

FUZZY STUDENT'S ASSESSMENT SYSTEM

NAZIRAH BINTI MOHAMMED ANWAR

This report is submitted in partial fulfillment of the requirement for the Bachelor in
Computer Science (Artificial Intelligence)

FACULTY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2015

DECLARATION

I hereby declare that this project report entitled

FUZZY STUDENT'S ASSESSMENT SYSTEM

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT: _____ Date:

(NAZIRAH BINTI MOHAMMED ANWAR)

SUPERVISOR: _____ Date:

(DR SHARIFAH SAKINAH BT SYED AHMAD)

DEDICATION

To my father and mother,

Mohammed Anwar bin Ismail and Hairun binti Anwar Basha.

To my supervisor,

Dr Sharifah Sakinah binti Syed Ahmad.

To my friends and colleagues and all that support me from behind.

Who inspired me with their love of learning, supporting and assistance.

ACKNOWLEDGEMENT

First and foremost, I thankful to the Allah the Almighty God for blessing me to complete this project. I would like to enlarge my gratefulness to my supervisor Dr. Sharifah Sakinah Syed Ahmad as support, teaching and helping me to this project. Special thanks also dedicated to her for all comments, idea and a guideline from first day I start this project.

This appreciation also goes to my friend that always gives support, opinions and advices for more to complete this project. Not forgotten to the lecturers in University Teknikal Malaysia Melaka (UTeM), because give me some information for completing this project.

Especially to my beloved family for, I would like to forward my obliged to them for their continuous support during my study period, their patience and benevolence. Lastly, I would like to thank to everyone who has contributed during my Projek Sarjana Muda. Your kindness and cooperation in completion of my paper work is much appreciated.

THANK YOU

ABSTRACT

Fuzzy Assessment System (FAS) local based application that developed to help university management to manage finding the accurate grade and marks for university's students using Fuzzy Expert System. This system helps lecturers in grading system by using a fair fuzzy system. This system was created to identify the difference that occurs between fuzzy system and manual existing system. MATLAB used as programming language to develop this system with Mamdani technique. The target users of this system are lecturers and university's students. The main objective of this system is to help lecturer in grading system while be very fair and equitable to students. This system is can be trusted because all the information and calculation skill was gathered from expert. These experts comprise of lecturers from UTeM. Membership Function was the important factor of creating this system because all the rules were created from it to develop a successful Fuzzy System. The main features of this system in its grading system. This system has two different sides for lecturer and student but lecturer still can used both side as a grading purpose.

ABSTRAK

Sistem kabur Penilaian (FAS) aplikasi berasaskan tempatan yang dibangunkan untuk membantu pengurusan universiti untuk menguruskan mencari grad yang tepat dan markah untuk pelajar universiti menggunakan Sistem Pakar Logik Kabur. Sistem ini membantu pensyarah dalam sistem penggredan dengan menggunakan sistem kabur adil. Sistem ini diwujudkan bagi mengenal pasti perbezaan yang berlaku antara sistem kabur dan sistem manual yang sedia ada. MATLAB digunakan sebagai bahasa pengaturcaraan untuk membangunkan sistem ini dengan teknik Mamdani. Para pengguna sasaran sistem ini adalah pensyarah dan pelajar universiti. Objektif utama sistem ini adalah untuk membantu pensyarah dalam sistem penggredan untuk lebih sangat adil dan saksama kepada pelajar. Sistem ini boleh dipercayai kerana semua kemahiran maklumat dan pengiraan telah dikumpulkan dari pakar. Pakar-pakar ini terdiri daripada pensyarah dari UTeM. Fungsi Keahlian adalah faktor penting dalam mewujudkan sistem ini kerana segala peraturan yang dicipta daripadanya untuk membangunkan Sistem Kabur yang berjaya. Ciri-ciri utama sistem ini dalam sistem penggredan itu. Sistem ini mempunyai dua sisi yang berbeza bagi pensyarah dan pelajar tetapi pensyarah masih boleh digunakan kedua-dua sisi sebagai tujuan penggredan.

TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	xiv
	LIST OF FIGURES	xvi
 CHAPTER I	 INTRODUCTION	 1
	1.1 Introduction	1
	1.2 Problem Statement	2
	1.3 Objective	3
	1.4 Scope	4
	1.5 Project Significance	5
	1.6 Expected Output	6
	1.7 Conclusion	7

CHAPTER II	LITERATURE REVIEW AND PROJECT	
	METHODOLOGY	8
2.1	Introduction	8
2.2	Fact and Finding	9
	2.2.1 Domain	10
	2.2.2 Existing System	12
	2.2.2 Techniques	23
2.3	Project Methodology	24
2.4	Project Requirement	28
	2.4.1 Software Requirement	28
	2.4.2 Hardware Requirement	29
	2.4.3 Other Requirement	29
2.5	Project Schedule and Milestones	30
2.6	Conclusion	33

CHAPTER III	ANALYSIS	34
3.1	Introduction	34
3.2	Problem Analysis	35
3.3	Requirement Analysis	45
	3.3.1 Data Requirement	45
	3.3.2 Functional Requirement	53
	3.3.3 Non-functional Requirement	54
	3.3.4 Other Requirement	55
3.4	Conclusion	56

CHAPTER IV	DESIGN	57
4.1	Introduction	57
4.2	High-Level Design	58
4.2.1	System Architecture	58
4.2.2	User Interface Design	77
4.2.2.1	Navigation Design	80
4.2.2.2	Input Design	81
4.2.2.3	Technical Design	84
4.2.2.4	Output Design	86
4.2.3	Database Design	90
4.2.3.1	Conceptual and Logical Design	90
4.3	Detailed Design	90
4.3.1	Software and Hardware Design	97
4.3.2	Physical Database Design	98
4.4	Conclusion	99

CHAPTER V	IMPLEMENTATION	100
5.1	Introduction	100
5.2	Software Development Environment Setup	101
5.3	Software Configuration Management	102
	5.3.1 Configuration Environment Setup	103
	5.3.2 Version Control Procedure	105
5.4	Implementation Status	106
5.5	Conclusion	109

CHAPTER VI	TESTING	110
6.1	Introduction	110
6.2	Test Plan	111
6.2.1	Test Organization	111
6.2.2	Test Environment	112
6.2.3	Test Schedule	116
6.3	Test Strategy	117
6.3.1	Classes of Tests	119
6.4	Test Implementation	120
6.4.1	Test Description	120
6.4.2	Test Data	122
6.5	Test Result and Analysis	123
6.6	Conclusion	125

CHAPTER VII	PROJECT CONCLUSION	126
7.1	Observation on Weakness and Strengths	126
7.2	Proposition of Improvement	127
7.3	Project Contribution	128
7.4	Conclusion	129
REFERENCES		131
APPENDIXES		133

LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Existing System	12
2.2	Schedule and Milestones	30
3.1	Existing System Course Outline	37
3.2	Assessment Method considered in BITI subject	45
3.3	Membership Function 1 (Quiz and Ass)	46
3.4	Input variable in Membership Function 1 (Quiz and Ass)	47
3.5	Output variable in Membership Function 1 (Quiz and Ass)	48
3.6	Input variable 1(Midterm) Membership Function 2(Pro and Mid)	48
3.7	Input variable 2 (Project) Membership Function 2 (Pro and Mid)	49
3.8	Output variable in Membership Function 2 (Pro and Mid)	50
3.9	Input variable 1(carry marks) in Membership Function 3 (PSM1)	51
3.10	Input variable 2(final marks) in Membership Function 3 (PSM1)	51
3.11	Output variable in Membership Function 3 (PSM1)	52
3.12	Functional Requirement	54
3.13	Non-functional requirement	55

