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INTELLIGENT DECISION SUPPORT MULTI AGENT SYSTEM IN IRRIGATION WATER MANAGEMENT



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Declaration

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Dedication

I dedicate this thesis to my family and friends. A special feeling of gratefulness to my dearest mother who shadow my life when need the encouragements. I will always appreciate the help of other family members for the things all they have done and their valuable thoughts. I dedicate this work and give many thanks to people at Rajarata University for their help and especially for the library staff.

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Abstract

Hydrology and water resources research have some interested in to look for new methodologies that help to address current and future water conflicts over freshwater. The aim of this thesis is applied multi-agent approaches in the water resource research as a valuable tool. Multi-agent systems that are frequently applied in various academic disciplines represent the system based on more or less autonomous and cognitive agents.

In the first part of the thesis, the method is critically reviewed. Applications conducted in hydrology, water sciences and related areas are considered for this purpose. In addition, existing software systems for multi-agent modeling are discussed. Since the representation of the environment has proved itself one of the most important points for applications in hydrology and water resources research, recent developments in this field of research are taken into account.

In the second part of this thesis, a prototype of a multi-agent model of the water supply in the area of Mahaweli H System was developed using the Java Agent Development Framework (JADE) and consist of diverse methods to support in Irrigation Water Management. The model aims at exploring the way the irrigation population handles this situation and manages to satisfy its cultivation demand of the water. Thereby, the representation of the natural water resources is based on empirical data and hydrological assumptions. In here highly concern about the water control technique used in irrigation system named as the Bulk Water Allocation system. The system was evaluated using the existing data from the Irrigation Department. It has resulted that the water wastage by the system was 72.04% and the natural phenomena was 74.00%. This result concluded that the automated software component of water management functions using multi agent technology as an effective solution for eliminating limitations in decentralized communication.

Contents

	Page
Chapter 1 Introduction	1
1.1 Prolegomena	1
1.2 Research Question	3
1.3 Aim and Objectives	3
1.4 Background and Motivation	4
1.5 Problem in Brief	5
1.6 Novel Approach to Irrigation Water Management	5
1.7 Structure of the thesis	6
1.8 Summary	6
Chapter 2 Current Trends And Issues in Irrigation Water Management (IWM)	7
2.1 Introduction	7
2.1.1 Multi-agent systems and Hydrology	7
2.1.2 Urban water management	8
2.1.3 Integrated Natural Resources Management	9
2.1.4 Integrated Watershed Management	9
2.1.5 Lake Management	10
2.2 Benefits of Multi Agent System in Hydrology and Water Resource Managements	11
2.3 Limitation for Hydrology and Water Resource Research	11
2.4 Summary	12

Chapter 3 The Multi Agent Technology	13
3.1 Introduction	13
3.2 Short History of Multi Agent Systems	13
3.3 Definition of Agents and Multi Agent Systems	16
3.4 Architecture of MAS	17
3.5 Different Types of Agents	19
3.6 Defining Agent Behaviors	21
3.6.1 Decision Making	23
3.6.2 Negotiation	24
3.7 Software and output of Data	25
3.8 Characteristics of Multi Agent Systems	25
3.9 Various Types of use of MAS	27
3.10 Summary	28
Chapter 4 Water supply in Mahaweli-H System	30
4.1 Introduction	30
4.2 Study Area	31
4.3 Bulk Water Allocation(BWA)	33
4.4 Structure	37
4.5 Design of the Model	39
4.6 General Assumption	39
4.7 Physical Environment	39
4.8 Agents	40
4.8.1 Farmer Agents	40
4.8.2 Water Master Agent	40
4.8.3 Agriculture Agent	40
4.9 Software	41
4.10 Decision Model	41

4.11	Resulting Structure	42
4.12	Summary	43
Chapter 5 Realizing Multi Agent Approach in IWM		44
5.1	Introduction	44
5.2	Hypothesis	44
5.3	Input to the System	44
5.4	Output to the System	45
5.5	Process of IWM	45
5.6	Summary	46
Chapter 6 Design of MAS for IWM		47
6.1	Introduction	47
6.2	The Architecture of IWM	47
6.3	Essential Entities in IWM	47
6.4	Relationship between entities in IWM	49
6.5	Summary	50
Chapter 7 Implementation of the MAS Solution in IWM		51
7.1	Introduction	51
7.2	Agent Categorization	53
7.3	Alias of Agent Representation	53
7.4	Agents joined with communication Process	54
7.5	Configuration and Initialization of Agents	55
7.6	Summary	59
Chapter 8 Evaluation		60
8.1	Introduction	60
8.2	Experimental Design	60
8.3	Experimental Results	60
8.4	Conclusion from the Experiment	61
8.5	Summary	62

Chapter 9 Conclusion	65
9.1 Introduction	65
9.2 Conclusion	65
9.3 Limitation and Future Work	65
9.4 Summary	65
References	66
Appendix A	69
A.1 Input text file to the System	69
A.2 Output System values by the System	69

List of Figures

Figure 3.1	Illustration of a multi-agent system	17
Figure 3.2	A Scheme of two agents, their environment and the included interactions	18
Figure 3.3	Schematic perspective on the agent-based framework for water mains rehabilitation decision support	20
Figure 3.4	Water council negotiation protocol	24
Figure 3.5	Various types of application for multi-agent systems	29
Figure 4.1	Position of the Mahaweli H- System	32
Figure 4.2	Map of Mahaweli System H	33
Figure 4.3	Structure of water distribution in the fields	36
Figure 4.4	Principal structure of the model	42
Figure 6.1	Module Based Architecture of IWM	48
Figure 6.2	High-Level Architecture of IWM	49
Figure 7.1	Agents joined with communication process	52
Figure 7.2	Farmer(Sender) and Water Master(Receiver)	53
Figure 7.3	Agent Initializations	56
Figure 7.4	Agent Initializations	56
Figure 7.5	Farmer(Sender) and Water Master(Receiver) Agent	57
Figure 7.6	Farmer(Sender) requesting process	57
Figure 7.7	Agent Communication Process	58
Figure 7.8	Decision Making Process	58
Figure 7.8	Message Passing Process	59
Figure 8.1	Comparison of the past data collected from the Irrigation Department	62
Figure 8.2	Comparison of System Data generated by the Model	62
Figure 8.3	Drainage Water Comparison of Row Data and System Data	63

List of Tables

Table 3.1	Some attributes of multi-agent systems together with their potential range	18
Table 3.2	Satisfaction values for the different agent types	23
Table 3.3	Two systems of interpretation representing two concepts of complexity	27
Table 4.1	The canal details of the Mahaweli H- System	37
Table 4.2	Factors relevant to the water supply system in Mahaweli –H , partly implemented in the current version of the model	38
Table 4.3	Some seasonal Crops of Mahaweli H System.	40
Table 4.4	Description of important features and attributes of the realized multi-agent system	43
Table 5.1	Inputs by Various Agents	44
Table 5.2	Outputs of the System	45
Table 7.1	Agents in Water Management	54
Table 7.2	Number of Agents in Water Management	55
Table 8.1	Existing data from the Department of Irrigation	60
Table 8.2	Resulted Data from the System	61

