
Determining Talent Based on Student Skills Using Fuzzy Logic

Gusti Rahmadani*

STMIK Kaputama Binjai, Indonesia

*Corresponding Author

Email : gustidani1998@gmail.com

Abstract

Education is a conscious, planned effort to create a learning atmosphere and the learning process of students actively develops their potential to have spiritual, religious, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and state. Learning is generally defined as a change in an individual that occurs through experience, and not because of the growth or development of his body or characteristics of a person since birth. So that they understand and know the best things to do to develop their knowledge, potential, and talents and skills. Because these talents are relatively stable, they can be used to help success in education and careers. Thus it can be said that talent reveals the potential to learn a certain activity, talent is relatively different, talent is relatively constant. Fuzzy logic is a logic that has a value of fuzzyness between true or false (Professor Lotfi A, 1965). Fuzzy logic is generally in problems that contain uncertainty (uncertainty), imprecision (inaccuracy), noise, and so on.

Keywords: Education, Talent, Skills, Fuzzy Logic

INTRODUCTION

Basically education is the most important part in efforts to develop abilities and skills. Both inside and outside school, in the family or community environment. This is in accordance with law no. 20 of 2003 concerning the national education system that education is a conscious effort to create a learning atmosphere and the learning process of students actively develops the potential to have spiritual strength, self-control, communication, intelligence, noble character, and skills needed by themselves, society, nation, and society. and country. Learning is generally defined as changes in individuals that occur through experience, and not growth or development of the body or characteristics of a person from birth. Therefore, support and direction play an important role in the development of student knowledge. So that they understand and know the best thing to do to develop their knowledge, potential, and talents and skills. So that they understand and know the best things to do to develop their knowledge, potential, and talents and skills. On the other hand, if left alone without reinforcement and direction, the talent will die and be useless. Because these talents are relatively stable, they can be used to help success in education and careers. Thus it can be said that: talent reveals the potential to learn a certain activity, talent is relatively different, talent is relatively constant.

Meanwhile, after knowing the dominant talent of his skills. Students can determine the majors that match their talents based on the superiority of their personal skills, in order to reduce cases of wrong majors after they determine their vocational education. According to the Big Indonesian Dictionary (KBBI), the meaning of the word major is part (study of science).

There are internal factors and external factors behind the difficulties or problems to identify the talent and skill problems faced by the school. Internal factors can include intellectual aspects, such as intelligence, talents, interests, motivations, physical conditions and conditions. External factors include students' social conditions, such as the environment, family economy, school and surrounding community.

Fuzzy logic is a logic that has a value of fuzzyness between true or false (Professor Lotfi A, 1965). Fuzzy logic is generally in problems that contain uncertainty (uncertainty), imprecision (inaccuracy), noise, and so on. Fuzzy logic bridges precise machine language with human language that is in meaning (significance), Fuzzy logic was developed based on human language (natural language).

RESEARCH METHODS

This research uses fuzzy logic research method. In general, fuzzy logic is a "counting" methodology with variables of words (linguistic variables), instead of counting with numbers. The words used in fuzzy logic are not as precise as numbers, but words are much closer to human intuition. Humans can immediately "feel" the value of the variables of words that they use every day. Thus, fuzzy logic makes room for and even exploits tolerance for imprecision. Fuzzy logic requires a cheaper "cost" in solving various fuzzy problems. With fuzzy logic, human expert systems can be implemented into machine language easily and efficiently. The precision language required by machines is difficult for humans to "feel" (i.e. less meaningful from the point of view of human language). In addition, the description can be quite long. On the other hand, variable words can be simpler, concise, and directly "feelable" by humans, but less precise from the point of view of machine language. This is where the role of the fuzzy system, which is to create communication so that it becomes more effective and efficient between machines and humans. Or, it can also be imagined that a fuzzy system is a machine that translates human language so that it can be understood by machines and vice versa.

RESULTS AND DISCUSSION

The results of research on determining talent based on students' skills using fuzzy logic are as follows:

1. To identify talents that are more dominant than the skills possessed by students by calculating the Fuzzy Logic method.
2. To help students determine majors related to their talents after graduating from school.
3. To reduce cases of wrong majors faced by students after determining their vocational education.

Field Research

Research conducted directly on the object of research. Field research methods used in data collection are:

1. Observation
By conducting research and analyzing directly the condition of SMP NEGERI 2, Binjai District, Langkat Regency, so that it can be analyzed according to the search and retrieval of data.
2. Literature Study
In studying the manual and reference data related to the problems encountered, it will be used in planning and designing applications made.

System analysis

System analysis is very important in research on existing systems. This is done with the aim of designing a new or updated system. The analysis of this system is a very critical and important stage. Because errors in this stage will also cause errors in the next stage.