5.1	Fuzzy System Configuration Environment Setup	105
5.2	Fuzzy Student's Assessment System Numbering of Product Version	106
5.3	Load Data Implementation Detail	106
5.4	Display Student's Grade Implementation Detail	107
5.5	Display Graph Implementation Detail	107
5.6	Display Student ID Implementation Detail	107
5.7	Display Student Marks Implementation Detail	108
5.8	Calculate Student Grade Implementation Detail	108
5.9	Display Marks Implementation Detail	108
5.10	Display Graph (right side) Implementation Detail	109
6.1	Application Software	113
6.2	System Software	113
6.3	System Hardware	114
6.4	Test Schedule	116
6.5	Test Description	120
6.6	Test Results and Analysis	124

LIST OF FIGURES

DIAGRAM	TITLE	PAGE
2.1	Marks scale at UTeM	11
2.2	Existing system at IIUM	17
2.3	Existing system at IIUM (Grading Scale)	18
2.4	Existing system at MMU	19
2.5	Existing system at MMU	20
2.6	Existing System used in UTeM	21
2.7	Formula for calculating GPA in existing system	22
2.8	Flow Chart of Fuzzy Student's Assessment System	25
3.1	Marks Scale in UTeM	36
3.2	Flowchart of this Existing Grading System	38
3.3	Example of Microsoft Excel in calculating student's total marks	41
3.4	IIUM grading scale	43
3.5	MSU grading scale	44

3.6	Membership Function for input variable “Quiz”	46
3.7	Membership Function for input variable “Assignment”	47
3.8	Membership Function for output variable “marks level”	48
3.9	Membership Function for input variable “Midterm”	49
3.10	Membership Function for input variable “Project”	49
3.11	Membership Function for output variable “Marks”	50
3.12	Membership Function for input variable “carry marks”	51
3.13	Membership Function for input variable “final marks”	52
3.14	Membership Function for output variable “gred”	53
4.1	Architecture of Fuzzy Expert System	58
4.2	Architecture of Fuzzy Assessment System (Expert System)	58
4.3	Architecture of Fuzzy Student’s Assessment System	59
4.4	Membership Function editors for Quiz and ASS	62
4.5	Membership Function editor for PRO and Mid	63
4.6	Membership Function editor for PSM1	63
4.7	Rules Editor for Quiz and ASS	64
4.8	Rules Editor for PRO and MID	65
4.9	Rules Editor for PSM1	66

4.10	Mamdani-style fuzzy inference process	67
4.11	Rule Evaluation	68
4.12	Rule Viewer of PSM1	69
4.13	Rule Viewer of QUIZ and ASS	70
4.14	Rule Viewer of PRO and MID	71
4.15	Clipping and Scaling MF	72
4.16	Aggregation of the rules	73
4.17	Center of Gravity Examples (COG)	75
4.18	Center of Gravity Calculation (COG)	75
4.19	Matlab Coding of Fuzzy Assessment System	76
4.20	Fuzzy Student's Assessment System interface	77
4.21	Fuzzy Student's Assessment System interface	78
4.22	Fuzzy Student's Assessment System output design	79
4.23	Fuzzy Student's Assessment System navigation flow	80
4.24	Fuzzy Student's Assessment System data load	81
4.25	Fuzzy Student's Assessment System output example	82
4.26	Fuzzy Student's Assessment System interface	83

4.27	Fuzzy Inference System (FIS) flow	84
4.28	FSAS output	86
4.29	FSAS Grade Output	87
4.30	Lecturer's side output	87
4.31	Output at command window	88
4.32	Grade output appears in command window.	89
4.33	Fuzzy Classification Model (Flow)	91
4.34	Membership Function of QUIZ and ASS	92
4.35	Membership Function of PRO and MIId	93
4.36	Membership Function of PSM1	94
4.37	Input of FSAS	95
4.38	Surface of PSM1	96
4.39	System Design Analyses	97
4.40	Databases in MATLAB Command Window	98
5.1	Fuzzy Assessment System Development Environments Setup	101
5.2	Matlab Configuration environment setup	103
5.3	Matlab Work Environments	104
6.1	MF of Normal System	114

