

Prediction on Target of Underprivileged Scholarships Using Fuzzy Logic Method

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Abstract

Education is key to the country's development, but in Indonesia, financial constraints for students often occur. In Java, population density and poverty are high, making it difficult for students. The government strives with scholarship programs, such as Bidikmisi/KIP Perguruan (Bidikmisi/KIP Lecture), Baznas Institute, KJMU, West Java Leadership Scholarship. However, scholarship disbursements often face misappropriation and discrepancies. Therefore, a Fuzzy Logic calculation is performed. This research uses the Mamdani Fuzzy Logic method to overcome this. This method is accurate and suitable for this study. The hope is that the distribution of scholarships will be more efficient and fair, focusing on those in need.

Keywords: Cumulative GPA, Electric Watts, Fuzzy Logic Mamdani, Matlab, Parental Income, Scholarship.

INTRODUCTION

Education is one of the pillars of the foundation of a country and is very influential in its development. Education has also been cited in Law Number 20 of 2023 concerning the National Education System. In it, there is a description of all matters related to the system and workings of national education in Indonesia, which include types, levels, standards, and so on. Because of this regulation, Indonesia has been regulated as well as possible (Sujana 2019). However, until now, Indonesia still has a lot of obstacles, especially in the field of education, which greatly impacts the economic and social sectors.

From the community sector to the financial sector, this can dampen the motivation of many students to continue their studies to a higher level. Parents' social circumstances can also be affected, including their parents' education, social environment, and place of residence, which are also factors that can reduce motivation to continue education as much as possible. Increased the growth of the economy and lack of employment associated with higher education (Dwi Radila *et al.* 2021). From the influences in the social and economic fields that occur, it can be concluded that these influences are one of the factors contributing to disability. The connections between socioeconomic status and disability is complex, as economic and social status have a major impact on job and educational options. Financial limitations that prevent some from accessing high-quality education have a direct negative impact on career opportunities and prolong poverty, both of which raise the risk of disability. The cycle of poverty and marginalization is made worse for people from lower socioeconomic backgrounds by obstacles to work and education. The struggle for few possibilities is getting harder to overcome, which disadvantages people with disabilities. High

living costs and population density only make matters more complicated. In many situations, the difficulty of providing care for deficient family members causes emotional and financial strains. In order to end this cycle, systemic inequality must be addressed through increased access to education, inclusive hiring practices, and more extensive socioeconomic reforms. This can be influenced by a number of factors, such as population density and high living needs, resulting in increasingly narrow and limited employment, a lack of work ethic, very limited capital, and family burdens that The increasing number of family members will increase the demands or burdens of life that must be met (Itang 2015). From these factors, it can be observed that one of the provinces significantly influencing social and economic issues is Bogor City because it plays a pivotal role in the administrative landscape of Indonesia. Bogor City holds immense significance as it is the location of the Presidential Palace of the Republic of Indonesia. This prestigious site serves as the official residence and workplace of the President of Indonesia, making Bogor City a focal point of political activities and decision-making processes at the highest level. Additionally, the presence of the Presidential Palace further emphasizes the city's pivotal role in the governance and administration of the nation. Furthermore, being the site of such a prominent symbol of national leadership adds to Bogor City's allure and importance on both national and international stages. This province is also the most densely populated region in Indonesia (Handayani *et al.* 2021). Not only Jawa Barat has the most populous provinces, but several provinces on Java Island also have high densities, such as:

Table 1. Population Data in Java Island

Provinsi	Jumlah Penduduk Tahun 2022
Jawa Barat	49.405,8
Jawa Timur	41.150,0
Jawa Tengah	37.032,4
Banten	12.252,0
DKI Jakarta	10.680,0
DI Yogyakarta	3.761,9

Source: Statistical Centre Body

From the level of population density, there are several impacts that can affect it, such as quality of life in the community, and high population density can cause a number of problems related to population problems, including poverty, difficulties in housing, limited employment, and so on (Christiani dan Masalah). According to the World Bank, poverty is a low level of welfare. Poverty is a phenomenon that occurs in almost all countries around the world. This affects various aspects of life (Permata dan Ni'mah 2023). High rates of poverty and high population density can have an impact on some adolescents who have dreams of continuing their education in college. Not a few teenagers are also willing to stop pursuing their dreams because they are hindered by unsupportive financial costs.

