

UNIVERSITITEKNOLOGI MARA

**DEVELOPMENT OF MALAYSIA FRESHWATER
FISH TAXONOMY**

NORAFIZA BINTIAWALLUDIN

Thesis submitted in fulfillment of the requirements
for the degree of
Master of Science

Faculty of Information Technology & Science Quantitative

November 2008

ACKNOWLEDGEMENTS

With the name of Allah the most Gracious, the most Merciful creator.

I seek His Blessing on His Prophet Muhammad S.A.W

All praise and glory be to Allah S.W.T whose infinite generosity has given me the strength to complete this final project in time.

My sincerest gratitude, thanks and most appreciation goes to my supervisor, Prof. Madya Zaidah Ibrahim, for her guidance, encouragement, comments and references. Her efforts in helping me throughout the course of the research motivate me to complete this thesis. My deepest appreciation also goes to my course coordinators, Prof. Madya Dr. Norlaila for her valuable guidance in the completion of this research.

In here I would also like to record my sincere thanks to Prof. Madya Dr. Harinder, fish taxonomy expert from Faculty of Applied Science, Universiti Teknologi MARA Malaysia.

I would like to express my grateful thanks to my friends, for their opinion, suggestion and cooperation they gave. Also thanks for their moral support during the months I spent preparing this final project. Thanks also go to the staffs and lecturers who helped me indirectly.

To my beloved parents and family, who are always there for me whenever I need them and million of thanks for all supports, blessing, loves and financial support they give to me. Finally, to whom I failed to mention, who directly contributed to this project.

Thank you very much.

ABSTRACT

This paper presents a Malaysia freshwater fish taxonomy developed for identifying the types of fish to suit specific circumstances based on the criteria such as body, shape, eyes, mouth, barbells, caudal fin etc. The user of the system will consist of the non-expert such as tourists, students, fishing fans. There are total of 564 species of freshwater fishes found in Malaysia where it is subcategorized by class, order, family, genera and scientific names fishes used in this system. The literature review involves in acquisition of knowledge from human expert books; document, journal, and existing system. Data collection leads to create freshwater fish knowledge base. The inference engine proposed in this study is based on forward and backward chaining to construct a decision tree. Certainty factor uses to makes some simple assumption for creating confidence measures. From the data gathered a Malaysia freshwater fish expert system prototype is developed.

Keyword: Freshwater fish, expert system, forward and backward chaining, knowledge base, certainty factor

TABLE OF CONTENT

CANDIDATE'S DECLARATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
TABLE OF CONTENT	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii

CHAPTER 1 INTRODUCTION

1.1	Research Background	1
1.2	Problem Statement	2
1.3	Research Questions	3
1.4	Research Objectives	3
1.5	Research Contribution	3
1.6	Project Scope	3
1.7	Project Limitation	4
1.8	Content of Thesis	4

CHAPTER 2 LITERATURE REVIEW

2.1	What is Artificial Intelligence?	6
2.2	Expert system	7
2.3	The Rule Based Expert System	8
2.4	Data-driven Rule-based Expert Systems	9
2.5	Goal-driven Rule-based Expert Systems	10
2.6	Example of rule based	11

2.7	Certainty Factor	11
2.8	Fish Taxonomy	12
2.9	Tools of Taxonomy	13
2.10	Fish identification	17
2.11	Freshwater Fishes in Malaysia	20
2.12	Fish Identification Database System	24
2.13	The Whale Watcher Expert System	25
2.14	Conclusions	26

CHAPTER 3 METHODOLOGY

3.1	Introduction	27
3.2	Identify Problem Statement	29
3.3	Knowledge Acquisition	29
3.4	Data Acquisition	29
3.5	Design	30
	3.5.1 Decision Trees	30
	3.5.2 Order decision trees	30
	3.5.3 Family and Species Decision Trees	32
3.6	Prototype Development	44
	3.6.1 The Production of Rules	46
	3.6.2 Calculation of Certainty Factor	49
3.7	Documentation	50

CHAPTER 4 RESULT AND FINDING

4.1	Introduction	51
4.2	Classification Fish based on Criteria	51
4.3	Freshwater Fish Expert System Screen Layout	52
4.4	Conclusions	57