

**UNIT I****Chapter 1 : Introduction to Machine Learning****1-1 to 1-11**

**Syllabus :** Classic and adaptive machines, Machine learning matters, Beyond machine learning-deep learning and bio inspired adaptive systems, Machine learning and Big data. Important Elements of Machine Learning-Data formats, Learnability

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**UNIT II****Chapter 2 : Feature Selection****2-1 to 2-34**

**Syllabus :** Scikit-learn Dataset, Creating training and test sets, managing categorical data, Managing missing features, Data scaling and normalization, Feature Selection and Filtering, Principle Component Analysis(PCA) - Non negative matrix factorization, Sparse PCA, Kernel PCA, Atom Extraction and Dictionary Learning.

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### UNIT III

**Chapter 3 : Regression****3-1 to 3-36**

**Syllabus :** **Linear Regression :** Linear Models, A bi-dimensional example, Linear Regression and higher dimensionality, Ridge, Lasso and ElasticNet, Robust regression with random sample consensus, Polynomial regression, Isotonic regression.

**Logistic Regression :** Linear classification, Logistic regression, Implementation and Optimizations, Stochastic gradient descendent algorithms, Finding the optimal hyper-parameters through grid search, Classification metric, ROC Curve.

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**UNIT IV****Chapter 4 : Naïve Bayes and Support Vector Machine****4-1 to 4-22**

**Syllabus :** Bayes' Theorem, Naïve Bayes' Classifiers, Naïve Bayes in Scikit- learn - Bernoulli Naïve Bayes, Multinomial Naïve Bayes, and Gaussian Naïve Bayes. Support Vector Machine (SVM) : Linear Support Vector Machines, Scikit- learn implementation- Linear Classification, Kernel based classification, Non-linear Examples. Controlled Support Vector Machines, Support Vector Regression.

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**UNIT V****Chapter 5 : Decision Trees and Ensemble Learning****5-1 to 5-30**

**Syllabus :** Decision Trees : Impurity measures, Feature Importance. Decision Tree Classification with Scikit-learn, Ensemble Learning- Random Forest, AdaBoost, Gradient Tree Boosting, Voting Classifier. Clustering Fundamentals:Basics, K-means: Finding optimal number of clusters, DBSCAN, Spectral Clustering. Evaluation methods based on Ground Truth- Homogeneity, Completeness, Adjusted Rand Index. Introduction to Meta Classifier:Concepts of Weak and eager learner, Ensemble methods, Bagging, Boosting, Random Forests.

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**UNIT VI****Chapter 6 : Clustering Techniques****6-1 to 6-18**

**Syllabus :** Hierarchical Clustering, Expectation maximization clustering, Agglomerative Clustering - Dendograms, Agglomerative clustering In Scikit- learn, Connectivity Constraints. Introduction to Recommendation Systems : Naive User based systems, Content based Systems, Model free collaborative filtering-singular value decomposition, alternating least squares. Fundamentals of Deep Networks : Defining Deep learning, common architectural principles of deep networks, the building blocks of deep networks.

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