VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. V Semester

(22PC2CB302) MACHINE LEARNING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Basic level Programming in Python

COURSE OBJECTIVES:

- To introduce students the implementation details of different Machine Learning algorithms
- To have a practical understanding of evaluating different machine learning models
- To experiment with probability-based algorithms, tree-based algorithms, association rule mining algorithms, and neural networks
- To understand ensemble models of machine learning algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Implement supervised and unsupervised, and data mining algorithms

CO-2: Apply the appropriate machine learning strategy for any given problem

CO-3: Evaluate the performance of different machine learning models

CO-4: Combine different models for ensemble learning

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3
CO-2	3	3	3	3	3	2	3	2	3	3	3	3	3	3	3
CO-3	3	3	2	3	3	2	2	2	3	3	3	3	3	2	3
CO-4	2	3	3	3	3	3	2	2	3	3	2	2	3	3	3

LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

WEEK 1:

Introduction to Python and Python Libraries- NumPy, Pandas, Matplotlib, Scikit

WEEK 2:

Perform Summary Statistics

WEEK 3:

Perform pre-processing in Python

Perform Feature Engineering and Feature Selection Methods.

WEEK 4:
Implement simple Linear regression
Implement regularized Linear regression
Implement regularized logistic regression

WEEK 5:
Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample

WEEK 6:
Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets

WEEK 7:
Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task.

WEEK 8:
Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

WEEK 9:
Build model using SVM with different kernels
Implement Perceptron Learning Algorithm.
Build models using different Ensemble techniques

WEEK 10:
Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library lasses/API in the program.

WEEK 11:
Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem.

WEEK 13:
Build model to perform Clustering using K-means after applying PCA and determining the value of K using Elbow method.
Build a model to perform hierarchical Clustering.

WEEK 14:
Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs
Mini projects in the Lab:
(1) Implementation of one clustering algorithm
(1) Implementation of one association rule mining algorithm
(2) Implementation of one anomaly detection algorithms
(3) Implementation of EM algorithm for some specific problem

TEXT BOOKS:
1. Machine Learning, Tom M. Mitchell, McGraw-Hill
2. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press, 2012
3. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 2007

REFERENCES:
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Machine Learning: The Art And Science of Algorithms That Make Sense of Data, Peter Flash, Cambridge, University press
3. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer 2009

ONLINE RESOURCES:
1. Andrej Karpathy Interview - ML Strategy | Coursera
2. https://developers.google.com/machine-learning/crash-course
3. Machine learning by Sebastian Raschka