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Sultan Syarif Kasim Riau  
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# Sistem Informasi Intelligence

# Scientific Paper

**Mustakim, S.T., M.Kom.**

Program Studi Sistem Informasi  
Fakultas Sains dan Teknologi  
Universitas Islam Negeri Sultan Syarif Kasim Riau

Scopus<sup>®</sup>

| 57195383688 |

 **sinta**  
Science and Technology Index

| 5975719 |

 **ORCID**

| 0000-0001-8459-7200 |

 **Google**  
scholar

| uejbEgcAAAAJ |

<http://mustakim.predatech.org>



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## Overview

Pengertian Scientific Paper/ Karya Ilmiah  
Bagian dan Teknik Penulisan Scientific  
Paper/ Karya Ilmiah

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# Pengertian Scientific Paper

Sistem Informasi Intelligence



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## Scientific Paper

- Definisi dari pengertian Paper sebenarnya adalah makalah.
- Sedangkan yang membedakannya adalah **tujuan** dan **unsur di dalamnya**.
- Dibandingkan dengan makalah pada umumnya, unsur paper lebih banyak.





## Scientific Paper

- Paper (bukan paper craft) bisa dikatakan sebagai salah satu karya tulisan ilmiah yang memiliki hubungan erat dalam dunia pendidikan.
- Terkadang kita menyamakan antara makalah dengan paper. Padahal sebenarnya keduanya berbeda.





## Scientific Paper

- **Paper/ Artikel Ilmiah** adalah sebuah karangan faktual atau nonfiksi tentang suatu permasalahan yang dimuat di jurnal, majalah, atau buletin dengan tujuan untuk menyampaikan gagasan dan fakta, guna meyakinkan, mendidik, dan menawarkan solusi dari suatu permasalahan.
- **Paper/ Artikel Ilmiah** adalah suatu artikel yang memuat dan mengkaji suatu masalah tertentu dengan menggunakan kaidah-kaidah keilmuan.
- **Paper/ Artikel Ilmiah** sebagai bagian dari karya ilmiah adalah karya ilmu pengetahuan yang menyajikan fakta umum dan ditulis menurut metodologi penulisan yang baik dan benar



## Eigenvalue of Analytic Hierarchy Process as The Determinant for Class Target on Classification Algorithm

Mustakim<sup>1</sup>, Novia Kumala Sari<sup>2</sup>, Jasril<sup>3</sup>, Ismu Kusumanto<sup>4</sup>, Nurul Gayatri Indah Reza<sup>5</sup>  
<sup>1,2,3</sup>Puzzle Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>4,5</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>1</sup>Department of Informatics Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>2</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

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### ABSTRACT

Data mining has two main concepts of data distribution, namely supervised learning and unsupervised learning. The most easily recognizable concepts from data distribution is related to the dataset, with and without target class. Analytic Hierarchy Process (AHP) technique that carries the concept of pairwise comparison able to answer the problem related to the dataset, which is to change unsupervised to be supervised by determining eigenvalue value of each attribute and sub attribute in AHP method. The case study conducted in this issue is related to determining the target classes used to predict the success of a student learning in UIN Soeka Riau. The three main attributes are Procurement, Total Credits (SKS) and Number of Repeated Courses, each having eigenvalues of 0.219; 0.189 and 0.171 which become the feedback in the determination of the Target Timely Graduation (TG) or Possibility of Timely Graduation (PTG). The biggest consistency ratio generated in the AHP case is 9.4% in the GPA attribute. This research recommends that further research should use datasets that have been arranged based on experimental combinations of the three main attributes above, then applied to the classification or prediction algorithm. So that it would obtain a decision of accuracy from data used against the real result on the field.

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#### Corresponding Author:

Mustakim  
Puzzle Research Data Technology, Faculty of Science and Technology,  
UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 28293.  
Email: mustakim@uin-suska.ac.id

DATA MINING has two main concepts in the study of data distribution, namely supervised learning and unsupervised learning. In the science of data mining, accuracy becomes a major feedback in summing up the [1]. Apart from the accuracy issues, something that need to be analyzed in data mining is the distribution of training data and testing data for supervised learning. Faulty data distribution can lead to an undesired result [2]. The study conducted by Mustakim in 2017 states that the most optimal data distribution is by applying the clustering techniques [3]. Regardless of the accuracy and data distribution, another thing which is directly related to data mining is the process of determining a class. In machine learning, there are two approaches: supervised and unsupervised learning [4], supervised learning is an

## Comparison of DBSCAN and PCA-DBSCAN Algorithm for Grouping Earthquake Area

<sup>1\*</sup> Mustakim  
Department of Information System  
Puzzle Research Data Technology (Produtech)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru – Riau, Indonesia  
mustakim@uin-suska.ac.id

<sup>2\*\*</sup> Meduaniwi Rahmawati Munderir  
Department of Information System  
Puzzle Research Data Technology (Produtech)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru – Riau, Indonesia  
meduaniwirahmawati@uin-suska.ac.id

<sup>3\*</sup> Okfalisa  
Department of Informatic Engineering  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru – Riau, Indonesia  
okfalisa@uin-suska.ac.id

<sup>2\*\*</sup> Eri Rahmi  
Department of Information System  
Puzzle Research Data Technology (Produtech)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru – Riau, Indonesia  
erirahmi@students.uin-suska.ac.id

<sup>4\*</sup> Said Thaofik Rizaldi  
Department of Information System  
Puzzle Research Data Technology (Produtech)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru – Riau, Indonesia  
11753101376@student.uin-suska.ac.id

<sup>6\*</sup> Idris Main  
Department of Information System  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru – Riau, Indonesia  
idria@uin-suska.ac.id

**Abstract**—Geologically, the territory of Indonesia is where the three active tectonic plates meet which are always moving and colliding with each other, resulting in earthquakes, volcanic pathways, and faults. Earthquake is a natural disaster that cannot be avoided or prevented, but the consequences of earthquakes can be minimized. Based on data obtained from Meteorology, Climatology and Geophysics Agency (MCGA), earthquakes often occur in Indonesia. Data obtained from earthquakes can be grouped to map the area of earthquake occurrence and an analysis will be carried out to determine the characteristics of earthquake clustering areas. The clustering in this study conducted with two experiments, first experiment is Density-Based Spatial Clustering of Applications with Noise (DBSCAN) without dimensional reduction and second experiment is DBSCAN clustering with dimensional reduction using Principal Component Analysis (PCA). The best cluster results can be found by calculating the value of Silhouette Index (SI) of each cluster. From the two experiments, the highest SI value was obtained in experiment using PCA, which was 0.4137. Then the second experiment was used as the best cluster results with the highest Dept and Magnitude features in clusters 19 and 17 which showed the 5 main regions where earthquakes often occur are Sumatra, Banda Sea, Moluccan Sea, Irian Jaya and Sulawesi.

**Keywords**— Climatology and Geophysics Agency, DBSCAN, DBSCAN-PCA, Earthquake Area, PCA

### 1. INTRODUCTION

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duties in the fields of Meteorology, Climatology, Air Quality and Geophysics according to the law.

Based on data obtained from BMKG, the activity of earthquakes in Indonesia is very high, on average, 400 times earthquakes every month were recorded. In 1991 to 2007, there were 24 major earthquakes, including in Aceh on December 26th, 2004 earthquake with 9.3 RS power. This earthquake was followed by a large tsunami which caused the loss of hundred thousand lives and caused the loss of trillions rupiah in assets, as well as the Yogyakarta earthquake on May 26th, 2006 which caused severe infrastructure damage. The Padang earthquake on September 30 2009 with 7.9 on the Richter Scale (RS) reached 4.8 trillion rupiahs loss, with 1,195 people killed, 271,540 units damaged. An earthquake with a tsunami in Aceh 2004 claimed nearly 300,000 lives in Indonesia, Thailand, India, Sri Lanka, Maldives and Africa [2].