The main purpose of this system analysis is to find errors and weaknesses of the current system, so that improvements can be proposed. In this study also conducted an analysis of the system being studied. It aims to find solutions to deal with the problems that exist in the system.

Problem Solving Representation

There are 3 things to do in this step, namely:

- 1) Setting goals and sets of alternatives

The purpose of solving this problem is to determine the value of the most dominant skills of a student based on the fields of sports, language skills, playing music, communication, writing, and leadership possessed by students.

Alternative skills are calculated as follows:

A1 = Physical Fitness

A2 = Music

A3 = Social

A4 = Art

A5 = Leadership

So that :

$$A = \{ [A]_1, A_2, A_3, [A]_4, A_5, [A]_6 \}$$

- 2) Determining Criteria

C1 = Sports

C2 = Language

C3 = Communication

C4 = Writing

C5 = Singing

So that :

$$C = \{ [C]_1, C_2, C_3, [C]_4, C_5 \}$$

- 3) Supporting data

No	Student's name	Sports	Language	Communication	Writing	Singing
1	Affandi Juliandi	85,5	96,2	65,3	62,3	70,1
2	Anishara	75,5	85,3	86,2	80,1	62,3
3	Rhaditya Abdillah	85,5	95,3	96,2	70,1	52,3
4	Alviano	96,2	70,1	52,3	95,3	96,2
5	Rafiandi	86,2	80,1	62,3	85,3	86,2
6	Kevin Sanjaya	65,3	62,3	70,1	96,2	65,3
7	Aulia Zahra	65,3	85,5	62,3	80,1	86,2
8	Shakia Nisa	52,3	96,2	70,1	62,3	65,3
9	Farhan Diki	80,1	65,3	85,5	86,2	80,1
10	Ali Abdian	62,3	52,3	96,2	65,3	62,3

Table. 1

Defuzzification

In this method explains the design of the fuzzy logic method and the model for determining student talent, there are four research criteria in determining the dominant talent of students, namely:

Criteria	Description
C1	Sport
C2	Speak
C3	Communication
C4	Write
C5	Sing

Table. 2 Criteria

Degree Of Importance	Membership Function Value
Not Good	0 – 0.45
Good	0.46 – 0.75
Very Good	0.76 – 1

Table. 3 Range Criteria

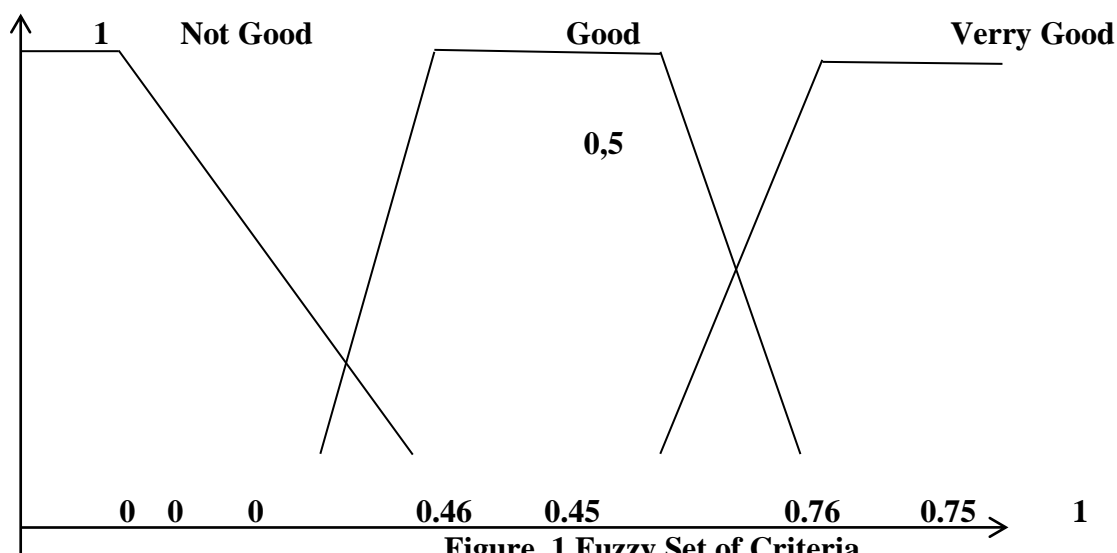


Figure. 1 Fuzzy Set of Criteria

$$\mu_{\text{Not Good}}[x] = \begin{cases} 0, & x \leq 0 \\ \frac{0.46 - x}{0.46 - 0} & 0 < x < 0.46 \\ 0, & x \geq 0.46 \end{cases}$$

$$\mu_{\text{Good}}[x] = \begin{cases} 1, & x \leq 0.45 \text{ atau } x \geq 0.76 \\ \frac{x - 0.45}{0.75 - 0.45} & 0.45 < x < 0.75 \\ \frac{0.76 - x}{0.75 - 0.76} & 0.75 \leq x \leq 0.76 \end{cases}$$

$$\mu_{\text{Verry Good}}[x] = \begin{cases} 0 & x \leq 0.75 \\ \frac{x - 0.75}{0.76 - 0.75} & 0.75 < x < 0.76 \\ 1, & x \geq 0.76 \end{cases}$$

