upon to determine the factors that influence the survival of patients with hepatitis.

A. Logistics Regression

Logistic regression is a method for finding the best matching model by providing a relationship between the independent variable and the dependent variable. In the process, data analysis usually has many independent variables that help determine results. Also, it is only measured by variables that have two possible outcomes[6]. This method explains the results through a mathematical transformation that allows all values to be weighted with a value between 0 and 1 [13].

$$p = 1/1 + e^{-y} \quad (1)$$

Where $y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4$ and e being Euler's number. β_0 is the constant, β_1 is the coefficient for variable X_1 , β_2 is the coefficient for variable X_2 , and so on[14].

B. Classification of Performance Measures

In the process of evaluating the performance and classification results obtained, a performance metrics model is used which is explained as follows:

- 1) *Confusion Matrix*: one technique that can be used in measuring performance to find the truth and accuracy of a model. By providing information comparing the results of classifications conducted by the system with actual classification results. Most performance metrics are based on the confusion matrix and the numbers in it[13]. Following are the terms related to the confusion matrix, which can be seen in the following table:

TABLE I. CONFUSION MATRIX

Prediction Result	Real Situation	
	Positive Class	Negative Class
Positive Class	TP	FP
Negative Class	FN	TN

- True Positive (TP): is a condition in which the case is worked on, the data is true (positive data) and correctly predicted.
- False Negative (FN): is a condition where the actual class of data is true (positive) and predicted to be false or in other words, the model is predicted as negative data while the data is positive.
- False Positive (FP): is a condition in which the actual class of data points is false (is negative data) and predicted as positive data (true).
- True Negative (TN): is the condition of the actual data is wrong (negative data) and correctly predicted as negative data (false).

The following explains the two metrics that are also generated from the table above, namely precision (P) and recall (R):

$$P = \frac{TP}{TP+FP} \quad (2)$$

$$R = \frac{TP}{TP+FN} \quad (3)$$

The precision value is the ratio of positive true predictions compared to the overall positive predicted results, while the recall value aims to determine what the ratio of true positive predictions is compared to all true positive data.

2) Accuracy

Accuracy is the ratio of true (positive and negative) predictions to the overall data based on the confusion matrix table obtained. Accuracy calculations are obtained using the following formula:

$$Accuracy = \frac{TP+TN}{TP+FN+FP+TN} \quad (4)$$

3) F1-Score

Is a weighted average of the precision and recall values, which can be seen in the formula below:

$$F1\ Score = \frac{2*P*R}{P+R} \quad (5)$$

RESEARCH METHODOLOGY

There are several stages used in this study, which are explained in the figure below:

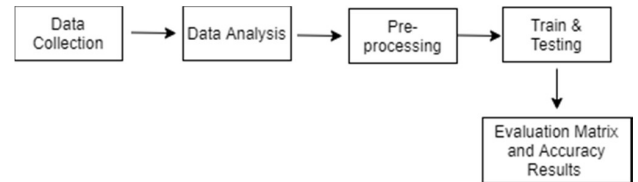


Fig. 1. Stages of the method implementation

In this study, the implementation phase starts with the process of collecting data, analyzing the process of checking the accuracy of the results obtained. More details are explained as follows :

1) Data collection

The process of data collection/collection of datasets needed in research. In this case, to predict hepatitis, the dataset used will be obtained from the UCI Machine Learning Repository[15].

2) Data analysis

In this process, the dataset that has been obtained is analyzed according to the needs of the study. Look at all the factors that exist in hepatitis and the relationship between one variable with another variable so that later it can be used optimally.

3) Data allowance / pre-processing

Doing data removal or cleaning by eliminating data that is not valuable or data that is not needed in the existing dataset for the prediction process.

4) Train & Test

After eliminating the data that is not needed, then the training and testing process is done using existing datasets. For this process, the data needs to be divided into two for training needs and the testing process.

5) Evaluation Matrix and Accuracy Results

From the existing training and testing stages, the results obtained are then checked for accuracy as to what, to then be made a conclusion on the desired prediction results and also as an analysis material needed in research.