Based on Law Number 11 of 2009 concerning Social Welfare, the government, together with the Ministry of Social Affairs, created a Family Program (PKH), which aims to help underprivileged families and improve the quality of resources, especially in the fields of education and health. From the PKH program, the Poor Student Assistance (BSM) was formed (Suharto 2015). Not only that, in the overcoming process, the government, both from the central and regional governments, is obliged to ensure the continuity of quality education services without discrimination and the availability of an education fund in accordance with the learning target, which is 12 years. One of the educational services provided by the government is the Education Scholarship. Law of the Republic of Indonesia Number 9 of 2009 concerning Education Legal Entities, Chapter VI, Article 46, Paragraph 2, stipulates that legal entities in the field of education must provide scholarships or tuition assistance to Indonesian citizens who are economically disadvantaged and/or to students with high potential in the field of education (Dalla dan Kewuel 2023).

A scholarship is the provision of financial aid for students to achieve further education. Scholarships are awarded to students based on different criteria (Habiba dan Liaqat 2022). The provision of individual financial support to students aims to support the smooth running of education. Scholarships can be interpreted as a form of appreciation given to individuals with the aim of supporting them in continuing their education to a higher level. Awards may include access to certain institutions or the provision of financial assistance, such as a UKT fee settlement. In principle, scholarships can be interpreted as a form of financial acceptance for those who get them. This provision is outlined in Article 4, paragraph 1, of the Income Tax Law of 2000. In this law, it is explained that the notion of income is an increase in economic capabilities, from wherever it is and wherever it comes from, that is received or obtained by someone both within and outside the country, which can be used for utilization needs or increasing wealth. Thus, scholarships can be interpreted as an increase in economic capabilities for the recipients and, therefore, are considered a source of income (Surya 2015).

From the problems obtained, of course, it becomes a very big problem for the government to channel an optimal solution to the financial obstacles experienced by students who want to pursue their studies at a higher level. In response to this, the Government as the highest person in charge of the country of Indonesia must certainly ensure that access to education can be easily reached by all people (Dewi Fitri dan Muhammad Amin MSi Jurusan Ilmu Pemerintahan Fakultas Ilmu Sosial Dan Politik 2017). Scholarships are a solution to these problems. Many scholarship programs are held both from Government and Non-Government that can help students to take education to a higher level due to financial factors, especially students who want to continue their education to the University level. Some of these scholarships are Bidikmisi/KIP College, Baznas Scholarship Institute, KJMU, West Java Leadership Scholarship, and others. The scholarship certainly has different terms and conditions to be declared a worthy and targeted scholarship recipient. However, from these provisions, there are many other things that become problems in the distribution of funding, such as the high possibility of misuse of scholarship funds and the distribution of funds is not on target. To overcome this problem, there is a Fuzzy Logic Method in determining scholarship recipients that can be used as an interesting solution. Fuzzy logic is considered appropriate for determining scholarship acceptance by imitating the way humans make decisions from vague data and produce decisions based on criteria set in the form of definite numbers that are converted into vague to obtain membership degrees, Linked to the reasoning process, and ends with defuzzification to produce a selection report for prospective scholarship recipients.

By using fuzzy logic, human artificial intelligence systems can be integrated into machine language with ease and efficiency. Fuzzy logic becomes a suitable approach for interpreting the input space into the output space (Arman 2017). Fuzzy logic is a type of logic that uses nested and quantified statements instead of true or false one-time statements. The outcome of fuzzy reasoning is not as uncertain as that produced by strict logic. The limits of each parameter-used invariable with fuzzy ranges are determined based on fuzzy membership sets. (Siskandar *et al.* 2023). Fuzzy logic can provide suitable solutions for variables with imprecise values (Santosa *et al.* 2022).