Earthquake is natural disaster that cannot be avoided or prevented, but the consequences of earthquakes can be minimized. The data obtained from the earthquake event can be grouped to find out the spread area of the earthquake and to map the area. By knowing the spread area of the earthquake, people who lives in the area can build earthquake resistant buildings to prevent earthquakes. Various clustering techniques in Data Mining

Clustering is a technique for grouping data objects into clusters. Clusters have a high degree of similarity between objects in other words. Density-Based Spatial Clustering of Applications with Noise (DBSCAN), DBSCAN is a partition-based cluster type where denser regions are considered clusters and areas with low density are called noise [4]. C. Konda Raj conducted a study which compared K-Means algorithm, K-Medoids, and





## Paper Journal

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- Melalui proses penilaian/ review oleh Penilai/ Reviewer dengan ketat
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### Eigenvale of Analytic Hierarchy Process as The Determinant for Class Target on Classification Algorithm

Mustakim<sup>1</sup>, Nova Kumala Sari<sup>2</sup>, Jauhari<sup>3</sup>, Irena Kusumawati<sup>4</sup>, Nurul Gayatri Indah Briza<sup>5</sup>  
<sup>1</sup>Pacific Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263  
<sup>2</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263  
<sup>3</sup>Department of Information Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263  
<sup>4</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263

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### Comparison of DBSCAN and PCA-DBSCAN Algorithm for Grouping Earthquake Area

<sup>1\*</sup> Mustakim  
Department of Information System  
Pacific Research Data Technology (Protecho)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
mustakim@iain-suka.ac.id

<sup>2\*</sup> Mediatrice Rahmawati Handayani  
Department of Information System  
Pacific Research Data Technology (Protecho)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
mediatrice.rahmawati@iain-suka.ac.id

<sup>3\*</sup> Orlinda  
Department of Informatics Engineering  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
orlinda@iain-suka.ac.id

<sup>4\*</sup> Saad Thaulik Hudaib  
Department of Information System  
Pacific Research Data Technology (Protecho)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
117510117@iain-suka.ac.id

<sup>5\*</sup> Irena Kusuma  
Department of Information System  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
iain@iain-suka.ac.id

Abstract—Geologically, the territory of Indonesia is where the three active tectonic plates meet which are always moving and colliding with each other resulting in earthquakes, volcano pathways, and tsunamis. Earthquake is a natural disaster that cannot be avoided or prevented, but the consequences of earthquakes can be minimized. Based on data obtained from Meteorology, Climatology and Geophysics Agency (BMKG), earthquakes often occur in Indonesia. Data obtained from earthquakes can be grouped to map the area of earthquake occurrence and an analysis will be carried out to determine the characteristics of earthquake clustering areas. The clustering in this study conducted with two experiments, first experiment is Density-Based Spatial Clustering of Applications with Noise (DBSCAN) without dimensional reduction, second experiment is DBSCAN clustering with dimensional reduction using Principal Component Analysis (PCA). The best cluster result can be found by calculating the value of Silhouette Index (SI) of each cluster. From the two experiments, the highest SI value was obtained in experiment using PCA, which is 0.84377. Then the second experiment can be used as the best cluster result with the highest Dap and Magnitude features in clusters 19 and 17 which showed the 8 main regions where earthquakes often occur are Sumatera, Bangka Sea, Malacca Sea, Irian Jaya and Sulawesi.

Keywords—Climatology and Geophysics Agency, DBSCAN, DBSCAN-PCA, Earthquake Area, PCA

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Clustering technique is the process of grouping a set of data objects into several groups or clusters so that objects in a cluster have a high similarity, but will be different from objects in other clusters [3]. The clustering technique used is Density-Based Spatial Clustering of Applications with Noise (DBSCAN). DBSCAN is a partition-based cluster type where denser regions are considered cluster and areas with low density are called noise [4]. C. Kandel Bag conducted a study which compared K-Means algorithm, K-Medoids, and





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<sup>1</sup>Pacific Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263  
<sup>2</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263  
<sup>3</sup>Department of Information Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263  
<sup>4</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 29263

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<sup>1\*</sup> Mustakim  
Department of Information System  
Pacific Research Data Technology (Prodatex)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
mustakim@iain-syriakarya.ac.id

<sup>2\*</sup> Mediatrice Rahmawati Handayani  
Department of Information System  
Pacific Research Data Technology (Prodatex)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
mediatrice.rahmawati@iain-syriakarya.ac.id

<sup>3\*</sup> Orlinda  
Department of Information Engineering  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
orlinda@iain-syriakarya.ac.id

<sup>4\*</sup> Era Rizki  
Department of Information System  
Pacific Research Data Technology (Prodatex)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
era@iain-syriakarya.ac.id

<sup>5\*</sup> Saad Thaidh Roudy  
Department of Information System  
Pacific Research Data Technology (Prodatex)  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
11751017@iain-syriakarya.ac.id

<sup>6\*</sup> Irena Kusuma  
Department of Information System  
Universitas Islam Negeri Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
ir@iain-syriakarya.ac.id

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**Improving Stock Price Prediction with GAN-Based Data Augmentation**

Juhua Bana Albrethan  
Universitas Gadjah Mada  
Tuban Department of Electrical and Information Engineering, Universitas Gadjah Mada  
Email: juhua.bana.albrethan@gmail.com

**ABSTRACT**  
The stock price is one of the most studied time series data because it is deemed to be profitable. Despite its, however stock price data is still difficult to predict because it is non-linear, non-parametric, non-stationary, and chaotic. One of the methods that most recently used to predict stock price data is deep learning. Although deep learning has a good performance to solve various problems, deep learning must be trained using a lot of data so this method will experience overfitting. This paper proposes a scheme to train a classifier model for predicting stock price time series data using augmented time-series data generated using GAN. The evaluation shows that the classifier model trained using augmented data has better performance on the AMZN and FB stock price datasets.

**Keywords:**  
GAN  
Time-series Forecasting  
Data augmentation  
Deep learning

**Corresponding Author:**  
Juhua Bana Albrethan  
Department of Electrical and Information Engineering,  
Universitas Gadjah Mada,  
R. Graha No. 2, Kampus UGM, Sindhuji, Mlati, Sewidenan, Sindhuji, Kec. Mlati, Kabupaten Sleman,  
Daerah Istimewa Yogyakarta 55281  
Email: juhua.bana.albrethan@ugm.ac.id  
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**1. INTRODUCTION**  
The stock price is one of the most studied time series data because it is deemed to be profitable. Despite its, however stock price data is still difficult to predict because it is non-linear, non-parametric, non-stationary, and chaotic [1]. One of the methods that most recently used to predict stock price data is deep learning, this method is based on a multi-layered perceptron inspired by the brain's neural network. Deep learning methods have been widely used to solve various problems such as image classification [2], speech recognition [3], sentiment analysis [4], and time series prediction [5, 6].  
There have been many studies that use deep learning models to forecast time series data. One deep learning architecture that is widely used for sequence data is a recurrent neural network (RNN). The RNN model has been applied to predict the S&P 500 stock price by using various features such as stock price, moving average, and volume [5]. In this study, it was shown that the performance of this model outperformed other models, the LSTM filter. This method has been applied to 50 other stock prices and produces better predictions than the previous methods.  
One of the most popular variants of RNN is LSTM. LSTM's performance in predicting the stock market has been tested by [6]. In this paper the three models, basic RNN, GRU, and LSTM are tested to predict Google's stock price. The results of this study prove that LSTM outperforms the other two models.  
Yang et al. [7] designed a multi-layered perceptron to predict the stock market in China, this model was trained using backpropagation and Adam as an optimizer. The results of this study indicate that the model offered is able to have good accuracy [8] offers a deep learning model with a combination of Long Short-Term Memory (LSTM) and Convolutional Neural Network (CNN). In this method, LSTM is used as the first layer whose output will be used as input from the next layer which is CNN. This method outperforms the performance of the previous methods.

