

Building android based game using Fuzzy Sugeno Method

¹Dyna Marisa Khairina, ²D. Sunaryono, ³H. R. Hatta

Faculty of Mathematics and Natural Sciences

¹Universitas Mulawarman, Samarinda, Indoensia

Abstract—Obey traffic rules is a must do. However, many motorists frequently violate these rules. Violating traffic rules either intentionally or unintentionally may lead to things that can cause harm and death. 'Traffic Master' is an educational game relating to regulations and traffic signs. Players must obey the existing rules to finish this game. If a player violates the rules, then the player will get a punishment of imprisonment or a fine amount of money. This game is made with the purpose of educating the players. In this game researchers applied fuzzy Sugeno method in determining the final score obtained player. Game 'Traffic Master' uses two variables, namely variable life and variable time to calculate the final score. This game is built based on the android operating system.

Index Terms—Android-based game, fuzzy sugeno method.

I. INTRODUCTION

Not a few motorists who ignore traffic signs were there as well as violating the provisions of the road which has been set as a stop on the zebra crossing, driving against the direction, driving past the sidewalk and many more violations are often done by the rider. Obeying the traffic rules is something that must be done by all motorists on the highway. Violating traffic rules either intentionally or unintentionally may lead to things that can cause harm and death. Traffic rules can be applied to a game. Game is a competitive activity that is creative and fun basically, which is limited by certain rules and requires expertise [1]. Game is very popular all walks of various types of circles so the games are an effective means to educate the public. Based games android operating system is one of the game's most sought after by society. The use of fuzzy methods in the game has done a lot of research as research using fuzzy logic Sugeno by Sugeno (1985) and research conducted by Tsukamoto (1979) using fuzzy Tsukamoto.

II. LITERATURE REVIEW

Fuzzy Logic

Fuzzy logic itself is a method that allows a state to have two values simultaneously, but for the amount of value depends on the weight of the membership owned [4]. This game uses fuzzy method in calculating the final score. Fuzzy method used in this research is Fuzzy Sugeno.

Fuzzy rule based system

Fuzzification, Inputs whose truth value is uncertain (crisp input) converted to the form of fuzzy input, in the form of linguistic semantic value is determined based on the membership function. In this study pennis using linear membership functions up and down linear as in Figure 1.

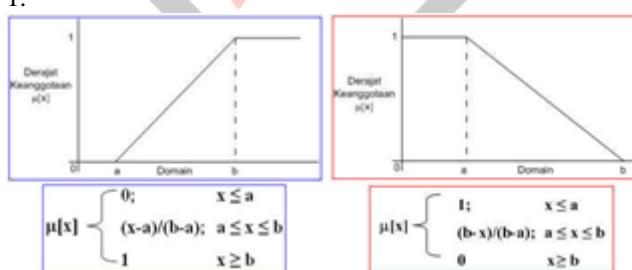


Fig. 1 Membership Function Linear Up and Linear Down

Inference, The process of inference compute all the rules in the knowledge base. In this study, researchers used a model IF x_1 is A₁ AND ... AND x_n is A_n THEN $y = f(x_1, \dots, x_n)$ where f can be any function of the input variables whose values are in the interval variable output.

Defuzzification, Defuzzification change fuzzy value back to its true value. Researchers using the weighted average method $y^* = \sum \frac{\mu(y).y}{\mu(y)}$ where y is the value of crisp and $\mu(y)$ is the degree of membership of crisp values y .

III. RESULT AND DISCUSSION

There are four main processes in determining the skill levels of players, which are the establishment of fuzzy sets such as determining variables and fuzzy sets, the formation of fuzzy rules or rule, the process of inference by using the function Min to evaluate the results of the rule that has been made, and defuzzyfication. The process contained in the system illustrated in Figure 2.

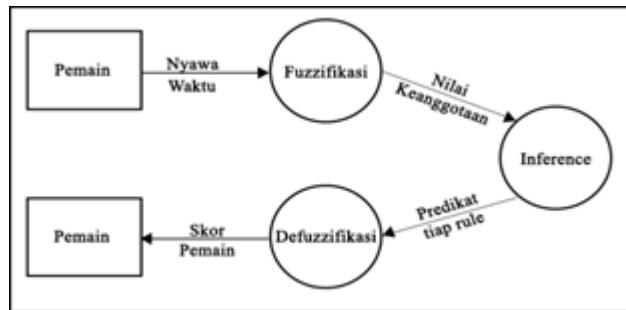


Fig. 2 DFD level 1

Map view is a view that shows maps and signs to be passed at the game. Began to see the game can be seen on Figure 3. On the game map display, there are six missions that must be executed sequentially. This six picture represents dorms, signs are allowed and not allowed to travel, the prohibited turn of direction, jams, traffic lights and campus.



