



Decision Support System for Late Tuition Payment Prediction of Computer Engineering Students Using Fuzzy Logic

Joseph Seranilla*, Carl Jasper Cruz, Shayne Marie Osuna Pascua, Rionel Belen Caldo

¹Computer Engineering Department
Lyceum of the Philippines University – Laguna
Km. 54, National Highway, Makiling, Calamba City, Laguna

Abstract: A decision support system that can predict and send an email for the late enrolment payment of students with the use of fuzzy logic will be a big help. This method of prediction is essential for the students that paying their tuition fee every semester. The basis for the prediction is by the number of late payment of the students and by the range of the amount of tuition fee. The proponent wants to develop a system that is usually using for an enrolment in school that will send a reminder to the students and parents regarding the payment of tuition fee. In this study, the proponent will make use of Fuzzy Logic for computing parameters and decision making. The output will be a decision if the system needs to send an email to the students and parents or not, based on the result. There will be some parameters to use for computations. The result will be exceptional (the system do not need to send an email) or not exceptional (the system need to send an email).

Key Words: Fuzzy Logic, Decision Support System, Intelligent, Quotient (IQ)

1. INTRODUCTION

1.1 Background of the Study

There are students that are having problems in paying their tuition fees on time that may be because they forgot to ask their guardians or parents for their tuition fees. There are also some guardians that will not be able to prepare the payment on time while some are having serious money issues that will cause delay on their payment.

The proponents' system will have the school or institution send emails to remind the students and their respective guardians that there is a possibility that they may have a delayed payment on tuition fees due to some expected circumstances.

The emails that will be sent to their recipients will contain the message which includes the current balance of the recipient.

This will serve as reminder to the guardians and insurance for the school to receive their payment on time during payment period.

Also this study will introduce potentially new method to keep students on tab that the current traditional system can't deal with efficiently. As a side-effect of this system, this may reduce the numbers of incidents involving students lying to their parents about their tuition fees.

This system is deeply dependent on the type of logic called fuzzy logic. The Fuzzy logic was first advanced by Dr. Lotfi Zadeh of the University of California at Berkeley. The Fuzzy logic is very useful

in artificial intelligence applications by representing the numbers or descriptions.

Fuzzy logic is a logic that has numerous values, estimated reasoning and a vague boundary. It is a method to computing based in degrees rather than the usual true or false (1 or 0) of Boolean logic on which the modern computer is based. The variable in fuzzy Logic system may be any real number between 0 and 1. Rules are formulated by the Fuzzy inference system and the decisions are made based on these rules. The entire process of decision making is mostly the combinations of concept of Fuzzy Set theory, fuzzy if-then rules and Fuzzy reasoning. Decision rules are made by using if-then statements with connectors present like "OR" and "AND" by the fuzzy inference system. The Fuzzy rule base is the part which is responsible for storing all the rules of the system and because of that, it can be called as the knowledge base of the Fuzzy system. The required output produced by the decision making is also handled by Fuzzy inference system.

The Fuzzy Control systems are based on rules in which a set of fuzzy rules represent a control decision mechanism for adjusting the effects of a certain system stimuli. The Fuzzy Logic is a system with a decision making which is closer to a human's decision making because the human knowledge is incorporated in fuzzy rules. So, we can say this type of

Operation is closer or perhaps similar to have a human brain works.

1.2 Problem Statement

Students cannot be completely trusted in handling large amount of money which normally should be given to them for their tuition fees.

Guardians are not completely aware of the state of their account on the school when they are not inquiring about it.

1.3 Objectives of the Study

The main objective on this study is to apply fuzzy logic to predict the potential delay of payment of the student or guardian

This study aims to:

- To improve the flow payment on the institutional
- To potentially reduce the incidents involve with false
- To ensure the guardians or parents are completely aware of their child or children's tuition accounts.

2. METHODOLOGY

2.1 Overview of the program

No. of Late (frequency of late payment)	Tuition Fee	Prediction (tendency of being late)	True/False
UA	L	Low	F
UA	H	High	T
UA	VH	Very High	T
A	L	Very Low	F
A	H	Low	F
A	VH	High	T

TABLE 1

The number of late will be UA (Unacceptable) if it exceeds half of the total possible late and A (Acceptable) if it is less. But the total possible late are depending on what year level the student is.

Based on figure 2, the tuition fee is considered L (Low) if the value is less than or equal to 25 and is considered H (High) when the value is from 25 to 45 then considered VH (Very High) when the value is greater than or equal to 45.

If the prediction output is 1 then the prediction is considered Very Low, if the output is 2 then it is considered low, if the output is 3 then it is High and it is considered Very High if the output is 4.