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**Automatic Car Detection Using Haar Cascade Classifier and Convolutional Neural Network for Traffic Density Estimation**

Miftahul Haasah, Galih Qurik Okhanga Pratomo, Hatri Eugger Pevandri  
Program Studi Informatika, Fakultas Teknik, Universitas Nur Jidat Probolinggo  
Email: \*haasah14@gmail.com, Galih.qurik@gmail.com, Hatri.eugger@gmail.com

**ABSTRACT**  
Based on a survey released by the TomTom Traffic Index in 2019, Indonesia was ranked seventh in the category of the most congested country in the world. One of the factors affecting traffic congestion in Indonesia is an inefficient and conventional traffic management system. Therefore, it is necessary to have a better traffic management system such as a Smart Traffic Light. One way to implement a smart traffic light system is to use a vehicle detection and counting system on the traffic CCTV video automatically. The method used in this research are Haar Cascade Classifier and Convolutional Neural Network. Haar Cascade Classifier has fast computation process and CNN is applied to validate the detection results of the Haar Cascade method for better accuracy. The average level of accuracy achieved by the system on quiet test data is 82%, normal test data is 69%, and busy test data is 69%. Meanwhile, the average computation time needed by the system for the quiet test data is 0.63 seconds, the normal test data is 0.32 seconds, and the busy test data is 1.05 seconds. Based on the trial results, combining the two methods can increase the accuracy and speed on the computation time required by the system.

**Keywords:**  
Traffic Density Estimation  
Haar Cascade  
CNN

**Corresponding Author:**  
Miftahul Haasah,  
Program Studi Informatika Fakultas Teknik,  
Universitas Nur Jidat,  
J.R. Sili, Jalan Mayor Karangganyu Paltan Probolinggo,  
Email: haasahm31@gmail.com  
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**1. INTRODUCTION**  
The increasing volume of vehicles number in Indonesia that is increasing rapidly has led to an increase in traffic density thus becoming one of the main factors causing a traffic jam [1]. A traffic jam or vehicle accumulation on the road is the result of transportation sector increase in Indonesia and inadequate road infrastructure development [2]. Apart from being caused by the number of vehicles operating, another cause of the congestion problem has not been resolved until now is a conventional system that is applied to most traffic lights. The current traffic light regulation is considered less flexible because it does not pay attention to the actual road conditions.  
The implementation of a better traffic light system management can reduce a traffic jam in Indonesia, one of the ways is by implementing a Smart Traffic Light System. The Smart Traffic Light System is a system that is regulated based on the actual traffic conditions on the road, where the duration of the traffic light is determined based on the queue length of the vehicle at each road junction. The earliest step to implement the Smart Traffic Light System is building a detection and counting system for the number of vehicles in traffic.  
Various studies have been conducted by test several object detection methods to find a better method applied for vehicle object recognition in traffic. In the year 2016, research with the title "Simulation and Analysis of Image Processing-Based Smart Traffic Light System Digital with Edge Detection and Segmentation Methods" was carried out by [3]. Edge detection is used to determine the boundary of an object before image segmentation processing that can classify an object. The results obtained from this study is a system to determine which segment has the longest queue by calculating the length of contours on each road

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# Unsur Utama Scientific Paper

- Judul dan Nama Penulis
- Abstrak
- Pendahuluan (Memuat Penelitian Terkait)
- Metodologi Penelitian dan Bahan
- Hasil dan Analisis
- Kesimpulan
- Referensi

Indonesian Journal of Electrical Engineering and Computer Science  
Vol. 12, No. 3, December 2018, pp. 1257-1264  
ISSN: 2502-4752, DOI: 10.11591/ijeecs.v12.i3.pp1257-1264 □ 1257

### Eigenvalue of Analytic Hierarchy Process as The Determinant for Class Target on Classification Algorithm

Mustakim<sup>1</sup>, Novia Kumala Sari<sup>2</sup>, Jasri<sup>3</sup>, Ismu Kusumanto<sup>4</sup>, Nurul Gayatri Indah Reza<sup>5</sup>  
<sup>1,2,3</sup>Puzzle Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>4,5</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>6</sup>Department of Informatics Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>7</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

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Article Info	ABSTRACT
<p><b>Article history:</b> Received Feb 21, 2018 Revised Jul 10, 2018 Accepted Aug 5, 2018</p> <p><b>Keywords:</b> AHP Classification Eigenvalue Timely graduation</p>	<p>Data mining has two main concepts of data distribution, namely supervised learning and unsupervised learning. The most easily recognizable concepts from data distribution is related to the dataset, with and without target class. Analytic Hierarchy Process (AHP) technique that carries the concept of pairwise comparison able to answer the problem related to the dataset, which is to change unsupervised to be supervised by determining eigenvalue value of each attribute and sub attribute in AHP method. The case study conducted in this issue is related to success of a student keep on Procurement, Tom each having eigenvalue feedback in the determination of Timely C generated in the AHP, recommends that further arranged based on output above, then applied to it would obtain a decision in the field.</p> <p style="text-align: right;">Copyright ©</p>

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**Corresponding Author:**  
Mustakim  
Puzzle Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 28293  
Email: mustakim@uin-suska.ac.id

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**1. INTRODUCTION**  
Data mining has two main concepts in the study of unsupervised learning. In the science of data mining, accurate results obtained [1]. Apart from the accuracy issues, somewhat related to the distribution of training data and testing data (it will be fatal to desired result [2]). The study conducted by Mb distribution is by applying the clustering techniques [3]. Re another thing which is directly related to data mining is learning, there are two approaches: supervised and unsup

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1. INTRODUCTION

Geographically, the territory of Indonesia is at the meeting point of three active tectonic plates, namely the Indian-Australian Plate on the south, the Eurasian Plate on the north and the Pacific Plate on the east. The three plates meet and collide with each other so that the Indo-Australian Plate dips through the Eurasian plate and causes convection, volcanic activity, and faults [1]. The Meteorology, Climatology and Geophysics Agency (BMKG) is carrying out government

### Comparison of DBSCAN and PCA-DBSCAN Algorithm for Grouping Earthquake Area

<sup>1\*</sup> Firdaus Rabbah  
Department of Information System  
Puzzle Research Data Technology (PuzzleTech)  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
firdd@iain-suska.ac.id

<sup>2\*</sup> Maulana Rahmawati Mandira  
Department of Information System  
Puzzle Research Data Technology (PuzzleTech)  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
maulana@iain-suska.ac.id

<sup>3\*</sup> Orlinda  
Department of Informatics Engineering  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
orlinda@iain-suska.ac.id

<sup>4\*</sup> Alvin Matus  
Department of Information System  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
alvin@iain-suska.ac.id

<sup>5\*</sup> Firdaus Rabbah  
Department of Information System  
Puzzle Research Data Technology (PuzzleTech)  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
firdd@iain-suska.ac.id

<sup>6\*</sup> Maulana Rahmawati Mandira  
Department of Information System  
Puzzle Research Data Technology (PuzzleTech)  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
maulana@iain-suska.ac.id

<sup>7\*</sup> Orlinda  
Department of Informatics Engineering  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
orlinda@iain-suska.ac.id

<sup>8\*</sup> Alvin Matus  
Department of Information System  
Universitas Islam Sultan Syarif Kasim Riau  
Pekanbaru - Riau, Indonesia  
alvin@iain-suska.ac.id

Abstract: Earthquake is natural disaster that cannot be avoided or prevented, but the consequences of earthquake can be minimized. The data obtained from earthquake event can be grouped to map the area of earthquake occurrence and an analysis will be carried out to determine the characteristics of earthquake occurrence. The clustering in this study is related to the earthquake. Data clustering is done using DBSCAN (Density-Based Spatial Clustering of Applications with Noise) algorithm. The results of the experiment are compared with the results of DBSCAN clustering with distance reduction using Principal Component Analysis (PCA). The best cluster results can be found by calculating the value of Silhouette Index (SI) of each cluster from the five experiments, the highest SI value is obtained in experiment using PCA, which is 0.8177. When the second experiment is used as the best cluster results with the highest First and Maximum Silhouette in cluster 19 and 7 which showed that 8 main regions where earthquake often occur are Sumatra, Banda Sea, Malacca Sea, Great Java Sea and Molucca.

