

National Institute of Technology
Jamshedpur – 831014
Department of Computer Applications
Spring Semester Session 2019 – 2020
Course Handout

Date: 06/01/2020

Batch : Master of Computer Application (4th Semester)
Course No. : CA34114
Course Title : Artificial Intelligence
Instructor In-Charge : Dr. Chandrashekhar Azad
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Course Description:-

Unit-I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Processing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Text Books

- T1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
- T2. Duda, Richard O., Peter E. Hart, and David G. Stork. Pattern classification. John Wiley & Sons

Reference Books

- R1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill
- R2. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
- R3. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India

Scope

This course covers the issues and techniques involved in the creation of computer systems that engage in intelligent behavior. The following are among the topics that we will cover: AI search techniques, Game Playing, Planning, Knowledge Representation, Reasoning under Uncertainty and Machine Learning etc. Students will study in detail about the complex theoretical details of an intelligent system and may implement that during the semester. There is a scope in developing the systems in game playing, speech recognition machine, computer vision, expert systems, robotics and many more.

Objectives

Artificial Intelligence (AI) is a field of computer science that attempts to build technology to inculcate human cognition in computer systems. A primary goal of AI is to build intelligent entities. This course is structured to give an overview of the area, as well as it provides necessary depth of the fundamental techniques. The attributes of human intelligence such as reasoning, planning, learning etc. will be attempted to be understood to be able to make computers behave intelligently in solving problems. By the end of the course, the students should have a general knowledge of the field of AI. They should be

able to recognize when and how to use AI techniques to solve problems. The students should also be able to evaluate new techniques they encounter. Students will also be given exposure of evolutionary algorithms such as Genetic Algorithm.

Course Plan

Lecture No.	Learning Objectives	Topics to be covered	Refer to chapter see (text book)
1-2	Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence,	Introduction to AI	T1
3-5	Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.	AI concepts	T1
6-11	Searching for solutions, Uniformed search strategies, Informed search strategies,	Searching for solutions	T1
12-13	Local search algorithms and optimistic problems, Adversarial Search,	search algorithms	T1
14-17	Search for games, Alpha - Beta pruning.	Search for games	T1
18-21	Propositional logic, Probabilistic reasoning, Utility theory	Propositional logic	T1
22-24	Theory of first order logic, Inference in First order logic	Theory of first order logic	T1
25-27	Forward & Backward chaining, Resolution,	Chaining	T1
28-30	Hidden Markov Models (HMM), Bayesian Networks.	HMM, Bayesian Networks	T1
31-33	Supervised and unsupervised learning, Decision trees,	learning	T1
34-38	Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning	learning	T1
39-40	Introduction, Design principles of pattern recognition system, Statistical Pattern recognition,	Pattern recognition	T2
41-42	Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA)	Parameter estimation methods	T2
43-45	Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.	Classification Techniques	T2

Evaluation Scheme (EC):

EC No.	Evaluation Component	Duration	Weightage	Date & Time	Nature of Component
1.	Mid Term Examination	02 Hours	30%	Academic Calendar	Closed Book
2.	End Term Examination	03 Hours	50%	Academic Calendar	Closed Book
3.	Internal Assessment	--	20%	TBA	(Class Test, Attendance, Assignments/Reports/Projects/Seminars)
Class Test/Reports/Projects/Seminars - 10 Marks, Assignment- 05 Marks, Attendance & Punctuality in class- 05 Marks					

→ **Chamber consultation hour:** Monday to Friday, 5PM to 6PM, Faculty Chamber

→ **Notices:** All notices regarding the course will be displayed only on the Department of Computer Applications notice board

Instructor In-Charge
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