If the system output is 0 then it is True in contrast with 0.5 and 1 in which the output is considered False.

True means that the operator will not send an email to the student and guardian regarding to their account. But, False prompts the user to send an email regarding the account of the student to the guardian and possible tendency that their payment will be late.

2.1.2 Remote Control System through Mobile and DTMF

In this paper, the proponents propose a method that uses a mobile phone and DTMF decoder to control remote machine. A mobile phone will be used as a remote control to the cutter machine to work. It is the one that will send controlling signal to the SIM card number in the Sudani One modem (connected with PC through USB port). Sudani One modem is an auto-answering mode. A DTMF tone is produced when you press a button on the phone when it is being called. The signal is fed to 8870 DTF decoder chip that will send a BCD value of tone to the PC through a parallel port. It will be the one that will determine if the appliance will switch on/off. This methodology can be applied to remote switching devices using DTMF technology in home automation.

2.2 Flowchart

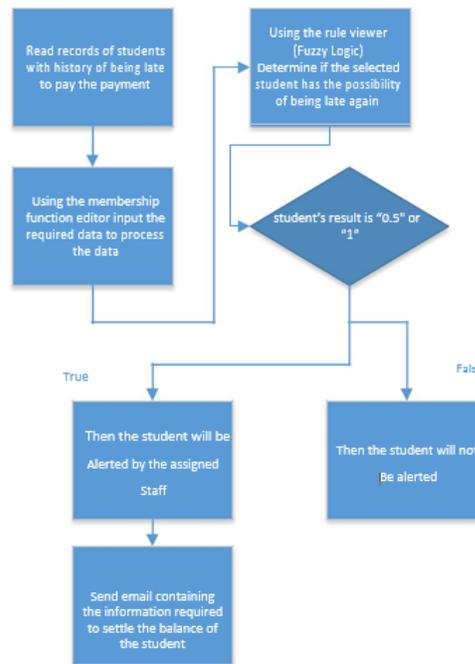


Figure 1: Flowchart

2.3 Program Interfaces

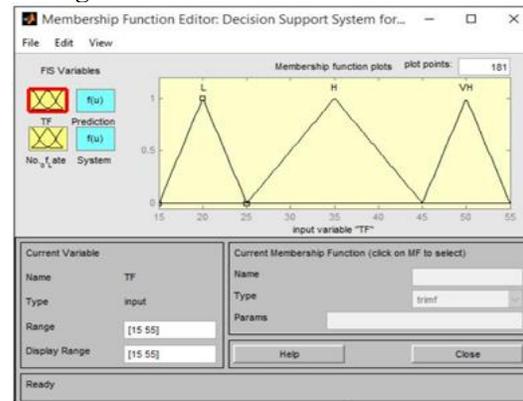


Figure 2: Range Of Tuition Fee

This interface is where the user will input the current range of tuition fee.

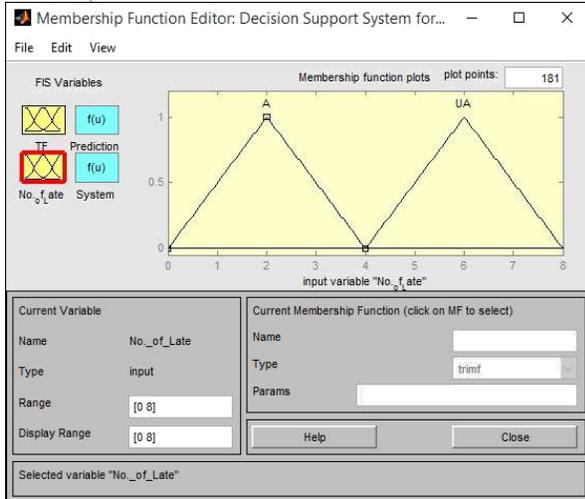


Figure 3: range of no. Of late of the Student

This interface is where the user will input the current range of no. of late of the student.

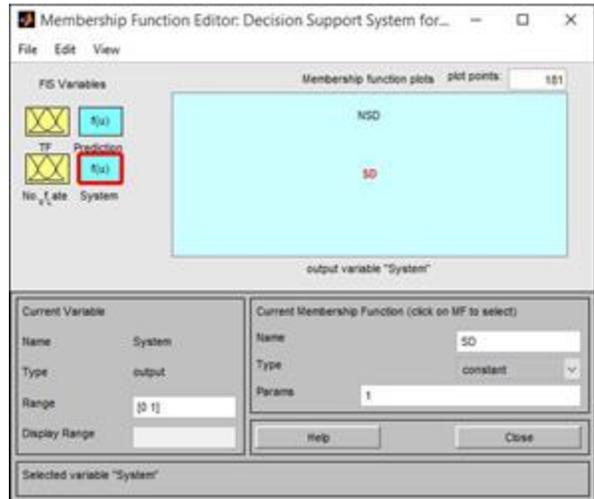


Figure 4: variable set-up for final Decision

This part is where the user or operator sets the variable required for the results to be shown to the user.



