



Course Weekly Outline

Course Instructor	Dr. Ayad R. Abbas
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Title	Machine Learning
Course Coordinator	Dr. Ayad R. Abbas
Course Objective	<p>The primary goal of machine learning research is to develop general purpose algorithms of practical value. Such algorithms should be efficient. As usual, as computer scientists. The general and specification, decision tree, genetic algorithm are studies and explained.</p> <p>The various types of neural networks are explained and demonstrated, applications of neural networks are described, and a detailed historical background is provided. The connection between the artificial and the real thing is also investigated and explained. Finally, the mathematical models involved are presented and demonstrated.</p>
Course Description	<p>Chapter One:</p> <p>1.1 What is Machine Learning?</p> <p>1.2 Learning Models</p> <p>1.3 Concept Learning as Search</p> <p>1.4 Version Space</p> <p>1.5 Decision tree</p> <p>Chapter Two: Fundamentals of Neural Networks.</p> <p>2.2 Development of Neural Networks</p> <p>2.3 Areas of Neural Networks</p> <p>Chapter Three: Theory of Neural Networks (NN)</p> <p>3.2 Artificial Neural Networks (ANN)</p> <p>3.2.1 Properties of ANN</p> <p>3.3 Types of learning</p> <p>3.4 Typical Architecture of NN</p> <p>3.5 Basic Activation Functions</p> <p>Chapter Four: Learning Algorithms</p> <p>4.2 Hebbian Learning Rule</p> <p>4.3 Perceptron learning</p> <p>4.4 Back propagation</p> <p>4.5 The Hopfield Network</p> <p>4.6 Bidirectional Associative Memory (BAM)</p> <p>4.7 Adaline</p> <p>4.8 Kohonen Network</p> <p>4.9 Self-Organizing Networks</p> <p>4.10 Adaptive Resonance theory (ART)</p> <p>Chapter Five: Genetic Algorithm (GA)</p> <p>5.2 Genetic Operators</p> <p>5.3 Genetic Programming (GP)</p>

	5.4 Travelling Salesman Problem (TSP) Chapter Six: Nearest- neighbor algorithm				
Textbook	Machine Learning, Tom M. Mitchell, McGraw-Hill, 1997				
References	1- Fundamantals of Neural Networks: Architecture, Algorithms, and application. ,Laurene Fausett, 1993 2- Neural Networks. By Phil Picton, 2001 3- Neural Networks. Fundamentals, Application, Examples. By Werner Kinnebrock, 1995				
Course Assessment	Term Tests	Laboratory	Quizzes	Project	Final Exam
	(20%)	(20%)	(10%)	----	(50%)
General Notes	Type here general notes regarding the course				



Course weekly Outline

week	Date	Topics Covered			
1	22/9/2014	Introduction (Definition of learning system, Goals and Application of machine learning ,	Designing simple vb program.		
2	29/9/2014	Aspect of developing a learning system: training data, concept representation , function approximation	Designing simple vb program.		
3	6/10/2014	The concept learning task (Concept learning as search through a hypothesis space, General-to-specific ordering of hypothesis).	Apply General-to-specific ordering of hypothesis.		
4	13/10/2014	Finding maximally specific hypothesis	Apply maximally specific hypothesis.		
5	20/10/2014	Version space and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.	Apply maximally candidate elimination algorithm.		
6	27/10/2014	Decision Tree Learning(Recursive inductive of decision tree)	Apply Decision Tree Learning		
7	3/11/2014	Decision Tree Learning (Picking the best splitting attribute: entropy and information gain).	Apply Decision Tree Learning		
8	10/11/2014	Fundamentals of Neural Networks (Development of Neural Networks Areas of Neural Networks).	Apply Basic Activation Functions using visual basic.		
9	17/11/2014	Theory of Neural Networks (NN) Properties of ANN	Application programs		
10	24/11/2014	Types of learning, Typical Architecture	Application programs		
11	1/12/2014	NN, Basic Activation Functions	Apply simple Neural Networks.		
12	8/12/2014	learning Rules, Hebbian Learning rule	Apply Hebbian Learning rule.		
13	15/12/2014	Basic Delta Rule, ANN taxonomy	Apply basic Delta rules		
14	22/12/2014	Learning Algorithms ,Perceptron learning	Apply Perceptron learning.		
15	29/12/2014	Back propagation algorithm	Apply Back propagation algorithm		
16	5/1/2015	General Review	-----		
17	12/1/2015	course exam	-----		
Half-year Break					
18	16/2/2015	The Hopfield Network	Apply The Hopfield Network		
19	23/2/2015	Bidirectional Associative	Apply BAM		

		Memory (BAM)		
20	2/3/2015	Adaline	Apply Adaline algorithm	
21	9/3/2015	Kohonen NN	Apply Kohonen NN	
22	16/3/2015	Self-Organizing Networks	Application program	
23	23/3/2015	ART	Apply ART	
24	30/3/2015	Genetic Algorithm (GA) Genetic Operators	Apply Genetic Algorithm	
25	6/4/2015	GA Fitness Function,	Apply Genetic Algorithm	
26	13/4/2015	Genetic Programming	Application program	
27	20/4/2015	GA Application	Application program	
28	27/4/2015	Travelling Salesman Problem (TSP)	Apply Travelling Salesman Problem (TSP)	
29	4/5/2015	Nearest- neighbor algorithm,	Application program	
30	11/5/2015	General Review	-----	
31	18/5/2015	Final course Exam	-----	

Instructor Signature:

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