In the use of fuzzy logic, there are variations of methods, each of which adopts various approaches and calculation outputs (Maryam *et al.* 2021). This fuzzy method itself has several methods in the fuzzy inference system, including the Tsukamoto Method, Mamdani Method, and Sugeno Method. (Kartika *et al.* 2018). Of the methods mentioned, the Mamdani Method is the oldest. Mamdani fuzzy inference systems are commonly utilized in fuzzy models due to their ability to produce easily interpretable results with a straightforward structure. Additionally, they are favored for their intuitive rules, which are simple to comprehend. Mamdani's Fuzzy Inference System, known as the "Min-Max Method," was invented by Ebrahim Mamdani in 1975, bringing a breakthrough in the application of fuzzy logic in artificial intelligence systems. In this system, both antecedents and consequences are linguistic terms, and their outputs correspond to the combination of distinct outputs provided by each rule's output (Maryam *et al.* 2021).

Furthermore, there is the Tsukamoto Method, which is an approach in which every effect in the "IF-THEN" rule must be presented in the form of fuzzy sets, complemented by monotonous membership functions. The output of this method is the inference result of any given rule, which is based on a predicate (fire strength). This final result can be obtained using weighted averages (Murti *et al.* 2015). Next is a final method, namely the Sugeno Method. The Sugeno method is a method where to get the output value requires 4 levels of techniques, namely making fuzzy sets (fuzzification), making a base of fuzzy knowledge with (rule If-Then), Inference Engine, and Affirmation (fuzzification). The difference between this method and other methods is not in the output of fuzzy sets but in the form of constant values or a linear equation. This Sugeno has two types of models, namely the Fuzzy Sugeno Zero-Order Model and the Fuzzy Sugeno First-Order Model (Rahman Hakim 2023).

To process fuzzy logic data, researchers use MatLab software to create a graph and process the data. Testing of this software is done with various random inputs. Advanced development of this program can be completed using Matlab software (Islami *et al.* 2017). Matlab software as a process storage medium in graphic form (Sadi dan Febriandi). According to research conducted by Naba (2009: 39), Matlab is explained as a high-level programming language that facilitates understanding the meaning of commands and functions, even for beginners. This is due to the fact that in Matlab, problems and solutions can be expressed in understandable mathematical notation. The openness of Matlab's user spectrum is driven by the availability of various toolboxes. The Toolbox in Matlab is a collection of Matlab functions (M-Files files with an.m extension) that extend to address specific problems in a particular field. Therefore, by using the toolbox provided by Matlab, users can understand and implement various special technologies. Fuzzy logic is one of the few fields that already has its own toolbox in Matlab (Sitohang dan Denson Napitupulu 2017).

This article is different from previous research. In this study, it strongly supports previous research and is indeed carried out through literature reviews that can involve an analysis and understanding of several studies. Previous research is an effort to research, explore, and study previous works that are very relevant to this research topic. Through a review of the existing literature, it was found that various previous research results that are still active with this research theme can be identified and integrated (Rifai dan Fitriyadi 2023).

- This research was previously conducted by (Komariyah *et al.* 2016) on fuzzy logic in the scholarship admission decision-making system. This study used the fuzzy Tsukamoto method. However, for further development, we use the fuzzy logic method to describe uncertain (vague) data in the same case, namely the determination of scholarships on target.

These previous studies provided a deeper understanding of the use of fuzzy logic in a scholarship acceptance case. By analyzing and comparing these findings, this study is expected to improve the accuracy of data collection in determining scholarships using the fuzzy logic method.

METHODS

Time and Location

This research was carried out from January to April. The location of this research is within the scope of students at IPB Vocational School. This is because there are several students at IPB Vocational School who receive underprivileged scholarship assistance.

Population and Research Sample

The goal of research is to apply scientific methods to acquire answers to questions. Determining the population and sample for the study is one of the phases in the research process (Amin *et al.* 2023).

- **Population and Research Sample**

Students at IPB University's School of Vocational Studies who have been listed as receivers of underprivileged scholarships represent the study's population.

- **Research Sample**

It is impossible that samples from every student at IPB Vocational School will be used for this study; instead, samples from five study programs—computer engineering technology, digital communication and media, accounting, software engineering technology, and ecotourism—will be used. Considering the population is thought to be homogeneous, the sampling technique definitely uses simple random sampling, which is a random sampling of the population.

Data Collection Techniques

The method or procedure for study or data collection is known as a data collection technique. A data gathering approach is one that works well independently of data analysis techniques, or it can even play a significant role in those procedures (Nadialista Kurniawan 2021). There are various approaches to gathering data, including descriptive, correlational, experimental, qualitative, quantitative, and observational technique (Rasyid 2022).