Based on the picture above, the membership function values for each degree of importance are obtained in the following table.

Degree of Importance	Value Membership Function
Not Good	0 – 0.45
Good	0.46 – 0.75
Verry Good	0.76 – 1

Table 4. Degree of Interest Criteria

Knowledge Base

Knowledge Base in designing a decision support system is very necessary which contains rules or rules that are useful in determining the output results of this decision support system. The design of these rules is a step after the formation of the fuzzy set. The rules can be seen below:

- 1) IF(sport is good sport) and (speaking is very good) and (communication is very good communication) and (writing is good writing) and (singing is singing good) Then (Leadership output)
- 2) IF(Sport is not good) and (speaking is good) and (communication is good communication) and (writing is writing very well) and (singing is singing very well) Then (output is art)
- 3) IF(Sport is not good sport) and (speaking is very good) and (communication is very good communication) and (writing is writing is very good) and (singing is singing good) Then (Social output)
- 4) IF(sport is very good sport) and (speaking is very good) and (communication is very good communication) and (writing is good writing) and (singing is not good singing) Then (output is not leadership)
- 5) IF(Sport is not good) and (speaking is good) and (communication is very good communication) and (writing is good writing) and (singing is singing very well) Then (output is music)

Calculation Method

In calculating the value of student talent using the fuzzy logic method as follows:

