MACHINE LEARNING
(Professional Elective-V)

Course Code: 15CS1106

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Course Outcomes :

At the end of the Course, the Student will be able to:

CO 1 Describe and design the concepts of learning.

CO 2 Describe and apply learning algorithms.

CO 3 Explain the first principles of neural networks

CO 4 Describe basics of sampling theory and hypothesis testing..

CO 5 Explain Bayesian learning theorem.

UNIT-I **(10 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 **(10 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 (10 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 (10 Lectures)

EVALUATING HYPOTHESES:

Motivation, Estimating Hypothesis Accuracy, 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 Hypothesis, Maximum Likelihood Hypothesis 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 (10 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”, McGrawHill publications, 1997

REFERENCES:

1. Christopher.M.Bishop, “Pattern Recognition and Machine Learning”, Springer publications, October 2007.
2. EthemAlpaydin, “Introduction to Machine Learning”, 2nd Edition, MIT Publishers, 2010

WEB REFERNCE:

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