**Keywords:** Clustering and Geophysics Agency, DBSCAN, DBSCAN-PCA, Earthquake Area, PCA.

1. INTRODUCTION

Geographically, the territory of Indonesia is at the meeting point of three active tectonic plates, namely the Indian-Australian Plate on the south, the Eurasian Plate on the north and the Pacific Plate on the east. The three plates meet and collide with each other so that the Indo-Australian Plate dips through the Eurasian plate and causes convection, volcanic activity, and faults [1]. The Meteorology, Climatology and Geophysics Agency (BMKG) is carrying out government

data in the field of Meteorology, Climatology, Air Quality and Geophysics according to the law.

Based on data obtained from BMKG, the activity of earthquakes in Indonesia is very high, on average, 400 times earthquakes every month were recorded. In 1991 to 2007, there were 24 major earthquakes, including in Aceh, on December 26th, 2004 earthquake with 9.3 RS power. This earthquake was followed by a large tsunami which caused the loss of hundreds thousand lives and caused the loss of billions of dollars in assets, as well as the earthquake on May 20th, 2006 which caused severe infrastructure damage. The Padang earthquake on September 30, 2009 with 7.5 on the Richter Scale (RS) reached 4.8 million people live, with 1,175 people killed, 271,500 are disabled. An earthquake with a tsunami on Aceh 2004 claimed nearly 300,000 lives in Indonesia, Thailand, India, Sri Lanka, Maldives and Africa [2].

Earthquake is natural disaster that cannot be avoided or prevented, but the consequences of earthquake can be minimized. The data obtained from earthquake event can be grouped to find out the spread area of the earthquake, people who lives in the area can build earthquake resistant buildings to minimize the loss that can be caused by earthquakes. This grouping was done using clustering techniques in Data Science field.

Clustering technique is the process of grouping a set of data objects into several groups or clusters so that objects in a cluster have a high similarity, but will be different from objects in other clusters [3]. The clustering technique used is Density-Based Spatial Clustering of Applications with Noise (DBSCAN). DBSCAN is a partitioned cluster type where dense regions are considered clusters and areas with low density are called noise [4]. C. Kordakoglu conducted a study which compared K-Means algorithm, K-Medoids, and



## Judul dan Nama Penulis

Indonesian Journal of Electrical Engineering and Computer Science  
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<sup>1,2,5</sup>Puzzle Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

<sup>1,2,5</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

<sup>3</sup>Department of Informatics Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

<sup>4</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

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## Abstrak

**Abstrak** merupakan isi atau rangkuman dari keseluruhan paper yang telah dibuat, namun diringkas hingga menjadi satu paragraf panjang dan biasanya butuh 200-250 kata untuk memenuhi abstrak hingga menjadi sangat singkat (jelas).

Beberapa bagian dari abstrak adalah:

- Kalimat pendahuluan tentang penelitian (1-2 kalimat)
- Permasalahan utama penelitian/ research gap (2-3 kalimat)
- Motivasi/ Inovasi/ Penyelesaian Masalah dari permasalahan yang ada (2-3 kalimat)
- Hasil dari penelitian/ hal baru yang ditemukan (4-5 kalimat)
- Kalimat penutup/ simpulan keseluruhan (1-2 kalimat)



## Abstrak

### ABSTRACT

Data mining has two main concepts of data distribution, namely supervised learning and unsupervised learning. The most easily recognizable concepts from data distribution is related to the dataset, with and without target class. Analytic Hierarchy Process (AHP) technique that carries the concept of pairwise comparison able to answer the problem related to the dataset, which is to change unsupervised to be supervised by determining eigenvalue value of each attribute and sub attribute in AHP method. The case study conducted in this issue is related to determining the target classes used to predict the success of a student learning in UIN Suska Riau. The three main attributes are Procrastination, Total Credits (SKS) and Number of Repeated Courses, each having eigenvalues of 0.319; 0.189 and 0.171 which become the feedback in the determination of the Target Timely Graduation (TG) or Possibility of Timely Graduation (F<sub>TG</sub>). The result of the AHP method generated in the AHP case is 9.4% recommends that further research s arranged based on experimental coml above, then applied to the classificati would obtain a decision of accuracy fr the field.

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### ABSTRAK

Ilmu data mining memiliki dua konsep utama dalam kajian jenis pembagian data, yaitu supervised learning dan unsupervised learning. Dua konsep tersebut yang paling mudah dikenali adalah terkait dengan dataset, yaitu memiliki kelas target dan tidak memiliki kelas target. Teknik Analytic Hierarcy Process (AHP) yang mengusung konsep perbandingan berpasangan mampu menjawab permasalahan terkait dataset, yaitu mengubah unsupervised menjadi supervised dengan menentukan nilai eigenvalue dari setiap atribut dan sub atribut pada metode AHP. Studi kasus yang diselesaikan dalam permasalahan ini adalah terkait penentuan kelas target yang digunakan untuk memprediksi keberhasilan studi mahasiswa di UIN Suska Riau. Tiga atribut utama yaitu Prokrastinasi, Total SKS dan Jumlah Mata Kuliah Mengulang yang masing-masing memiliki nilai eigen 0,319; 0,189 dan 0,171 menjadi tolak ukur dalam penentuan kelas target Lulus Tepat Waktu (LTW) atau Kemungkinan Lulus Tepat Waktu (KLTW). Rasio konsistensi terbesar yang dihasilkan pada kasus AHP adalah 9,4% pada atribut IPK. Penelitian ini merekomendasikan untuk penelitian selanjutnya hendaknya menggunakan dataset yang telah disusun berdasarkan kombinasi percobaan dari ketiga atribut utama diatas, diterapkan pada algoritma kalasifikasi atau prediksi. Sehingga diperoleh sebuah keputusan akurasi terhadap data yang digunakan dengan hasil ril dilapangan.



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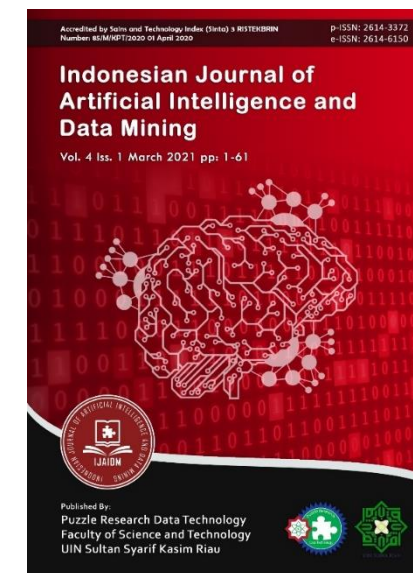
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## Pendahuluan

**Pendahuluan** atau Introduction pada dalam sebuah paper, biasanya berisi tulisan garis besarnya dari permasalahan yang hendak dibahas, pada sebuah paper hanya berisi disekripsi singkat tentang permasalahan atau hal yang akan dibahas, kenapa dan apa tujuan dalam permasalahannya itu.

Dalam pendaluan harus mengikuti beberapa kaidah berikut:

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- Merujuk karya sebelumnya dan harus ada kontribusi/ state of the art
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## Pendahuluan

Beberapa bagian yang dibahas dalam pendahuluan:

- Deskripsi yang jelas tentang permasalahan dan tujuan dari penelitian tersebut.
- Tunjukkan/ beritahu mengapa permasalahan ini penting, menantang dan menarik untuk di bahas (motivasi).
- Sedikit review singkat dan jelas mengenai penelitian sebelumnya, sehingga menjadi dasar penelitian kita (scope).
- Tunjukkan gap/ masalah yang ada pada penelitian sebelumnya, agar menjadi pertanyaan yang akan kita selesaikan dalam penelitian kita.
- Tulis dengan jelas solusi yang diusulkan (proposed approach) dan bagaimana ia bisa mengatasi masalah yang kita sebutkan sebelumnya (solution).
- Tulislah secara global penemuan yang dihasilkan (result).
- Lalu tuliskan struktur penulisan bagian-bagian berikutnya (outline).



