Syllabus for Masters of Technology

Computer Engineering- Data Science

Subject Code: 01DS0104

Subject Name: Machine Learning Laboratory

M. Tech. Year - I

Objective: The laboratory provides a platform for students to implement and experiment with various machine learning algorithms. They get hands-on experience in coding and implementing algorithms such as linear regression, decision trees, support vector machines, neural networks, and more. It also allows students to train machine learning models on datasets and evaluate their performance. They explore different evaluation metrics, cross-validation techniques, and strategies to optimize models for better performance. Overall, the Machine Learning laboratory aims to complement the theoretical knowledge gained in the classroom with practical skills and hands-on experience. It provides an environment for students to experiment, explore, and gain confidence in applying machine learning techniques to real-world scenarios.

Credits Earned: 2 Credits

Course Outcomes: After Learning this lab course, students will be able to

- Apply various Machine Learning algorithms to solve real time problems (Apply).
- Implement algorithms for real time simulations (Apply).
- Analyze algorithms for various applications (Analyze).
- Demonstrate various pattern matching, predictive, forecasting and training algorithms implementation. (Apply).

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA	CSE	Viva (V)	Term work (TW)	
0	0	2	1	0	0	0	50	50	100

Sr. No.	Title of Experiments	Total Hrs
1	Basic exercises on Python Machine Learning Packages such as Numpy, Pandas and matplotlib.	2
2	Given a dataset. Write a program to compute the Covariance, Correlation between a pair of attributes. Extend the program to compute the Covariance Matrix and Correlation Matrix.	2
3	Given a set of sample points in N dimensional feature space. Write a program to fit the points with a hyper plane using Linear Regression. Calculate sum of residual error.	2
4	Write a program that provides option to compute different distance measures between two points in the N dimensional feature space. Consider some sample datasets for computing distances among sample points.	2
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.	2
6	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem.	2
7	Write a program to implement feature reduction using Principle Component Analysis.	2
8	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.	4
9	Given a dataset for classification task. Write a program to implement Support Vector Machine and estimate it test performance.	2
10	Write a program to implement perceptron for different learning task.	2
11	Write programs to implement ADALINE and MADALINE for given learning task.	2
12	Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.	2
13	Write a program to implement K means clustering algorithm. Select your own dataset to test the program. Demonstrate the nature of output with varying value of K.	2

Reference Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. https://www.coursera.org/learn/practical-machine-learning