

24MCAH301: MACHINE INTELLIGENCE

Hours/Week: 4
Credits: 4

I.A. Marks: 30
Exam. Marks: 70

Course Learning Objectives:

- The basic exposition to the goals and methods of Artificial Intelligence.
- Apply these techniques in applications which involve perception, reasoning and learning.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search.
- The basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Course Outcomes: After completing the course, the students will be able to,

- Recognize concept of knowledge representation and predicate logic and transform the real life information in different representation.
- Realize the state space and its searching strategies.
- Understand machine learning concepts and range of problems that can be handled by machine learning.
- Apply the machine learning concepts in real life problems.
- Compare AI with human intelligence and traditional information processing and discuss its strengths and limitations as well as its application to complex and human-centred problems.
- Discuss the core concepts and algorithms of advanced AI, including informed searching Algorithm, Different Types of Machine Learning Approaches
- Apply the basic principles, models, and algorithms of AI to recognize, model, and solve problems in the analysis and design of information systems.

UNIT-I:

12 Hrs.

Introduction to Artificial Intelligence and Problem-Solving Agent: Problems of AI, Intelligent Agents, Agents & environment, nature of environment, structure of agents, goal-based agents, utility-based agents, learning agents. Defining the problem as state space search, production system, problem characteristics, Strategies for state space search, Using the State Space to Represent Reasoning with the Predicate calculus (State space description of a logical system, AND/OR Graph).

UNIT-II:

12 Hrs.

Heuristic Search: Introduction, Hill-Climbing and Dynamic Programming, The Best-first Search Algorithm, Introduction to Machine Learning: Different Types of Machine Learning Approaches, Examples of Machine Learning Applications, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Semi-supervised learning. Training, Validation and Testing, Over-Fitting and Under-Fitting, Different Types of Error Calculation,

UNIT-III:

12 Hrs.

Classification Algorithms: Simple Linear regression, Multiple linear regression, Polynomial regression, Ridge regression, Lasso Regression (L1 Regularization); Decision trees: Gini impurity, entropy, and information gain, and mean squared error, Decision Tree Algorithms: ID3, C4.5; Naïve Bayes Classifier, Basics of Support Vector Machine

UNIT-IV:

12 Hrs.

Clustering: Distance measures, Different clustering methods -Distance, Density, Hierarchical, Iterative distance-based clustering, Dealing with continuous, categorical values in K-Means,

Constructing a hierarchical cluster, K-Medoids, k-Mode and density-based clustering, Measures of quality of clustering

Feature Reduction/**Dimensionality reduction**: Principal components analysis (Eigen values, Eigen vectors, Orthogonality), Linear discriminant analysis;

REFERENCE BOOKS:

1. George F Luger, Artificial Intelligence – Structures and Strategies for Complex problem solving, 5thEdn, pearson.
2. E. Rich, K. Knight, S B Nair, Artificial intelligence, 3rdEdn, McGraw Hill.
3. S. Russel and P. Norvig, Artificial intelligence – A Modern Approach, 3rdEdn, Pearson
4. D W Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 1990.
5. EthemAlpaydin, Introduction to Machine Learning- 3rd Edition, PHI.
6. Tom M. Mitchell, Machine Learning, McGraw-Hill.
7. Ian Goodfellow and YoshuaBengio and Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning), MIT Press, 2016.

