

# **Agent Based Solution for Artificial Neural Network Optimisation**



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Faculty of Information Technology

University of Moratuwa

January 2014

# **Agent Based Solution for Artificial Neural Network Optimisation**



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Dissertation submitted to the Faculty of Information Technology, University of Moratuwa, Sri Lanka for the partial fulfilment of the requirements of the Degree of MSc in Artificial Intelligence

January 2014

# Declaration

I declare that this dissertation does not incorporate, without acknowledgment, any material previously submitted for a Degree or a Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations.

Name of Student: P.S.M. Dharmakeerthi

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Supervised by

Name of Supervisor: Prof. Asoka S. Karunananda

Signature of Supervisor

Date:

# Dedication

This thesis is dedicated to

my mother , father

and my beloved wife Ranmalee

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for their sacrifice and unwavering confidence.

Standing by me burning the midnight oil many  
times.

# Acknowledgement

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## Abstract

Artificial neural networks are highly used in the areas of pattern recognition, feature extraction, function approximation, scientific classification, control systems, noise reduction and prediction. Feed-forward and back-propagation neural networks are the most commonly used artificial neural networks. Many researchers face difficulties when selecting a proper ANN architecture and training parameters. The manual ANN training process is not the best practical solution because it is a much time consuming task. Also most of the people conduct the manual process in an ad-hoc manner without having a proper knowledge about artificial neural networks. At the end of this research project a multi-agent system: MASAnnt (Multi Agent System for Artificial Neural Network Training) was developed to automate the neural network training for feed-forward and back-propagation neural network. Interaction among agents enables emergence of quality training sessions which cannot be achieved by an ad-hoc training sessions conducted by humans. It is straight forward to recognize training parameters such as number of hidden layers, number of neurons in each hidden layer, momentum, learning rate, Emax (Error goal) and activate function of an ANN as a set of agents. Inherent features of agents including coordination, communication and negotiation are able to mimic the ANN optimizing and training process by manipulating these parameters. Our experiments show that the more rational results can be obtained from the system with both simple data sets like XOR as well as with real life data sets. We can conclude that the neural network optimization and training tasks are successfully accomplished by the agent based approach by analysing the results of the evaluation.

# Contents

	<b>Page</b>
<b>Chapter 1 Introduction</b>	<b>1</b>
1.1 Introduction	1
1.2 Background and Motivation	2
1.3 Aim	3
1.4 Objective	3
1.5 Users	3
1.6 Inputs and Outputs	3
1.7 Resource requirements	4
1.8 Overview of the Report	4
1.9 Summary	5
<b>Chapter 2 Current Movements in Artificial Neural Network Optimization</b>	<b>7</b>
2.1 Introduction	7
2.2 Artificial Neural Networks Training	7
2.3 Manual Processes in Neural Network Training	8
2.4 Automated Approaches to Neural Network Training	8
2.5 Comparison of Available Researches	12
2.6 Summary	14
<b>Chapter 3 Technology Adapted In This Project</b>	<b>15</b>
3.1 Introduction	15
3.2 Artificial Neural Network	15
3.2.1 Feed-Forward and Back-Propagation Neural Network	15
3.2.2 Training Parameters of ANN	16
3.3 Multi Agent Systems	18
3.3.1 Complex Systems	18
3.3.2 Attempts to Solve Complex Problems Using Multi Agents Technology	18
3.4 Multi Agent Technology for Neural Network Optimization	19
3.5 Summary	20

	<b>Page</b>
<b>Chapter 4 An Approach to Use Multi Agent Technology to ANN Training</b>	<b>21</b>
4.1 Introduction	21
4.2 Hypothesis	21
4.3 Users	21
4.4 Inputs and Outputs	21
4.5 Process	22
4.6 Technology that Implements the Solution	22
4.7 Features	23
4.8 Summary	23
<b>Chapter 5 Design of MASannt Toolkit</b>	<b>24</b>
5.1 Introduction	24
5.2 Program Flow	24
5.3 High Level Design of MASannt Toolkit	26
5.4 System Control Agent	26
5.4.1 GUI	Behaviour
26	
5.4.2 Negotiation	Behaviour
27	
5.4.3 Message Space	Behaviour
27	
5.5 Training Unit	28
5.6 Expert Agent Unit	28
5.7 Ontology	29
5.8 Training Data	29
5.9 Summary	30
<b>Chapter 6 Implementation of MASannt Toolkit</b>	<b>31</b>
6.1 Introduction	31
6.2 Development Environment	31
6.3 Implementation of System Control Agent	31
6.3.1 Implementation of GUI	GUI
32	



6.3.2	Implementation of System Control Agent Behaviours	34
6.4	Training Agent	37
6.4.1	Neural Network	38
6.5	Expert Agent	38
6.6	Ontology	39
		<b>Page</b>
6.7	Summary	41
<b>Chapter 7 Evaluation of MASAnnt Toolkit</b>		<b>42</b>
7.1	Introduction	42
7.2	Overall Functionality of the System	42
7.3	User Interface Evaluation	43
7.4	Evaluation with XOR	44
7.5	Evaluation with Iris Data Set	45
7.6	Summary	47
<b>Chapter 8 Conclusion and Further Work</b>		<b>48</b>
8.1	Introduction	48
8.2	Overall Conclusion	48
8.3	Achievements of the Objectives	49
8.4	Problems Encountered	49
8.5	Further Work	50
8.6	Summary	50
<b>References</b>		<b>51</b>
<b>Appendix A: XOR Training Graphs</b>		<b>54</b>
<b>Appendix B: Isis Data Set Training Graphs</b>		<b>56</b>

## List of Figures

	<b>Page</b>
Figure 3.1: Structure of a Feed-Forward and Back-Propagation Neural Network	16
Figure 4.1: Inputs and Outputs	21
Figure 5.1: Program Flow	25
Figure 5.2: High Level Design of MASAnnt Toolkit	26
Figure 5.3: Message Space	27
Figure 5.4: Expert Agent and Ontology	28
Figure 5.5: Training Data	30
Figure 6.1: Initialization of the Application	31
Figure 6.2: MASAnnt User Interface	33
Figure 7.1: User Interface Evaluation	43

## List of Tables

	<b>Page</b>
Table 2.1: Comparison of Available Researches	13
Table 7.1: Evaluation of UI Components	44
Table 7.2: XOR Training Data	44
Table 7.3: XOR Training Results	44
Table 7.4: Iris Data Set Training Results - Max Cycles: 50,000	45
Table 7.5: Iris Data Set Training Results - Max Cycles: 100,000	46



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## List of Code Fragments

					<b>Page</b>
Code	Fragment	6.1:	Activation	of Expert	Agents
35					
Code	Fragment	6.2:	Request	Message of	System Control Agent
35					
Code	Fragment	6.3:	Response	Message from	Expert Agents and Negotiation
36					
Code	Fragment	6.4:	Training	Agent	
37					
Code	Fragment	6.5:	Agent	Decision	Making
38					
Code	Fragment	6.6:	Learning	Rate	Ontology
39					
Code	Fragment	6.7:	Communication		Ontology
40					
Code	Fragment	6.8:	Common		Ontology
40					
Code	Fragment	6.9:	Training	Parameter	Ontology
41					