CS-37: Machine Learning with Python

Objectives:

- To Understand and develop model of ML with Python.
- Apply ML techniques to real-world data sets and problems.
- Learn how to deploy machine learning models into production environments.

Prerequisites:

- Basic Understanding of Python Programming.

Unit No.	Topic	Detail
1	Introduction to Machine Learning	• Introduction to ML, Relation of ML with AI and DL, Defining Machine Learning, How machines learn, types of machine learning: supervised learning, unsupervised learning, reinforcement learning, applications of machine learning.
2	Supervised Learning	• Regression: Pre-processing data using different techniques – mean removal, scaling, normalization, binarization, label encoding, linear regression, case study implementation using Python • Classification: Building simple classifier, logistic regression classifier, Naïve bayes classifier, training and testing dataset, accuracy using cross-validation, visualizing confusion matrix, extracting the performance report. • Predictive Modeling: Building linear and non-linear classifier using Support Vector Machine (SVM), extracting confidence measurements, Case study implementation using Python.
3	Unsupervised Learning	• Clustering: Data using k-means clustering, compressing image using vector quantization, mean shift clustering model, agglomerative clustering, case study implementation using Python.
4	Natural Language Processing	• Natural Language Processing: o pre-processing data, o stemming data, o using lemmatization, o diving chunks, o text classifier, o case study implementation using Python.
5	Computer Vision with OpenCV	• Object Detection: o Detecting and tracking objects using Haar cascades from images and videos o Detecting face, eyes, mouth, nose, pupils

Reference Books:

▪ "Machine Learning" by Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das - Pearson

- "Python Machine Learning Cookbook" by Prateek Joshi – PACKT Publishing – 2016 Edition.
- "OpenCV: Computer Vision Projects with Python – Learning Path" by Joseph howse, Prateek Joshi, Michael Beyeler – PACKT Publishing – 2016 Edition.

Course Outcomes:

- To define and explain machine learning and its relation with AI and DL along with types of ML.
- To determine regression or classification supervised learning method of ML to any real-life application and estimate accuracy of the model.
- To be able to contrast various unsupervised learning methods and solve any real0life situation using ML and estimate accuracy of the model.
- To solve any fundamental text-processing.
- To construct a model to detect object from it.