

ML Syllabus

UNIT 1

Introduction

- Basic Definitions
- Types of Learning (SUPERVISED, UNSUPERVISED, REINFORCEMENT)

Concept Learning

- Hypothesis Space
- FIND - S (ALGO)
- Candidate Elimination (ALGO)
- Inductive Bias

Probability Distribution

- Binomial Distribution
- Poisson Distribution
- Normal Distribution
 - Z-Score (Standard Normal Distribution)
- Exponential Distribution
 - MBTF

Hypothesis Testing

- Central Limit Theorem
- Z-Test
- χ^2 Test
- ANOVA (One Way and Two Way)
- t Test and its types

Data Preprocessing

- Types of Data
- Data Quality Problems
- Methods of Preprocessing
- Noise
- Dimensionality Reduction
 - Principal Component Analysis (Achhe se Krna hoga, Class mein nhi huya tha)

UNIT 2

Linear Regression

- Linear Regression with Single Attribute
- Linear Regression Normal Form and Its Derivation (By calculating Least Cost Error)
- Gradient Descent (ALGO) (Its types and How to use it)

Logistic Regression

- Logistic Regression Derivation (By Maximum Likelihood Estimation)
- How to use logistic Regression?

Model Diagnostics (Book se same to same)

- Coefficient of Determination R^2 Test
- Hypothesis Test for Regression Coefficient (t-test)
- ANOVA
- Residual Analysis
- Outlier Analysis
- Making Predictions and Calculating Accuracy
 - Mean Square Error
 - Root Mean Square Error
 - Mean Absolute Error and Mean Absolute Percentage Error

Model Regression

- Polynomial Curve Fitting
- Underfitting
- Overfitting
- Bias vs Variance

UNIT 3

Naive Bayes

- Naive Bayes introduction, mathematics, derivation and how to use
- m-estimate method of Naive Bayes
- Document Classification using Naive Bayes
- Evaluation Metrics: Gold +ve, Gold -ve, Precision, Accuracy (see notes)

Decision Tree

- How to use
- Entropy
- Information Gain
- Overfitting and Pruning
- Gain Ratio and Gini Index

SVM (see notes)

- Working, How to use, Mathematical Terms, Derivation
- Hard and Soft Margin

- Kernel

Ensemble Learning (assignment)

Random Forest (assignment)

Bagging and Boosting (assignment)

UNIT 4

Clustering

- Introduction
- Types

K-Means

- introduction, how to use, mathematics
- document clustering
- choosing best k value

Hierarchical Clustering

- Agglomerative clustering (khud se kr lena)
- Linkage : single, complete, avg

UNIT 5

Recommendation System

- Associative Rules: Apriori (as in Data Mining)
- Content Based Recommendation System
- Collaborative Filtering

Overview of ANN

- Perceptron
 - Single Layer (and its mathematics)
 - Multi Layer (Topics: back propagation + others)
- Follow Notes for rest.

Gradient Descent

Bias Variance

Cross Validation