The quantitative research method was selected as the data collection method for this study. This method generally is about identifying the root cause of connection by a methodical arrangement of elements. From the very beginning of conception to the study design, this Quantitative Method is one sort of research that has methodical, planned, and properly defined specifications (Amalia Yunia Rahmawati 2020). This study aims to ascertain the degree of a variable's influence on other variables under investigation, therefore a quantitative approach is employed to interpret data that is in the form of ratios (Pratama 2019). Quantitative research methodologies involve multiple steps, more specifically:

1. Study Literature.

The process of collecting information for a study of literature consists of understanding and collecting theories from a variety of research-related books. Time planning, reading, and summarizing research materials are the four steps of this approach (Adlini *et al.* 2022). In order to do the research for our project, Prediction on the Target of Underprivileged Scholarships Using the fuzzy logic method, we first gathered information from journals. In addition, we studied data processing methods using fuzzy logic, which we would subsequently use to compute data for our study.

2. Questionare

In our research, we also collected data in the form of questionnaires with several scholarship students, especially in the Computer Engineering Technology, Communication and Digital Media Study Program, Accounting, Software Engineering Technology, and Ecotourism at School of Vocational Studies - IPB University. In addition to aiming to obtain information directly from scholarship recipients, we also know and measure the level of trust and accuracy of the data in predicting scholarship acceptance. The following is a graph of the results of the questionnaire conducted through Google Form:

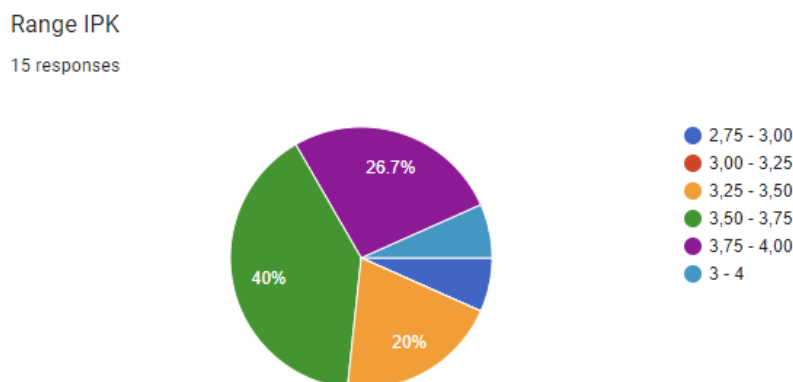


Figure 1. Range IPK

Range pendapatan orangtua

15 responses

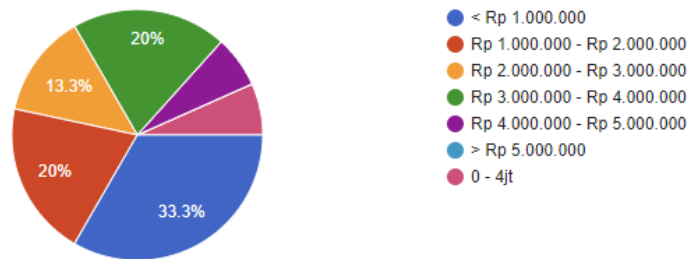


Figure 2. Parental Income

Watt Listrik Rumah

15 responses

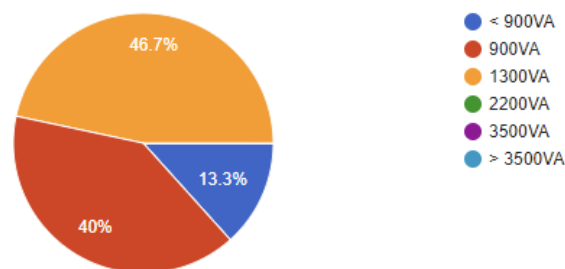


Figure 3. Home Electrical Wattage

From on the graph's results, it was found that 15 respondents submitted data on the standards used to identify scholarships for the disadvantaged based on their personal experiences. According to the graph, 40% of respondents have a GPA between 3.50 and 3.75; 33.3% of respondents have a range of < IDR 1,000,000 for parents' opinions; and 46.7% of respondents have a household electricity wattage worth 1300VA. The Mamdani fuzzy logic approach may calculate based on the three data criterion.