Fig. 3 Map view

To see the game on the game "Traffic Master" is divided into two parts. The first part of each mission, the player must drive past some of the vehicle until it reaches a certain point. In this view the player is given four lives. Lives will be reduced if a player crashed into the vehicle or crash into the pavement. Players otherwise fail if the player runs out of lives. See the first part of the game on each mission can be seen in Figure 4.



Fig. 4 Part one in every mission

In the second part, the player must choose the right position according to the situation and the options. In this view the player is given 10 seconds. Players otherwise fail if the time runs out or the wrong position. See the second part of the game can be seen in Figure 5. Views score featuring scores obtained after the player made it through the first part and the second part on each mission. Views score can be seen in Figure 6.

System testing is performed to determine the results of the system have been made. The system will be tested by comparing the fuzzy calculation Sugeno game with Sugeno fuzzy calculation is done manually. Manual calculation using 2 data is variable life 1, variable time 2 and variable life 1, variable time 8:

1.Life 1, Time 2

$$\mu_{\text{Few Life}} = (4 - 1)/(4 - 1) = 1$$

$$\mu_{\text{Many Life}} = (1 - 1)/(4 - 1) = 0$$

$$\mu_{\text{Few Time}} = (10 - 2)/(10 - 1) = 0,889$$

$$\mu_{\text{Many Time}} = (2 - 1)/(10 - 1) = 0,111$$

$$\alpha_1 = \min(0,0,111) = 0$$

$$\alpha_2 = \min(0,0,889) = 0$$

$$\alpha_3 = \min(1,0,111) = 0,111$$

$$\alpha_4 = \min(1,0,889) = 0,889$$

$$R_1 = (12,5 \times 1) + (5 \times 2) = 22,5$$

$$R_2 = (12,5 \times 1) + (4 \times 2) = 20,5$$

$$R_3 = (8 \times 1) + (5 \times 2) = 18$$

$$R_4 = (8 \times 1) + (4 \times 2) = 16$$

$$Z = \frac{((0 \times 22,5) + (0 \times 20,5) + (0,111 \times 18) + (0,889 \times 16))}{(0 + 0 + 0,111 + 0,889)}$$

$$= 16,22$$

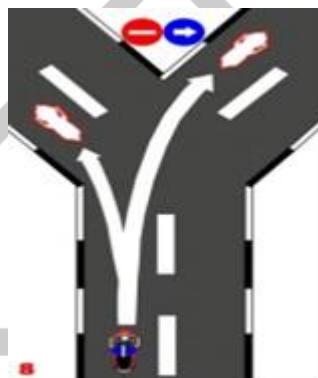


Fig. 5 Part two in second mission



Fig. 6 Score views

The calculation results we will compare with those in the game that have been made. The yield on the game can be seen in Figure 7. It can be seen that the user calculation results consistent with the results generated by the system.

2.Life 1, Time 8

$$\mu_{\text{Few Life}} = 1$$

$$\mu_{\text{Many Life}} = 0$$

$$\mu_{\text{Few Time}} = 0,222$$

$$\mu_{\text{Many Time}} = 0,778$$

$$\alpha_1 = \min(0,0,222) = 0$$

$$\alpha_2 = \min(0,0,778) = 0$$

$$\alpha_3 = \min(1,0,222) = 0,222$$

$$\alpha_4 = \min(1,0,778) = 0,778$$

$$R_1 = (12,5 \times 1) + (5 \times 8) = 52,5$$

$$R_2 = (12,5 \times 1) + (4 \times 8) = 44,5$$

$$R_3 = (8 \times 1) + (5 \times 8) = 48$$

The calculation results will be compared with the in the game that have been made. The yield on the game can be seen in Figure 8. It can be seen that the user calculation results consistent with the results generated by the system.



Fig. 7 Game scores with variable life 1, variable time 2



Fig. 8 Game scores with variable life 1, variable time 8

IV. CONCLUSION

Application of the method of fuzzy on what kind of educational games on the scores counting can run well. Sugeno fuzzy method can be applied to the educational game 'Traffic Master' based on testing that has been done.

REFERENCES

- [1] G. K. Akilli, "Games and simulations: A new approach in education?," *Games simulations online Learn. Res. Dev. Fram.*, pp. 1–20, 2007.
- [2] M. Sugeno, "An introductory survey of fuzzy control," *Inf. Sci. (Ny.)*, vol. 36, no. 1–2, pp. 59–83, 1985.
- [3] Y. Tsukamoto, "An approach to fuzzy reasoning method," *Adv. fuzzy set theory Appl.*, vol. 137, p. 149, 1979.
- [4] N. T. Black and W. Ertel, *Introduction to artificial intelligence*. Springer Science & Business Media, 2011.