NARASIMHA REDDY ENGINEERING COLLEGE
(Autonomous)
Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad
Accredited by NAAC with A Grade, Accredited by NBA

MACHINE LEARNING

B.Tech. III Year II Semester								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
CS3201PC	Core	L	T	P	C	CIA	SEE	Total
		3	1	0	4	25	75	100
Contact classes: 45	Tutorial Classes: 15	Practical classes: NIL				Total Classes :60		
Prerequisites 1. Data Structures 2. Knowledge on statistical methods								

Course Objectives:

1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.
4. To apply the hypothesis using algorithms.
5. To study the analytical learning techniques.

Course Outcomes:

1. Explain the concepts and able to prepare different Machine learning models.
2. Understand the Neural networks and its usage in machine learning application.
3. Understand the Bayesian learning, Computational learning and their application.
4. Apply various Machine Learning algorithms and Model Selection.
5. Ability to apply analytic learning techniques on real time applications.

COURSE SYLLABUS

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering - introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning-Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II

Artificial Neural Networks-1- Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multi-layer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses - Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning - Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory-Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance - Based Learning- Introduction, *k*-nearest neighbor algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT - IV

Genetic Algorithms - Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules - Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning-Introduction, the learning task, *Q*-learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1-Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning-Motivation, inductive-9analytical approaches to learning using prior knowledge to initialize the hypothesis.

TEXT BOOK:

1.Machine Learning -Tom M. Mitchell, -MGH

REFERENCE BOOK:

1.Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis