AIT 322 **MACHINE LEARNING** **2 (1+1)**

Objective(s)

At theend of this course, Student will have better understanding of Machine learning concept and scenario of machine learning application. They will be able to compare different types of learning algorithms and apply machine learning concepts in real life problems.

Unit I

Introduction: Learning Problems, designing a learning system, Issues with machine learning, Supervised vs Unsupervised Learning, Regression vs Classification, Bias vs Variance, Train-Test split, Python Libraries (NumPy, SciPy, Matplotlib, Pandas, Scikit-Learn, StatsModels), Hyper-parameter tuning, model selection, cross-validation

Unit II

Regression: Linear algebra review (Matrix Multiplication), Gradient Descent, Least squared Error, Loss/cost Function, Simple and Multiple Regression, Handling quality parameters using dummy variables, Imputation of missing values

Unit III

Classification: Bayes Theorem, Maximum Likelihood, Naïve Bayes Classifier, Logistic Regression, LDA, k-NN, SVM, Decision Tree, Random Forests, Feature selection, Confusion Matrix

Unit IV

Unsupervised Learning: Linear algebra review (Eigen Value, Eigen Vectores), Dimensionality Reduction, PCA, hierarchical clustering, k-means clustering

Unit V

Neural networks **:**Neural Network Representation, Appropriate problems for Neural Network Learning, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Remarks on Back Propagation Algorithms

Reference Book(s):

1. Tom M Mitchell, “Machine Learning”, McGraw Hill
2. Peter Harrington, “Machine Learning in Action”, DreamTech

Practical(s):

1. Linear Algebra (Matrix-Vector, Matrix-Matrix multiplaction, Eigen value, Eigen vector)
2. Data Handling and cleaning (Pandas dataframe, Scikit-learn impute, onehotencoding)
3. Regression (Simple Linear Regression, Multiple Linear Regression)
4. Classification using Naïve Bayes Classifier, Logistic Regression, k-NN, SVM, Decision Tree and Random Forests)
5. Clustering through k-means clustering and heirarchicalclustering
6. Dimensionality reduction through PCA
7. Construction of Neural Networks for classification and regression