## Pendahuluan

### PENDAHULUAN

Data Mining memiliki karakteristik dalam melakukan proses untuk mencapai sebuah hasil yang diinginkan. Dalam ilmu data mining, akurasi menjadi sebuah tolak ukur utama dalam menyimpulkan hasil yang didapatkan (Gupta et al, 2011) (Han et al, 2011). Selain dari permasalahan akurasi hal yang perlu dianalisis dalam data mining adalah terkait dengan pembagian data latih dan data uji untuk jenis supervised learning. Pembagian data yang salah akan berakibat fatal terhadap hasil yang ingin dicapai (Wei dan Dunbrack, 2013). Penelitian yang dilakukan oleh Mustakim pada tahun 2017 menyatakan bahwa pembagian data yang paling optimal adalah dengan menerapkan teknik clustering (Mustakim, 2017). Terlepas dari akurasi dan pembagian data, hal lain yang berkaitan langsung dengan data mining adalah proses penentuan sebuah kelas. Dalam machine learning, terdapat dua pendekatan yaitu supervised dan unsepervised learning (Isfahani, 2015), supervised learning adalah sebuah pendekatan dimana sudah terdapat data yang dilatih, dan terdapat variable yang ditargetkan sehingga tujuan dari pendekatan ini adalah mengelompokan suatu data ke data yang sudah ada (Sathya, 2013). Kondisi ini mewajibkan sebuah data set perlu memiliki variabel kelas untuk memprediksikan data yang baru (Kalhori and Zeng, 2014).

Beberapa jenis algoritma yang termasuk kedalam kelompok supervised learning yang sering digunakan dan telah dilakukan perbandingan adalah K-Nearest Neihngboar (K-NN), Probabilistic Neural Network (PNN) dan K-Nearest Centroid Neighbor (KNCN) (Tamouk and Allahakbari, 2012); Naïve Bayes, Decision Tree dan K-NN (Ashari et al, 2013); Artificial Neural Network (ANN) dan Support Vector Regression (SVR) (Mustakim et al, 2016). Dari berbagai penelitian tesrbut diperoleh beragam hasil dari setiap perbandingan antara algoritma satu dengan yang lain. Selanjutnya, penelitian yang melibatkan algoritma-algoritma tersbut menggunakan data pelatihan yang memiliki atribut kelas target, karena sifatnya yang perlu melakukan pembelajaran (Paulin and Santhakumaran, 2011).

Penelitian ini mencoba melakukan simulasi studi kasus berdasarkan dataset yang berasal dari observasi lapangan, wawancara dan peoses akuisisi data dari beberapa pakar. Tujuan utama adalah mengumpulkan data yang bersifat unsupervised learning menjadi supervised learning sebagai model prediksi. Berdasarkan

Algorithms for Pattern Classification, International Journal of Advanced Research in Artificial Intelligence (IJARAI), 2(2), pp. 34-38

**Commented [MM6]:** Sharareh R. Niakan Kalhori, Xiao-Jun Zeng. 2014. Improvement the Accuracy of Six Applied Classification Algorithms through Integrated Supervised and Unsupervised Learning Approach. Journal of Computer and Communications, 2(1), pp. 201-209

**Commented [MM7]:** Jamshid Tamouk, Farshid Allahakbari. 2012. A comparison among accuracy of KNN, PNN, KNCN, DANN and NFL. International Journal of Computer Science Issues (IJCSI), 9(3). pp. 319-322.

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## Pendahuluan

hasil pengumpulan data, variabel dan observasi terdapat 7 variabel dan 38 sub variabel yang digunakan dalam menentukan prediksi kelulusan tepat waktu Mahasiswa di UIN Sultan Syarif Kasim Riau Indonesia. Permasalahan yang terjadi adalah tidak adanya variabel kelas target dalam data set yang digunakan untuk melakukan prediksi tersebut. Sedangkan salah satu syarat supervised learning adalah adanya kelas target (Kaura et al, 2015). Namun demikian, pada penelitian yang dilakukan terdapat beberapa asumsi yang dapat dilakukan penentuan variabel target yaitu dengan cara melakukan perbandingan berpasangan terhadap semua variabel yang digunakan.

Keterkaitan perbandingan antara satu variabel dengan variabel yang lain sering digunakan istilah dengan pemodelan Decision Making. Algoritma yang sangat terkenal adalah Analytic Hierarchy Process (AHP) dan Analytic Network Process (ANP) (Triantaphyllou and Mann, 1995) (Khademi et al, 2014). AHP dan ANP memiliki beberapa keunggulan diantaranya mampu menyelesaikan persoalan-persoalan yang rumit dalam hal pengambilan keputusan (Balubaid and Alamoudi, 2015), memiliki validasi yang baik karena menggunakan nilai konsistensi (Whitaker, 2007) dan mampu merepresentasikan persepsi manusia kedalam matriks (Saaty, 1990) (Wedley, 1993). Terkait dengan AHP dan ANP terdapat suatu acuan dalam menentukan keputusan yaitu berdasarkan nilai eigenvalue (Xuli, 1997) (Saaty, 2003). Nilai Eigen direpresentasikan dari masing-masing variabel kriteria dan variabel alternatif dengan mengacu kepada nilai rasio konsistensi (Saaty, 2008).

Dalam kasus ini, percobaan kombinasi perbandingan berpasangan Metode AHP akan implementasikan untuk penentuan variabel kelas pada algoritma Data Mining khususnya klasifikasi dan prediksi. Pada beberapa penelitian, AHP hanya dikombinasikan dengan sesama jenis algoritma Multi Attribute Decision Making (MADM) seperti Technique For Others Reference by Similarity to Ideal Solution (TOPSIS) dan Simple Additive Weighting (SAW) dengan penerapan pengambilan keputusan saja (Kusumawardani and Agintiara, 2015) (Fox et al, 2016) (Afsari et al, 2017). Oleh karena itu, hasil akhir dari penelitian ini adalah bagaimana memperoleh variabel terbaik dari serangkaian variabel yang digunakan serta mendapatkan variabel kelas target dataset yang akan digunakan dalam proses prediksi kelulusan tepat waktu Mahasiswa.

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## Metodologi Penelitian dan Bahan

- Sebuah paper yang baik harus ada ulasan tentang metodologi seperti apa dan kegunaannya dalam pembuatan karya ilmiah.
- Biasanya dijelaskan dengan gambar atau bagan/ flowchart sebagai tujuan untuk mempermudah pemahaman para pembaca dalam memahami isi paper.
- Jelaskan pula deskripsi masing-masing bagian dalam gambar jika ada.
- Penulisan Metodologi dan Bahan biasanya tergantung dari masing-masing publisher

### Eigenvalue of Analytic Hierarchy Process as The Determinant for Class Target on Classification Algorithm

Mustakim<sup>1</sup>, Navia Kumala Sari<sup>2</sup>, Jazril<sup>3</sup>, Isnu Kusumanto<sup>4</sup>, Nurul Gayatri Indah Reza<sup>5</sup>

<sup>1,2,3</sup>Puzzle Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

<sup>4,5</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

<sup>6</sup>Department of Informatics Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

<sup>7</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

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Data mining has two main concepts of data distribution, namely supervised learning and unsupervised learning. The most easily recognizable concepts from data distribution is related to the dataset, with and without target class. Analytic Hierarchy Process (AHP) technique that carries the concept of pairwise comparison able to answer the problem related to the dataset, which is to change unsupervised to be supervised by determining eigenvalue value of each attribute and sub attribute in AHP method. The case study conducted in this issue is related to determining the target classes used to predict the success of a student learning in UIN Sultan Riau. The three main attributes are Procurement, Total Credit (SKS) and Number of Repeated Courses, each having eigenvalues of 0.119, 0.189 and 0.171 which become the feedback in the determination of the Target Timely Graduation (TTG) or Possibility of Timely Graduation (PTG). The biggest consistency ratio generated in the AHP case is 9.0% in the GPA attribute. This research recommends that further research should use datasets that have been arranged based on experimental combinations of the three main attributes above, then applied to the classification or prediction algorithm. So that it would obtain a decision of accuracy from data used against the real result on the field.

