MACHINE LEARNING
(ELECTIVE-II)

Course Code: 13CS1103

L	T	P	C
4	0	0	3

Course Educational Objectives:

To give an in depth perspective of Machine Learning principles

Course Outcomes:

- To give a holistic perspective of Machine learning.
- To introduce concept learning, version spaces.
- To explain in depth the various concepts of decision trees, artificial neural networks, Bayesian learning, instance based learning.
- To familiarize the student with evaluating the hypotheses.
- To introduce Computational Learning theory and the various theorems of Statistical Machine Learning theory.

UNIT-I (12 Lectures)

INTRODUCTION TO MACHINE LEARNING:

Well-Posed Learning Problem, 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

UNIT-II (12 Lectures)

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-III (12 Lectures)

ARTIFICIAL NEURAL NETWORKS:

Introduction, Neural Network Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Backpropagation Algorithm, Remarks on Back Propagation Algorithm, An Illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks

UNIT-IV (12 Lectures)

EVALUATING HYPOTHESES:

Motivation, Estimating Hypothesis Acuracy, Basics of Sampling Theory , A General Approach for Deriving Confidence Intervals, Differene in Error of Two Hypotheses, Comparing Learning Algorithms

BAYESIAN LEARNING:

Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least-Squared Error Hypotheses, Maximum Likelihood Hpotheses for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, The EM Algorithm

UNIT-V (12 Lectures)

COMPUTATIONAL LEARNING THEORY:

Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning

INSTANCE BASED LEARNING:

Introduction, k-Nearest neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

TEXT BOOK:

Tom Mitchell, *"Machine Learning"*, Mc GrawHill publications, 1997

REFERENCES:

1. Christopher.M.Bishop, *"Pattern Recognition and Machine Learning"*, Springer publications, October 2007.
2. Ethem Alpaydin, *"Introduction to Machine Learning"*, 2nd Edition, MIT Publishers, 2010

WEB REFERNCES:

https://www.coursera.org/course/ml