Data Analysis Techniques

Noeng Muhadjir (1998: 104) defines data analysis as a systematic effort to collect and organize observations, interviews, and other data sources to enrich the researcher's understanding of the case being studied and communicate the findings to others. To deepen this understanding, analysis needs to be deepened by efforts to find additional meanings (Rijali 2019). The process of analyzing this data is carried out after the data has been obtained and calculated using the fuzzy logic method with the Mamdani method. Based on the data collection techniques above, a data analysis will be carried out using the research techniques we use, namely:

1. Creating Fuzzy Sets and Fuzzy Inputs

- The first step in using fuzzy logic to predict underprivileged scholarship recipients is to create a fuzzy set for each relevant input variable, such as GPA, parental income, and wattage of electricity. The data was obtained from the results of questionnaires conducted by several scholarship students.
- The 3 variables can be divided into fuzzy sets such as GPA (Ugly, Medium, and Good), parental income (Not Decent, Enough Kite, and Very Decent), and finally Watts of Electricity (Not Feasible, Decent, and Very Decent).

2. Implementing Fuzzy Operators

- Once the fuzzy set and fuzzy input have been defined, the next step is to apply fuzzy operators, such as fuzzy logic operators (AND, OR, NOT) and fuzzy implication operators.
- Fuzzy operators are used to combine information from multiple input variables and generate membership values for the output variables, which is a prediction of Scholarship acceptance.

3. Implement the Implication Function

- The implication function is used to correlate predefined fuzzy rules with the given fuzzy input.
- These fuzzy rules describe human knowledge or empirical rules applied in the context of predictive scholarship admission.

4. Composing All Outputs

- Once the implication process is done for all fuzzy rules, the next step is to compose all outputs produced into a single membership value that represents the predicted acceptance of the Scholarship.
- This process involves combining all the implication results of each fuzzy rule into a single membership value that reflects the degree of match (fit) between the input variable and the output variable.

5. Defuzzification

- The final stage is defuzzification, where the membership value generated from the previous step is converted into a firm or crisp value that can be used as a final prediction. At this stage, the average calculation (Weight Average / WA) of each predicate on each variable is carried out.

Research Procedure

The use of a framework structure in research aims to help research run in accordance with predetermined stages. The following are the stages in the research procedure:

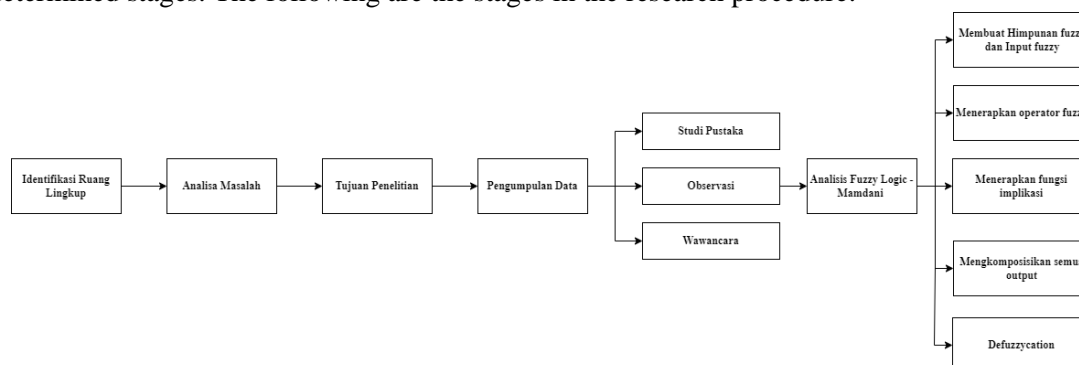


Figure 4. Research Procedure

1. Scope Identification

This research will focus on determining the eligibility of receiving Underprivileged Scholarships at IPB Vocational School. The scope includes an analysis of variables such as GPA, parental income, and electrical power that have previously been attached by scholarship students.

2. Problem Analysis

The main problem to be solved is to increase accuracy in determining scholarship acceptance to be right on target.

3. Determining Research Objectives

The main objective of this research is to develop a more accurate and efficient method of predicting scholarship acceptance using the Fuzzy Mamdani Logic Method.