RESULT AND DISCUSSION

In obtaining the results in this study, researchers used Python as a tool that helps in the analysis process to achieve accuracy. The process undertaken to achieve this begins with a preliminary analysis of the data that has been obtained from UCI Machine Learning to find out the interrelationships of information contained in the data. For hepatitis, based on small interviews conducted with relevant medical personnel and according to the data obtained are divided into two categories, namely clinical symptoms and laboratory examination results. Clinical symptoms consist of steroids, antivirals, fatigue, malaise, anorexia, liver big, liver firm, spleen palpable, spiders, ascites, varices, and histology while for the category of laboratory examination results consist of bilirubin, alk phosphate, SGOT, albumin, and protime.

After knowing the information contained in the data used by conducting the data analysis process, the next process is pre-processing the data. In this stage, the removal or removal of data that is not used or worthless is carried out. From 155 available data, it is obtained that there is valuable information on the attributes of steroids, fatigue, malaise, anorexia, liver big, liver firm, spleen palpable, spiders, ascites, varices, bilirubin, alk phosphate, SGOT, albumin, and protime. However, not all data that is valuable in these attributes is a large percentage. For more details, you can see the following picture:

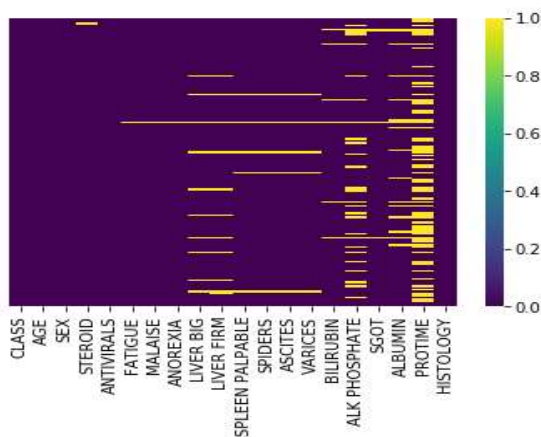


Fig. 2. Information that has no value in the dataset

In Figure 2, it can be seen that the attribute that has the most valuable information is protime so that in the process of

eliminating this data, the researcher removes all information that is not valuable in the dataset so that it can be used optimally in the next process. The remaining dataset after the pre-processing of data is 80 data. This data is then used to train and test data stages and obtain accuracy.

A. Train and Test data

In this process, the attributes contained in the data are divided into two, namely training data and testing data. The goal is to build a model using training data and predict output with its test data, by determining the dependent and independent variables as the initial step. In the training process, the value of x is expressed as an influence (independent variable) and the value of y is expressed as being influenced or dependent on the value of other variables (the dependent variable). The following tables 2 and 3 represent the two variables in question:

TABLE II. INPUT VARIABLE (INDEPENDENT VARIABLE)

No.	Attributes	Values
1	Age	7 - 78 years
2	Sex	Male, Female
3	Steroid	No, Yes
4	Antivirals	No, Yes
5	Fatigue	No, Yes
6	Malaise	No, Yes
7	Anorexia	No, Yes
8	Liver Big	No, Yes
9	Liver Firm	No, Yes
10	Spleen Palpable	No, Yes
11	Spiders	No, Yes
12	Ascites	No, Yes
13	Varices	No, Yes
14	Bilirubin	0.3 - 4.8
15	Alk Phosphate	26 - 295
16	Sgot	14 - 420
17	Albumin	2.1 - 5.3
18	Protime	21 - 100
19	Histology	No, Yes

TABLE III. OUTPUT VARIABLE (DEPENDENT VARIABLE)

No.	Attributes	Values
1	Class	Die, Live

In the two tables above, the x values consist of age, sex, steroid, fatigue, malaise, anorexia, liver big, liver firm, palpable spleen, spiders, ascites, varices, bilirubin, alk phosphate, SGOT, albumin, and protime. (output) is a class attribute that represents two conditions of hepatitis patients, namely death and/or survival.