Figure 4: Variable Set-Up For Prediction

This part is where the user or operator sets the output variable required for the calculation.

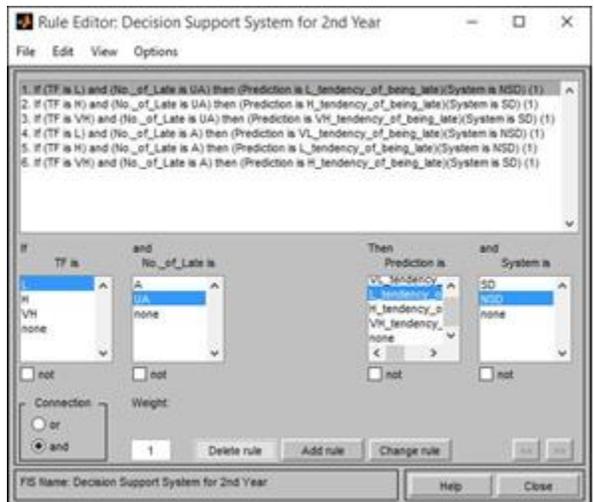


Figure 5: Rule Editor Of The System

This interface is where the rules are set up by the operator.

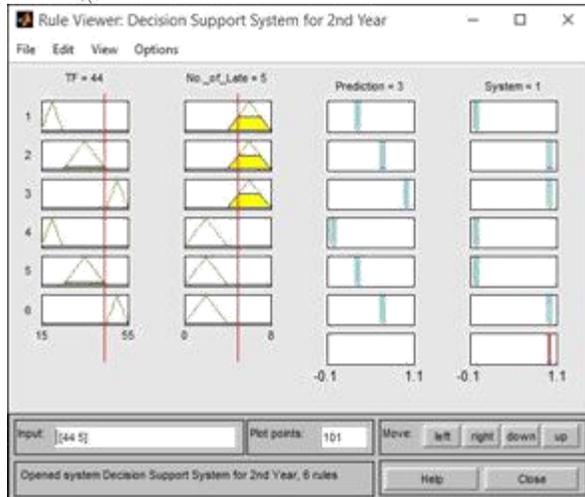


Figure 5: Decision Support System

This is where the operator or user will see the result of the calculation based on the rules and parameters given in the previous interfaces.

3. RECOMMENDATIONS

The proponents strongly recommend that if a school or institution wants to use this system, they should have a proper and able staff that can operate this system and have a vast knowledge about fuzzy logic and computer science. Also, regarding to the parameters that will be used on the system, we recommend that it should have enough data to fully maximize the capacity of this system resulting to a more accurate result.

4. ACKNOWLEDGEMENTS

The proponents want to acknowledge first, God for guiding them from the beginning and making this study possible. Second, Engr. Rionel Caldo and Engr. Davood Pour Yousefian Barfeh for advising the proponents by giving them instructions to make this paper more presentable. Third, Mr. Derrick Castillo, Mr. Anthony Sumague and Ms. Ariane Fulla for assisting the proponents on some minor problems regarding to constructing the paper. Lastly, the proponents' parents or guardians for giving the proponents the opportunity to study in Lyceum of the Philippines Laguna thus make them able to make this paper. All the proponents are very grateful to the aforementioned people especially God.

5. REFERENCES

- Fuzzy logic. (n.d.). Retrieved October 22, 2015, from https://simple.wikipedia.org/wiki/Fuzzy_logic
- What is fuzzy logic? - Definition from WhatIs.com. (n.d.). Retrieved October 22, 2015, from <http://whatis.techtarget.com/definition/fuzzy-logic>
- Kozłowska, E. (2012, January 8). Basic principles of fuzzy logic. Retrieved October 22, 2015, from <http://access.feld.cvut.cz/view.php?cisloclanku=2012080002>
- Kapil Dev Sharma, M. Ayyub, Sumit Saroha, and Ahmad Faras, Advanced Controllers Using Fuzzy Logic Controller (FLC) for Performance Improvement, Department of Electrical Engineering, AMU Aligarh, India.
- Lotfi A. Zadeh, "Is there a need for fuzzy logic?" Department of EECS, University of California, Berkeley, CA 94720-1776, United States, February 2008