4. Collecting Data

Data will be collected through various means, including literature studies to gain a deep theoretical understanding, direct observation of the scholarship distribution process at IPB Vocational School by interviewing a number of scholarship recipient students to gain insight into their experiences.

RESULTS AND DISCUSSION

To determine qualification for an underprivileged scholarship, three factors can be considered: GPA, parental income, and usage of electricity. The three variables will then be handled using calculations from the Mamdani fuzzy logic method. Data was collected using a questionnaire from underprivileged students and processed through five stages:

1. Defining Fuzzy Group and Fuzzy Input

a) Cumulative GPA

The following are the values and sets of the IPK Input Variables:

Table 2. GPA Input Variables

GPA Score	Condition
2,75 – 3,25	Low
3,00 – 3,75	Medium
3,50 – 4,00	High

Here is a table showing the GPA input made, with a range of 2.75 as the lowest and 4.00 as the highest value.

From **Table 2**, the following graph is obtained:

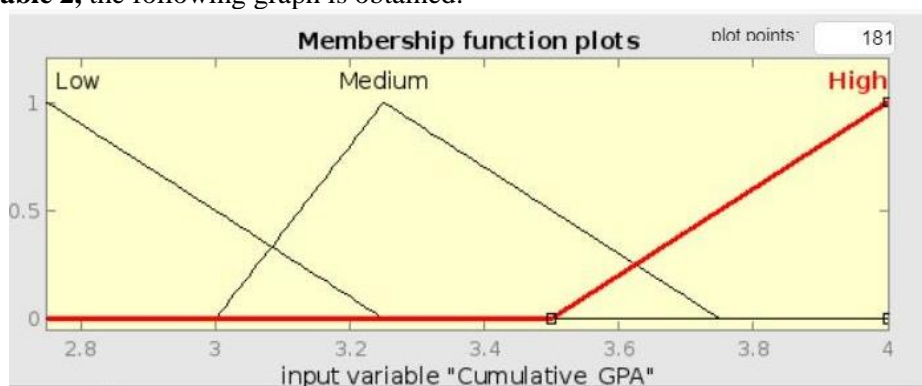


Figure 5. GPA Membership Set Graph

From this graph, it can also be known the membership set of each set on the GPA variable. Here we use the trapezmf function on low and high sets while trimf on medium sets.

$$\begin{array}{l}
 \text{Fx (IPK)} \\
 \begin{array}{l}
 \text{Rendah (x)} \quad \{x < 2,75 \quad ; 1 \quad 2,75 \leq x \leq 3,0 \quad ; 1 \quad 3,0 \leq x \leq 3,25 \quad ; \frac{3,25-x}{3,25-3,00} \quad x > \\
 3,25 \quad ; 0 \quad \text{Sedang (x)} \quad \{x < 3,0 \quad ; 0 \quad 3,0 \leq x \leq 3,25 \quad ; \frac{x-3,0}{3,25-3,00} \quad 3,25 \leq x \leq 3,75 \quad ; \frac{3,75-x}{3,75-3,25} \quad x > \\
 3,75 \quad ; 0 \quad \text{Tinggi (x)} \quad \{x < 3,5 \quad ; 0 \quad 3,5 \leq x \leq 4 \quad ; \frac{x-3,50}{4,0-3,50} \quad x = 4 \quad ; 1 \quad x > 4 \quad ; 0
 \end{array}
 \end{array}$$

Next to determine the degree of membership of the GPA with a value of 3.50 which is in the medium range. So, the equation obtained is:

$$\mu_{x_{sedang}[3,50]} = \frac{c-x}{c-b} = \frac{3,75-3,50}{3,75-3,25} = \frac{0,25}{0,5} = \frac{1}{2} = 0,5$$

b) Parents' Income

The following are the values and sets of the Parent's Income Input Variables:

Table 3. Parental Income Input Variables

Parents' Income Value	Condition
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0 – 4	Priority
3 – 5	Not a priority

From this parental income table, there are two inputs that have a range of 0 to 5. This input itself is a parable with crisp numbers where each input describes a million number, such as 2 means Rp. 2,000,000.00 and so on.