After the process of determining input and output variables, the dataset used in the study is then divided by a percentage of 70% of the overall data used for the training process while for the testing process 30% of the entire dataset is used. Next is the use of the logistic regression model algorithm to train and test and predict the data.

B. Evaluation of Classification and Accuracy Results

The prediction stage is done by testing a predetermined dataset and through a training process that has been done before with the existing logistic regression model. The results obtained from the performance of the model are then calculated with evaluation metrics such as accuracy,

precision, and recall [4] to obtain a comparison of the resulting classification results. Obtaining the level of accuracy represents the ability of the existing algorithm in assessing the overall data. The higher the accuracy obtained, the better the classification[1]. Therefore, this study uses a confusion matrix to display the results of the analysis obtained. The following tables 4 and 5 are the results of a classification in the confusion matrix and other classification performance measures:

TABLE IV. CLASSIFICATION RESULTS IN THE CONFUSION MATRIX

Prediction Result	Real Situation	
	Positive Class	Negative Class
Positive Class	3	0
Negative Class	4	17

TABLE V. SHOWS OTHER CLASSIFICATION PERFORMANCE MEASURES

	Precision	Recall	F1 Score
Die	0.43	1.00	0.60
Live	1.00	0.81	0.89
Avg	0.71	0.90	0.75

Table 4 above shows the classification results generated by the system, with real and negative class real situation values consisting of a true positive, false negative, false positive, and true negative which indicate that 30% of the test data from all the datasets used, generated true prediction of true (positive) data has a value of 3, negative data condition (false) which is predicted as positive data (true) has a value of 0, positive data predicted to be false data (negative) has a value of 4 and negative data condition (false) and correctly predicted as negative data is 17.

While table 5 shows the performance measures with the evaluation metrics used. The first row represents the class "Die" with a precision value of 0.43, a recall value of 1.00, and an F-1 score of 0.60 while the second row in the table represents the "Live" class with a precision value of 1.00, recall 0.81, F-1 score 0.89. The avg is the average value of the two classes. With each value, a precision value of 0.71, recall of 0.90, and F-1 score of 0.75. The obtained accuracy level is 0.8333 or 83.33%; then, the results can be accepted.

Besides, from the data and analysis of research that has been done, it is known that patients suffering from hepatitis in addition to being seen through the results of existing laboratory examinations, in clinical symptoms, there are several factors that also most influence on patients who survive or die, including endurance body, diet and body needs for nutrition, and healthy liver function (big heart).

In existing patient data, these three factors are seen from clinical symptoms called antivirals, anorexia, and liver big. Therefore patients with hepatitis need to continue to maintain a healthy and balanced lifestyle and endurance.

CONCLUSION

The conclusions that can be conveyed from the results and discussions in this study are:

1. The use of logistic regression as a prediction method is good enough to answer the research objectives by obtaining an accuracy rate of 83.33%.
2. Factors that affect patients with hepatitis in addition to the results of laboratory tests, clinical symptoms that need to be considered are endurance, diet, and nutritional needs of the body, as well as maintaining healthy liver function through the two previous factors.

Future advice in research is to be able to use a larger and more complex amount of data, more directed by the types of hepatitis, and be able to make comparisons using more than one classification model.

ACKNOWLEDGMENT

The author would like to thank the financial support provided by the Magister Informatika at Universitas Atma Jaya Yogyakarta for this research.

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PROUDLY PRESENTED TO:

Goldy Valendria Nivaan and Andi Wahyu Rahardjo Emanuel (Universitas Atma Jaya Yogyakarta, Indonesia)

Authors of the Paper 1570691079 Entitled:

Analytic Predictive of Hepatitis using The Regression Logic Algorithm

for outstanding contribution at the 3rd ISRITI 2020
(International Seminar on Research of Information Technology & Intelligent Systems)
organized by STMIK AKAKOM YOGYAKARTA in collaboration with
the Indonesia Researcher & Scientist Institute (IRSI).
Yogyakarta - Indonesia, 10 December 2020

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Conference Chair



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