Affandi Juliandi

➤ Sport

If $x = 85$ $c = 40$ $d = 99$

Down $(d-x) / (d-c)$
 $= (99 - 85) / (99 - 40)$
 $= (25/59) = 0.23$

Up $(x-a) / (b-a)$ $a < x < b$
 $= (85 - 40) / (99 - 40)$
 $= 45/59 = 0.76$

➤ Speak

If $x = 96$ $c = 40$ $d = 99$

Down $(d-x) / (d-c)$

$$= (96-99) / (96-40)$$

$$= -3/56 = -0.05$$

$$\text{Up } (x-a) / (b-a) \quad a < x < b$$

$$= (96-40) / (99-40)$$

$$= 56/59 = 0.94$$

➤ Communication

$$\text{If } x = 65$$

$$c = 40$$

$$d = 99$$

$$\text{Down } (d-x) / (d-c)$$

$$= (99-65) / (99-40)$$

$$= 34/59 = 0.57$$

$$\text{Up } (x-a) / (b-a) \quad a < x < b$$

$$= (65-40) / (99-40)$$

$$= 25/59 = 0.42$$

➤ Write

$$\text{If } x = 62$$

$$c = 40$$

$$d = 99$$

$$\text{Down } (d-x) / (d-c)$$

$$= (99-62) / (99-40)$$

$$= (37/59) = 0.62$$

$$\text{Up } (x-a) / (b-a) \quad a < x < b$$

$$= (62-40) / (99-40)$$

$$= 22/59 = 0.37$$

➤ Singing

$$\text{If } x = 70$$

$$c = 40$$

$$d = 99$$

$$\text{Down } (d-x) / (d-c)$$

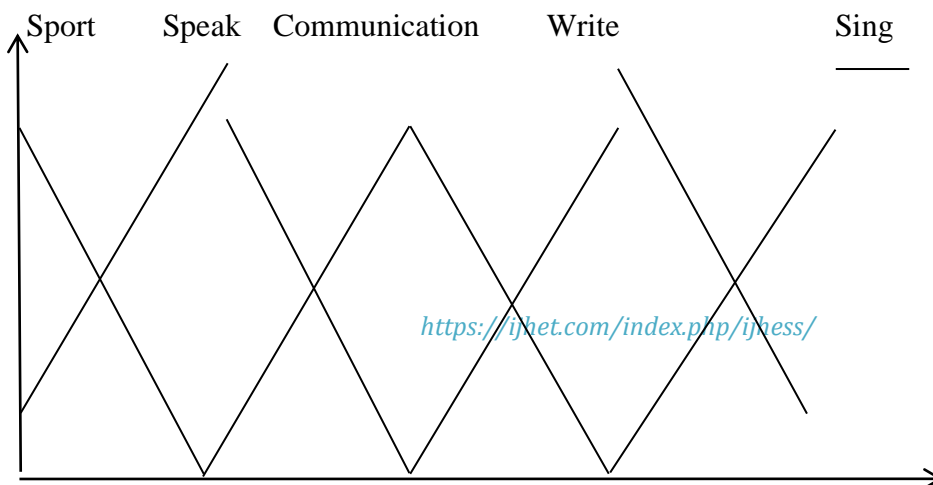
$$= (99-70) / (99-40)$$

$$= (22/59) = 0.37$$

$$\text{Up } (x-a) / (b-a) \quad a < x < b$$

$$= (70-40) / (99-40)$$

$$= 30/59 = 0.50$$



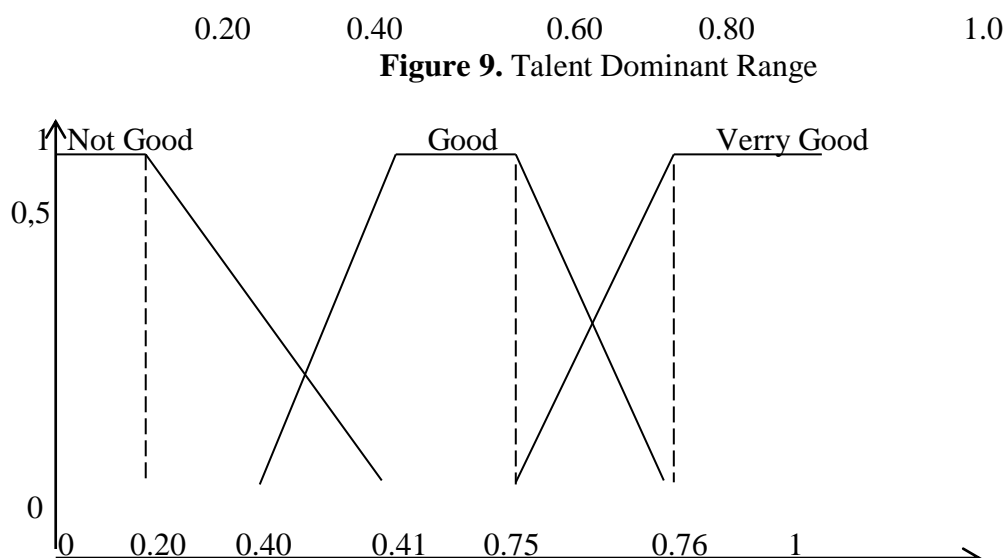


Figure 10 Talent Requirement Degree

The calculation results for each student's talent value can be seen in the following table:

No	Name	Talent				
		Physical Fitness	Music	Social	Art	Leadership
1	Affandi Juliandi	0.76	0.94	0.42	0.37	0.50
2	Anishara	0.59	0.76	0.94	0.67	0.37
3	Rhaditya Abdillah	0.76	0.93	0.94	0.50	0.20
4	Alviano	0.93	0.50	0.20	0.76	0.94
5	Rafiandi	0.93	0.67	0.37	0.76	0.77
6	Kevin Sanjaya	0.25	0.37	0.50	0.94	0.42
7	Aulia Zahra	0.25	0.94	0.37	0.67	0.77
8	Shakia Nisa	0.20	0.50	0.37	0.42	0.42
9	Farhan Diki	0.67	0.42	0.76	0.77	0.67
10	Ali Abdian	0.37	0.20	0.94	0.42	0.37

Table. 5 Talent Score Results

The results of calculations to determine the dominant talent of students can be seen in the following table:

No	Name	Dominant Talent	Value
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1	Affandi Juliandi	Music	0.94
2	Anishara	Social	0.94
3	Rhaditya Abdillah	Social	0.94
4	Alviano	Leadership	0.94
5	Rafiandi	Physical Fitness	0.93
6	Kevin Sanjaya	Art	0.94
7	Aulia Zahra	Music	0.94
8	Shakia Nisa	Music	0.5
9	Farhan Diki	Art	0.77
10	Ali Abdian	Social	0.94

Table.6 Students' Dominant Talents

CONCLUSION

The results of the research are Determining Talent Based on Student Skills Using Fuzzy Logic and the discussion that has been carried out can be drawn several conclusions, namely as follows:

1. Decision Support System Techniques using Fussy Logic can build a system that determines talent based on students' skills using fuzzy logic.
2. By determining the most appropriate rule and obtaining 5 rules for the application of Fuzzy Logic to determine the most dominant talent of student skills.
3. From the results of testing the students' skill scores, it was found that 5 rules were formed and the highest score was obtained.

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