From **Table 3**, the following graph is obtained:

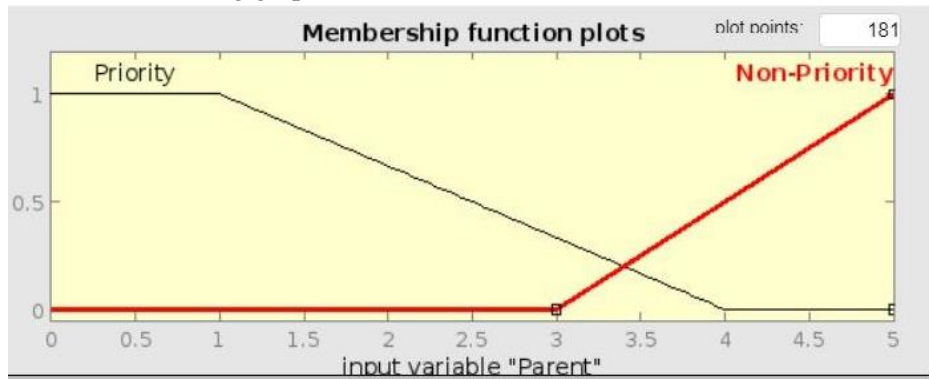


Figure 6. Parent Income Membership Set Graph

From this graph, it can also be known the membership set of each set in the Parent Income Variable. Here we use the trapezoidal function on both sets.

$$F_x (\text{Pendapatan orang tua}) \begin{cases} \text{Prioritas}(x) & \{x < 0 & ; 0 & x = 0 & ; 0 \leq x \leq 1 & ; 1 & 1 \leq x \leq 4 & ; \frac{4-x}{4-1} & x > 4 & ; 0 \\ \text{Tidak Prio}(x) & \{x < 3 & ; 0 & 3 \leq x \leq 5 & ; \frac{x-3}{5-3} & x = 5 & ; 1 & x > 5 & ; 1 \end{cases}$$

Next to determine the degree of membership of the GPA with a value of 2 contained in the priority range. So, the equation obtained is:

$$\mu_{x_prioritas}[2] = \frac{d-x}{d-c} = \frac{4-2}{4-1} = \frac{2}{3} = 0,66$$

c) Electric Wattage

The following are the values and sets of the Electrical Watt Input Variables:

Table 4. Electric Wattage Input Variables

Rated wattage of electricity	Condition
0 – 2,5	High priority
2 – 3,5	Priority
3 – 5	Not a priority

From the table above is a table that describes the wattage of electricity owned in the house. This table has the same range but with different crisp numbers where 1 represents a value of 450VA and 5 describes a value of 3500VA.

From **Table 4**, the following graph is obtained:

the medium category, with a parent income of 2 (Rp. 2,000,000.00) which is included in the priority category, and a house with a watt of electricity worth 2 (900VA) which is included in the high category. From the input obtained, find an output from the fuzzy operator as follows:

IF (IPK is Sedang) and (Gaji_Ortu is Prioritas) and (Watt_Listrik is Prioritas Tinggi) then (Peluang_(%) is Diterima

$$\alpha_1 = \text{Min}(\mu_{x_ipksedang[3,5]} \cap \mu_{y_pendapatprioritas[2]} \cap \mu_{y_listrikpriotinggi[2]})$$

$$\text{Min}(0,5 ; 0,67 ; 1)$$

$$\alpha_1 = 0,5$$

2. Implement the Implication Function

Based on calculations that have been done through fuzzy operation, an implication calculation is obtained. Here is a graph and calculation of the implications.

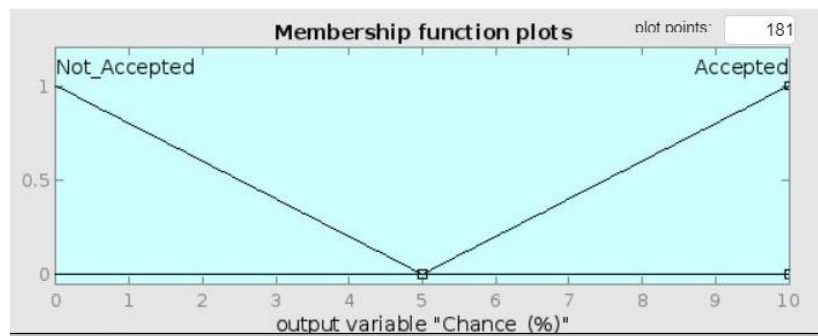


Figure 8. Output

Implikasi Kiri :

$$\frac{x - a}{b - a}$$

$$\frac{x - 5}{10 - 5} = \frac{x - 5}{5} = 0.5$$

$$x - 5 = 2.5$$

$$x = 7.5$$

3. Composing All Outputs

Furthermore, from the output graph, there are 2 parts to the received graph that we can calculate to compose all outputs. The part of the graph is separated according to the left implication result, which is $x = 7.5$ which is then divided into 2 parts, namely in the > 7.5 is A1 in the form of a triangle, and AII is rectangular. Then do a calculation of the area of the area.