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#### Corresponding Author:

Mustakim  
Puzzle Research Data Technology, Faculty of Science and Technology,  
UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 28293.  
Email: mustakim@uin-suka.ac.id

#### 1. INTRODUCTION

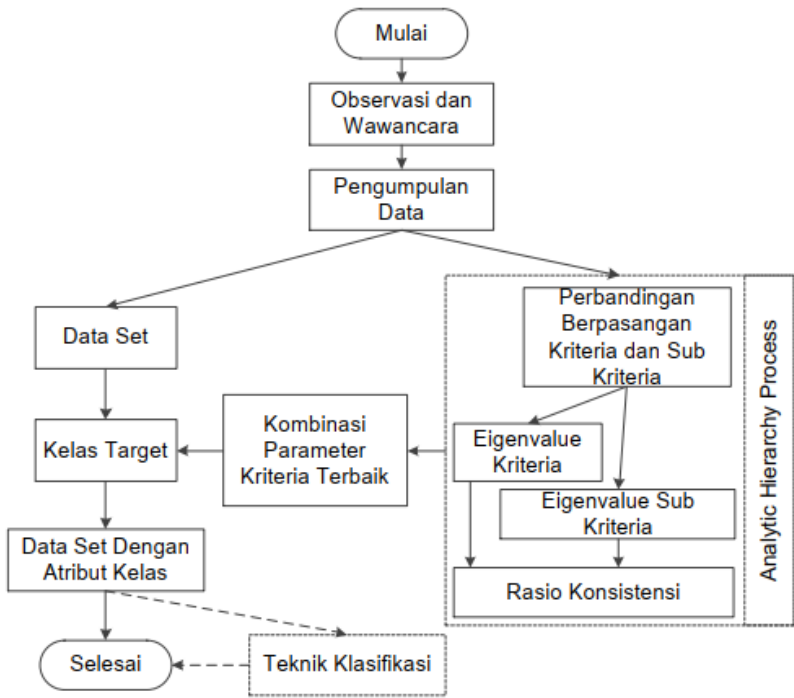
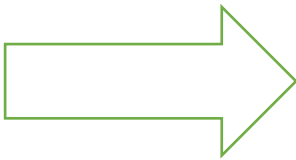
Data mining has two main concepts in the study of data distribution, namely supervised learning and unsupervised learning. In the science of data mining, accuracy becomes a major feedback in summing up the results obtained [1]. Apart from the accuracy issues, something that need to be analyzed in data mining is related to the distribution of training data and testing data for supervised learning. Fairly data distribution will be fatal to desired result [2]. The study conducted by Mustakim in 2017 states that the most optimal data distribution is by applying the clustering technique [3]. Regardless of the accuracy and data distribution, another thing which is directly related to data mining is the process of determining a class. In machine learning, there are two approaches: supervised and unsupervised learning [4], supervised learning is an



## Metodologi Penelitian dan Bahan

### METODOLOGI PENELITIAN

Kegiatan ini dimulai dengan mencari literatur review dan mendiskusikan perihal kelulusan tepat waktu Mahasiswa di UIN Suska Riau dengan Dosen pembimbing tugas akhir, dosen dibidang psikologi mahasiswa, unit pimpinan Fakultas dan Mahasiswa. Beberapa hal yang dilakukan dalam kegiatan tersebut adalah mengumpulkan data primer, observasi dan wawancara kemudian melakukan perbandingan berpasangan kepada pakar untuk melakukan akuisisi pengetahuan kedalam basis pengetahuan. Secara umum metodologi penelitian dapat ditunjukkan pada gaml



Gambar 1. Metodologi Penelitian



## Metodologi Penelitian dan Bahan

Bahan 1: SL dan UL disertai dengan rujukan/ citation

umum metodologi penelitian dapat ditunjukkan pada gambar 1.

### Supervised and Unsupervised Learning

Supervised learning adalah sebuah pendekatan teknik machine learning dimana sudah terdapat data yang dilatih, dan terdapat variable yang ditentukan, sehingga tujuan dari pendekatan ini adalah mengelompokan suatu data kedalam data yang sudah ada (Blume and Matthes, 2012) (I Tarassenko and S Roberts, 1994) (Carneiro et el, 2007) (Wei and Kosorok, 2013). Sedangkan unsupervised learning tidak memiliki data latih, sehingga dari data yang adadapat dikelompokkan menjadi beberapa bagian sesuai dengan kebutuhan (I Tarassenko and S Roberts, 1994) (Jennifer and Brodley, 2004).

### Klasifikasi

Klasifikasi adalah salah satu teknik dalam data mining yang digunakan untuk mengklasifikasikan data ke dalam kelas yang telah ditentukan (Agrawal, 2014). Dalam klasifikasi terdapat variabel target yang disebut dengan kelas. Model ini akan menguji kumpulan data yang berisi informasi variabel atau atribut berdasarkan variabel input atau prediktor (Okfalisa et al, 2017) (Larose, 2005). Selain sebagai teknik pengkelasan, klasifikasi juga berfungsi untuk melakukan prediksi secara terus menerus, pemodelan tersebut dapat dikatakan sebagai prediktor (Han et al, 2011).

Supervised Learning Approaches to Classify Sudden ...

**Commented [MM25]:** I Tarassenko, S Roberts, "Supervised and unsupervised learning in radial basis ...

**Commented [MM26]:** Gustavo Carneiro, Antoni B. Chan, Pedro J. Moreno, Nuno Vasconcelos, "Supervised Learning ...

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Bahan 2: Klasifikasi disertai rujukan/ citation





## Metodologi Penelitian dan Bahan

Bahan 3: AHP – Tabel disertai dengan rujukan/ citation

### Analytic Hierarchy Process (AHP)

AHP merupakan sebuah metode yang mengkombinasikan antara kuantitatif dan kualitatif, yang diusulkan oleh Thomas L. Saaty dari American Operation Research tahun 1970 (He and An, 2016). Metode AHP dapat mengatasi permasalahan-permasalahan kompleks pada kasus pengambilan keputusan. Elemen dari sebuah keputusan dibagi menjadi beberapa bagian yang terdiri dari target, atribut atau kriteria dan solusi, yang sering disebut dengan penyelesaian masalah berdasarkan sub-sub level tertentu (He and An, 2016) (Wei and Li, 2010) (Balubaid and Alamoudi, 2015). Skala penilaian pada AHP dapat ditunjukkan pada Tabel 1 berikut (Saaty, 2008):

Tabel 1. Skala Penilaian Perbandingan Berpasangan Saaty

Intensitas	Keterangan	Penjelasan
1	Kedua elemen <u>sama pentingnya</u>	Dua elemen mempunyai pengaruh yang sama besar terhadap tujuan
3	Salah satu elemen <u>sedikit lebih penting</u>	Pengalaman dan penilaian sedikit menyokong satu elemen dibandingkan elemen yang lainnya
5	Salah satu elemen <u>jelas lebih penting</u>	Pengalaman dan penilaian sangat kuat menyokong satu elemen dibandingkan elemen yang lainnya
7	Salah satu elemen <u>sangat jelas lebih penting</u>	Suatu elemen yang kuat disokong dan dominan terlihat dalam praktek
9	Salah satu elemen paling lebih penting	Bukti yang mendukung elemen yang satu terhadap elemen yang lain memiliki tingkat penegasan tertinggi yang mungkin menguatkan
2,4,6,8	Apabila ragu-ragu antara dua nilai yang berdekatan	Nilai ini diberikan bila ada dua kompromi diantara dua pilihan
Kebalikan	Jika untuk aktivitas i mendapat suatu angka dibandingkan dengan aktivitas j, maka j mempunyai nilai kebalikannya dibandingkan dengan i	

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## Hasil dan Analisis

- Inilah bagian penting dalam sebuah paper, yaitu mengenai percobaan, sebuah eksperimen atau riset yang kita lakukan terhadap suatu hal seperti data yang akan digunakan, jumlah data, sumber dan lain sebagainya.
- Perlu sedikit ketelitian yang baik, karena beberapa hal yang mendasar itu akan tertuang dalam sebuah paper.
- Bagian ini juga akan mendeskripsikan dan memvisualisasikan seluruh hasil dari penelitian yang dikerjakan

