

SEMESTER-V
COURSE 14: MACHINE LEARNING

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. To learn the basics of machine learning
2. To learn the importance of feature engineering
3. To understand the foundational rules of probability
4. To Study different classification and clustering techniques
5. To understand the basics of neural networks concepts

Course Outcomes: Upon Completion of the course, the students will be able to

1. Develop an appreciation for what is involved in Learning models from data
2. Understand a wide variety of learning algorithms
3. Understand how to evaluate models generated from data
4. Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models
5. Understand different neural network concepts

Unit-I:

Introduction to Machine Learning: Introduction, what is human learning, types of human learning, what is machine learning, types of machine learning, problems not to be solved using machine learning, Applications of machine learning, Tools in machine learning, Issues in machine learning

Preparing to Model: Machine learning activities, Basic types of data in machine learning, Exploring structure of data, Data quality and remediation, Data Preprocessing

Case Study: Machine Learning **Case Study** on Trendyol

Unit-II:

Modelling and Evaluation: Selecting a model, Training a model, Model representation and Interpretability, Evaluating Performance of a model, Improving performance of a model

Basics of Feature Engineering: Introduction, Feature transformation, Feature subset selection

Case Study: Machine Learning **Case Study** On Harley Davidson

Unit-III:

Brief Overview of Probability: Importance of Statistical Tools in Machine Learning, Concept of Probability, Random Variables, Some Common Discrete Distributions, Some Common Continuous Distributions, Multiple Random Variables, Sampling Distributions, Hypothesis Testing

Bayesian Concept Learning: Why Bayesian methods are important, Bayes Theorem, Concept Learning, Bayesian Belief Network

Case Study: Machine Learning **Case Study** on Tesla

Unit-IV:

Supervised Learning : Classification: Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms

Super vised Learning : Regression: Example of Regression, Common Regression Algorithms

Unsupervised Learning: Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering, Finding Pattern using Association Rule

Case Study: Predicting Heart Failure in Mobile Health

Unit-V:

Basics of Neural Network: Understanding Biological Neuron, Exploring the Artificial Neuron, Types of Activation Functions, Early Implementations of ANN, Architectures of Neural Network, Learning Process in ANN, Back Propagation, Deep Learning

Other Types of Learning: Representation Learning, Active Learning Vs Memory based Learning, Ensemble Learning Algorithm

Case Study: American Cancer Society on Google Cloud ML Engine

Prescribed Text Books:

1. Machine Learning, Pearson by Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das
2. Introduction to Machine Learning with Python:A Guide for Data Scientists by Andreas C.Muller & Sarah Guido
3. Machine Learning for Absolute Beginners, 2nd Edition by Oliver Theobald
4. Machine Learning for Dummies: IBM Limited Edition by Judith Hurwitz and Daniel Kirsch

SEMESTER-V
COURSE 14: MACHINE LEARNING

Practical

Credits: 1

2 hrs/week

Course Outcomes: On successful completion of this practical course, student shall be able to:

4. Execute basic programs in either R or Python.
5. Gain practical knowledge on different python libraries/packages .
6. Implement different machine learning algorithms

Implement the following using in either R Language or Python

1. Introduction to basic commands:

- a) Get and Set Working Directory
- b) See Directory Content
- c) Install and Load Packages
- d) Compile Source File for Execution
- e) Commands for basic user input/output
- f) Basic Data Types and Data Manipulation Functions

2. Introduction to basic commands Continued:

- a) Conditional Statements
- b) Loops
3. Data Manipulation Package installation and different operations using installed package
4. Standard Library function to plot the Graphs
5. Basic Data Exploration on any dataset available publicly
6. Starting to Model to find accuracy of the model
7. Learning Algorithms-kNN Linear Regression
8. Unsupervised Algorithm- k-means
9. Supervised Algorithm- Naïve Bayes
10. Implement Decision Tree and Support Vector Machine using Library Functions
11. Implement Neural Network using Library Function