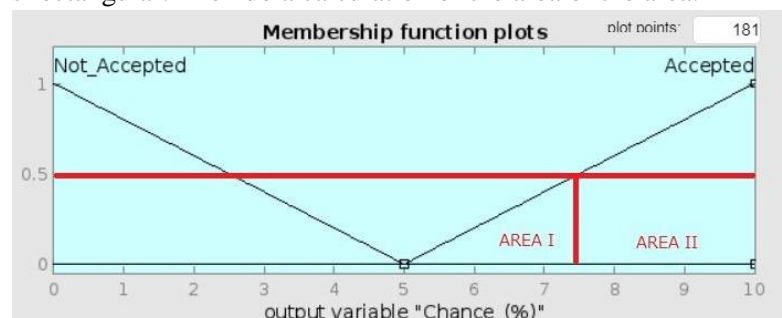


Figure 9. Composing All Outputs

$$A_1(\text{Triangular}) = \frac{A \cdot t}{2}$$

$$A_1(\text{Triangular}) = \frac{2,5 \times 0,5}{2} = 0.625$$

$$A_2(\text{Rectangular}) = \frac{p \cdot l}{2}$$

$$A_2(\text{Rectangular}) = 2.5 \times 0.5 = 1.25$$

$$\sum \text{Area} = LD_1 + LD_2$$

$$\sum \text{Area} = 0.625 + 1.25$$

$$\sum \text{Area} = 1.875$$

From these results, the area can be 1,875

4. Defuzzyfication

The final stage is defuzzyfication, where the membership value generated from the previous step is converted into a firm or crisp value that can be used as a final prediction. At this stage, the average calculation (Weight Average / WA) of each predicate on each variable is carried out.

Moment Of Set 1

$$\int_5^{7.5} \left(\frac{x-5}{10-5}\right) x dx \rightarrow = \frac{25}{6} = 4.16$$

Moment Of Set 2

$$\int_{7.5}^{10} (0.5) x dx \rightarrow = \frac{175}{16} = 10.9375$$

$$\sum \text{Moment} = MH_1 + MH_2$$

$$\sum \text{Moment} = 4.16 + 10.9375$$

$$\sum \text{Moment} = 15.0975$$

$$COA = \frac{\int_a^b F(x) x \cdot dx}{\int_a^b F(x) dx}$$

$$COA = \frac{\sum \text{Moment}}{\sum \text{Region Area}}$$

$$COA = \frac{15.0975}{1.875}$$

$$COA = 8.052$$

From the results of the manual calculation output, the defuzification value is **8,052**

CONCLUSION

Based on our research on **Prediction of the Right Target for Underprivileged Scholarships Using the Fuzzy Logic Method**, we took 3 criteria from determining the acceptance of the Scholarship, namely GPA, Parents' Income, and Watt of Electricity. We obtained this data by data collection techniques in the form of questionnaires taken from observations and conditions experienced by respondents. After the data is obtained, it can then be processed using the Fuzzy Logic Mamdani Method. In this method, there are 5 steps including: Determining fuzzy sets and fuzzy inputs, applying fuzzy operators, applying implication functions, composing all outputs, and defuzification. From these 5 steps, a case study was then taken where if a student with a GPA of 3.50 and parents with an income of IDR 2,000,000 and a house with an electric wattage of 900VA, then if calculated using Fuzzy Logic,

they will get a defuzzification value of 8,052 which means that the student is declared ACCEPTED and deserves a scholarship. From the data and discussion described, it was found that the conclusion of this journal is a journal to help students to have an idea of the percentage of them receiving scholarships which in this journal are underprivileged scholarships.

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