6.2	MF of New System	115
6.3	Example of Membership Function's range	115
6.4	Student's marks data in MS Excel	122
6.5	Student's marks data in note pad (.txt)	123

LIST OF APPENDIXES

1.0	Appendix A	133
2.0	Appendix B	135
3.0	Appendix C	137
4.0	Appendix D	138
5.0	Appendix E	139
6.0	Appendix F	146
7.0	Appendix G	149
8.0	Appendix H	151

CHAPTER 1

INTRODUCTION

1.1 Introduction

During Projek Sarjana Muda (PSM) student needs to create one application or research according to their topic. In this case I had chosen to create a system based on Fuzzy Logic Expert System. The title for this system is Fuzzy Student's Assessment System. All input and data are collected from the expert in this field, so, the data collection will never be false.

Usually all university will do assessment for grading system by using manual system. The existing system nowadays was using the mathematical summation technique to find the total of student's marks by adding the coursework marks and final examination's marks of students. This application will focus on Universiti Teknikal Malaysia Melaka (UTeM) lecturer's assessment system. Some information had been collected from them based on their knowledge and experiences to create this Fuzzy Logic Expert System.

Therefore, the purpose of this system is to identifying the differences in term of output represented between fuzzy assessment system and non-fuzzy assessment system to recognize the differences in representing student's final marks for evaluate the final grade given between these two systems.

Besides, this Fuzzy Student's Assessment System will be used to calculate student's marks in certain selected subjects to determine the final grade. All the data and information about these subjects will be collected from lecturers. Therefore, the latest students result output from the existing assessment system of the selected subjects will be collected too for the purpose of comparison.

Fuzzy Inferences System need are very detail input data to produce a complete membership functions. Therefore, in this research all input data will be collected from expert by questionnaire and interview.

1.2 Problem Statement

- Manual Assessment System/ Existing System are too rigid and not flexible.

Normally, existing assessment system will only do the summation to calculate the total marks receive by each students and mostly the will used Microsoft excel to do this calculation. So that, all elements such as quiz, assignment, project, midterm and final has same amount of importance. Therefore, it is not flexible because we cannot hire the highest important to any of the element individually. This system in too rigid and sometimes can be unfair to students.

- Human Error will occur during do some calculation for grading assessment system.

The normal assessment system is too rigid and totally numeric, it is possible that lecturers makes some mistake during insert students carry marks. This can lead to human error problem which can change the exact grade of student.

- Grading poses an exceedingly difficult problem to instructors

This is because what it intends to measure, being a human capacity, cannot be crisply defined. Normally to give an accurate grade for student will be the most difficult problem for lecturers because grading system was fully measured from student's works and examination marks. Sometimes, very intelligent student maybe cannot perform well during finishing their assignment or during midterm because of some reasonable problem. But they can highly perform during final examination. Therefore, lecturers still need to assessment according to their work not to their wisdom. This is an example why grading poses are difficult. Besides, lecturer need to be very closely on grading skill and cannot be flexible in assess student.

Link: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=387218>

- Attach meaning to grades always suffer from lack of uniformity

The variation of grading practices among university creates the difference in grading system normally in term of their mark's scale. This can lead to form uniformity in grading system even in the same country.

- Some grading system can be unfair to brilliant student

Some students they have taken the trouble to complete their homework or assignment on their own and get the highest marks. However, there are some students who just imitate the student's work but still get the same marks. This is because the existing system does not have the ability to set the level of importance of input data in determining student's grade.

1.3 Objective

- To explore a fuzzy system approach in grading assessment system.
- To construct parameters for fuzzy grading system.
- To evaluate fuzzy grading system by using real student's assessment data.