### Eigenvalue of Analytic Hierarchy Process as The Determinant for Class Target on Classification Algorithm

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## Hasil dan Analisis

- Pemecahan pada poin ini adalah hal-hal atau issue yang ingin disampaikan dari penelitian yang telah dilakukan.
- Semua berisikan ide-ide menarik atau gagasan pada sebuah permasalahan tentang apa yang ingin disampaikan kepada para pembaca dan biasanya berupa opini atau saran.
- Bagian ini terkadang disebut juga dengan analisis dari sebuah penelitian

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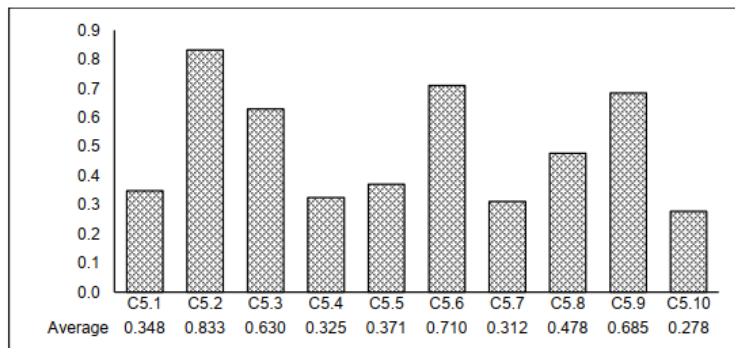




## Hasil dan Analisis

### Perbandingan Berpasangan Atribut AHP

Berdasarkan Tabel 1 skala perbandingan berpasangan yang dikemukakan oleh Saaty terkait dengan perbandingan setiap atribut/ kriteria yang menjadi acuan dasar dalam penilaian yang didasarkan pada persepsi manusia. Dalam penilaian pada penelitian ini disimulasikan oleh Pakar Pertama dengan matriks perbandingan yang ditunjukkan pada Tabel 2



Gambar 3. Rata-rata eigen pada atribut Prokrastinasi

Jika dilihat dari Gambar 3 diatas dapat disimpulkan bahwa sub atribut C5.2, C5.6 dan C5.9 sangat mempengaruhi attribute Prokrastinasi dimana sub atribut tersebut adalah Menunggu Teman Bimbingan, Menunda Mengerjakan Tugas Akhir dan Menunggu Penyelesaian Laporan Teman. Hal tersebut sangat mempengaruhi keterlambatan mahasiswa dalam menyelesaikan studinya.

Dari penilaian seluruh attribute dan sub atribut perbandingan berpasangan AHP diperoleh nilai Rasio Konsistensi terkecil adalah 0,023 atau 2,3% pada penilai ke 2 atribut Kepercayaan Diri dan nilai Rasio Konsistensi terbesar berada pada Atribut IPK dengan nilai 0,094 atau 9,4% pada Penilai ke 4. Namun demikian semua penilaian masih tetap berada dibawah 10% yang artinya penilaian dinyatakan Konsisten.

Untuk keseluruhan penilaian perbandingan berpasangan yang dilakukan oleh 4 orang pakar menghasilkan nilai eigen rata-rata atribut utama adalah IPK (0,054), Total SKS (0,189), Mengambil Mata Kuliah Tugas Akhir disemester 7 (0,050), Jumlah Mata Kuliah Mengulang (0,171), Prokrastinasi (0,319), Kepercayaan Diri (0,125) dan Disiplin (0,092). Secara detail dapat ditunjukkan pada Tabel 4 berikut:

Tabel 4. Nilai eigen atribut utama untuk keseluruhan penilai

Atribut	Penilai 1	Penilai 2	Penilai 3	Penilai 4
C1	0.035	0.082	0.066	0.032
C2	0.317	0.115	0.031	0.293
C3	0.058	0.046	0.042	0.055
C4	0.172	0.167	0.223	0.121
C5	0.153	0.448	0.376	0.298
C6	0.166	0.056	0.181	0.098
C7	0.099	0.086	0.081	0.103
Total	1,000	1,000	1,000	1,000

Berdasarkan tabel 4 diatas dapat dilihat bahwa atribut Prokrastinasi memiliki nilai potensi yang sangat tinggi sebagai faktor utama keberhasilan Mahasiswa, hal tersebut menjadi sebuah temuan bahwa dalam penentuan tepat waktu studi bisa berpotensi besar dipengaruhi oleh atribut Prokrastinasi (C5), kemudian disusul oleh atribut Total SKS (C2) dan Jumlah Mata Kuliah Mengulang (C4). Atribut Prokrastinasi terdiri dari 10 sub atribut dengan rata-rata eigen sebagai berikut:



Tabel 5. Acuan Kombinasi Penentuan Kelas Variabel

Atribut	C4	C2	C5	Class
Combination 1	Yes	Yes	Yes	LTW
Combination 2	Yes	Yes	No	KLTW
Combination 3	Yes	No	Yes	KLTW
Combination 4	No	Yes	Yes	KLTW

## Hasil dan Analisis

### Dataset untuk Klasifikasi

Proses selanjutnya adalah melakukan kombinasi penentuan kelas variabel yang didasarkan dari tabel 5 diatas. Sebanyak 112 data yang diperoleh dari penyebaran kuesioner kepada Mahasiswa terkait dengan permasalahan keterlambatan masa studi, diperoleh data lengkap yang telah memiliki Kelas Target yang ditunjukkan pada Tabel 6 berikut:

Tabel 6. Dataset dengan Kelas Target yang telah ditentukan

No	Kode	C1	C2	C3	C4	C5	C6	C7	Kelas Target
1	SI026	2.99	149	9	0	2	3	3	KLTW
2	SI028	2.93	140	6	1	2	3	3	KLTW
3	SI029	3.53	146	0	1	1	3	3	LTW
4	SI030	3.05	150	3	1	2	3	3	KLTW
5	SI037	3.18	149	5	0	2	3	3	KLTW
6	SI042	3.33	142	0	1	1	3	3	LTW
7	SI043	3.3	146	0	1	1	3	3	LTW
8	SI051	3	146	0	1	2	3	3	LTW
9	SI055	3.02	146	2	1	1	3	3	LTW
10	SI057	3.4	146	0	1	1	3	3	LTW
...	...	...	...	...	...	...	...	...	...
112	SI034	3.32	149	0	1	2	2	2	LTW

Secara umum terdapat temuan bahwa keberhasilan Mahasiswa untuk mencapai studi tepat waktu sangat dipengaruhi oleh tiga aspek utama yaitu Prokrastinasi, Total SKS dan Jumlah Mata Kuliah Mengulang. Sedangkan atribut yang lain seperti IPK, Ambil Mata Kuliah di Semester 7, Kepercayaan Diri dan Disiplin sebagai atribut pendukung, namun tidak bisa diabaikan. Oleh karena itu, novelty dari riset ini adalah adanya atribut utama dan atribut pendukung untuk melakukan prediksi keberhasilan mahasiswa. Selanjutnya, teknik Unsupervised learning dapat digunakan untuk proses yang berhubungan erat dengan dataset yang bersifat Supervised learning, seperti prediksi dan klasifikasi. Kelemahan dari penelitian ini adalah dalam menentukan perbandingan berpasangan yang sifatnya persepsi manusia terkadang memiliki nilai yang sangat jauh antara satu penilai dengan penilai yang lain, sehingga banyaknya pakar mempengaruhi nilai eigen yang dihasilkan. Sementara terkait dengan dataset, riset ini belum dilakukan validasi terhadap hasil

Dataset yang awalnya tidak memiliki kelas target atau yang lebih dikenal dengan unsupervised learning, dengan proses penentuan kombinasi dan perbandingan berpasangan AHP dapat memiliki variabel/ atribut kelas target. Dataset tersebut selanjutnya dapat digunakan untuk proses klasifikasi dan prediksi keberhasilan masa studi Mahasiswa untuk data baru. Klasifikasi dapat dilakukan dengan menerapkan Algoritma Back Propagation Neural Network (BPNN), Probabilistic Neural Network (PNN), Learning Vector Quantification (LVQ) serta Algoritma Klasifikasi yang lain.



## Kesimpulan

- Kesimpulan merupakan bagian dari jawaban atas tujuan penelitian yang dilakukan
- Penulisan kesimpulan hendaknya ditulis dengan padat, singkat dan jelas namun dapat menjelaskan secara keseluruhan dari penelitian dan isi paper
- Kesimpulan dapat memuat saran yang diberikan penulis untuk keberlanjutan riset yang dikerjakan untuk dikembangkan, atau kritikan/ kelemahan dari penelitian yang dikerjakan utk dapat disempurnakan kedepannya

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Timely graduation

#### ABSTRACT

Data mining has two main concepts of data distribution, namely supervised learning and unsupervised learning. The most easily recognizable concepts from data distribution is related to the dataset, with and without target class. Analytic Hierarchy Process (AHP) technique that carries the concept of pairwise comparison able to answer the problem related to the dataset, which is to change unsupervised to be supervised by determining eigenvalue value of each attribute and sub attribute in AHP method. The case study conducted in this issue is related to determining the target classes used to predict the success of a student learning in UIN Suka Riau. The three main attributes are Procrastination, Total Credit (SKS) and Number of Repeated Courses, each having eigenvalues of 0.319, 0.189 and 0.171 which become the feedback in the determination of the Target Timely Graduation (TTG) or Possibility of Timely Graduation (PTG). The biggest consistency ratio generated in the AHP case is 9.9% in the GPA attribute. This research recommends that further research should use datasets that have been arranged based on experimental combinations of the three main attributes above, then applied to the classification or prediction algorithm. So that it would obtain a decision of accuracy from data used against the real result on the field.

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#### Corresponding Author:

Mustakim  
Puzzle Research Data Technology, Faculty of Science and Technology,  
UIN Sultan Syarif Kasim Riau, Pekanbaru-Riau, Indonesia 28293.  
Email: mustakim@uin-suka.ac.id

#### 1. INTRODUCTION

Data mining has two main concepts in the study of data distribution, namely supervised learning and unsupervised learning. In the science of data mining, accuracy becomes a major feedback in summing up the results obtained [1]. Apart from the accuracy issues, something that need to be analyzed in data mining is related to the distribution of training data and testing data for supervised learning. Faulty data distribution will be fatal to desired result [2]. The study conducted by Mustakim in 2017 states that the most optimal data distribution is by applying the clustering technique [3]. Regardless of the accuracy and data distribution, another thing which is directly related to data mining is the process of determining a class. In machine learning, there are two approaches: supervised and unsupervised learning [4], supervised learning is an





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## Kesimpulan

### **KESIMPULAN**

Berdasarkan penelitian yang dilakukan yang diterapkan pada studi kasus prediksi keberhasilan studi mahasiswa di UIN Suska Riau dengan ini dapat disimpulkan bahwa atribut utama yang menjadi tolak ukur untuk mengetahui tingkat keberhasilan mahasiswa yaitu prokrastinasi dengan memiliki nilai eigen terbesar dibandingkan dengan yang lain. Sedangkan pada sub atributnya hal yang sangat berpengaruh pada prokrastinasi adalah atribut menunggu teman bimbingan dan menunda pengerjaan tugas akhir. Empat kombimasi yang dilakukan dalam menentukan kelas target untuk dataset supervised learning pada kasus ini adalah prokrastinasi, total SKS dan Jumlah Mata Kuliah Mengulang. Ketiga atribut tersebut digabungkan dengan empat atribut yang lain menjadi satu kesatuan pada dateset yang dibangun untuk proses klasifikasi dan prediksi. Rasio konsistensi dari atribut dan sub atribut rata-rata menunjukkan persentase yang kecil atau menjauhi dari 10%, dengan demikian penilaian dianggap sangat konsisten.



## Referensi

- Referensi yang digunakan hendaknya terbaru (5 tahun terakhir) dan berasal dari rujukan jurnal yang baik/bereputasi
- Memaksimalkan referensi berasal dari jurnal internasional
- Referensi harus yang benar-benar berkaitan/ relevan baik dari metode yang digunakan maupun dari objek studi yang dikerjakan
- Tidak diperkenankan menggunakan referensi yang berasal dari sumber blog, Wikipedia, website yang bukan bagian dari kepentingan akademik/ penelitian
- Menggunakan tools manajemen referensi seperti Mendeley atau zotero

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### Eigenvalue of Analytic Hierarchy Process as The Determinant for Class Target on Classification Algorithm

Mustakim<sup>1</sup>, Navia Kumala Sari<sup>2</sup>, Jazril<sup>3</sup>, Ismu Kusumanto<sup>4</sup>, Nurul Gayatri Indah Reza<sup>5</sup>  
<sup>1,2,3</sup>Puzzle Research Data Technology, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>4,5</sup>Department of Information Systems, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>6</sup>Department of Informatics Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293  
<sup>7</sup>Department of Industrial Engineering, Faculty of Science and Technology, UIN Sultan Syarif Kasim Riau,  
Pekanbaru-Riau, Indonesia 28293

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Mustakim  
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Email: mustakim@uin-suka.ac.id

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- Soft Computing
  1. Penerapan Algoritma Genetika
  2. Proses Pemodelan Algoritma Fuzzy
  3. Optimasi Algoritma PSO dan ACO
- Sistem Pakar
  1. Sistem Pakar untuk Pemilahan A dengan Centainty Factor
  2. Sistem Pakar Diagnosa Penyakit B Menggunakan Forward Chaining
- Sistem Pendukung Keputusan (SPK)
  1. SPK Pemilihan Perumahan Menggunakan AHP
  2. Perbandingan Algoritma TOPSIS dengan SMARTER untuk Pemilihan C
  3. Penerapan Algoritma SWA, SMART dan MOORA untuk Pemilihan D Terbaik





Beberapa Algoritma Pilihan untuk SPK kelompok MADM:

- Analytic Hierarchy Process (AHP)
- Analytic Network Process (ANP)
- Fuzzy Analytic Hierarchy Process (AHP)
- Technique For Order Performance By Similarity To Ideal Solution (TOPSIS)
- Elimination Et Choix Traduisant La Realite (ELECTRE)
- Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE)
- Simple Multi Attribute Rating Technique (SMART)
- Simple Multi Attribute Rating Technique Exploiting Ranks (SMARTER)
- Multi-Objective Optimization On The Basis Of Ratio Analysis (MOORA)
- Additive Ratio Assessment (ARAS)
- Profile Matching
- Multi-Attributive Border Approximation Area Comparison (MABAX)



Beberapa Algoritma Pilihan untuk SPK kelompok MADM:

- Complex Proportional Assessment (COPRAS)
- Decision-Making Trial And Evaluation Laboratory (DEMATEL)
- Evaluation Based On Distance From Average Solution (EDAS)
- Step-Wise Weight Assessment Ratio Analysis (SWARA)
- Multi-Attribute Utility Theory (MAUT)
- Simple Additive Weighting (SAW)



1. Carilah 1 kasus (dalam kehidupan sehari-hari) yang akan anda jadikan sebagai objek penelitian
2. Tentukan Kriteria dan Alternatif pada kasus anda tersebut, kemudian pembobotan dilakukan dengan pakar (jika ada)
3. Pilih 2 atau lebih algoritma/ metode yang akan anda pelajari, kemudian terapkan pada kasus anda tersebut
4. Tuliskan proses yang anda kerjakan tersebut dengan mengikuti kaidah penulisan Karya Ilmiah/ Scientific Paper yang telah dipelajari
5. Satu kasus yang akan anda selesaikan dengan menggunakan 2 atau 3 metode sifanya tidak abstrak dan dapat disimpulkan. Model kasus yang diselesaikan adalah dengan membandingkan 2 atau lebih algoritma/ metode, hasil akhir dari penelitiannya adalah terdapat 1 metode terbaik.
6. Kerjakan dalam kelompok yang terdiri dari 3 orang, maksimal halaman paper adalah 8 halaman termasuk referensi.
7. Minggu depan adalah evaluasi Pendahuluan, Bahan dan Metode, Referensi serta Proses 2 atau lebih algoritma/ metode yang digunakan.





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