Teaching Plan

Name of the Faculty: Dr. Rakesh Kumar

Name of the Course: B.Sc(H) Computer Science

Semester : VI Sec (if any) : A & B

Title of the Paper : Machine Learning

Course Learning Outcomes

On successful completion of this course, the student will be able to:

1. Differentiate between supervised and unsupervised learning tasks.

2. Differentiate between linear and non-linear classifiers.

3. Describe theoretical basis of SVM

4. Implement various machine learning algorithms learnt in the course.

Month	Topic Covered	References
January	Basic definitions, Hypothesis space and inductive bias, Bayes optimal classifier and Bayes error, Naive Bayes classifier Curse of dimensionality, dimensionality reduction, feature scaling, feature selection methods Practical: Query 1 to 6	Reference [2], Chapter 1, page 1-5 Reference [2], Chapter 2, section 2.1 - 2.4 Reference [2], Chapter 6, section 6.1, 6.2, 6.7, 6.9 Reference[3] Page 33-35 Reference [1], Chapter 10
February	Linear regression with one variable, linear regression with multiple variables, Gradient Descent Logistic regression, over-fitting, regularization. performance evaluation metrics, validation methods Practical: Query 7 to 12 Assignment 1 Class Test 1	Reference [1], Chapter 7, page 194-205 https://medium.com/analytics-vidhya/linear-regression-with-gradient-descent-derivation-c10685ddf0f4 • https://towardsdatascience.com/introduction-to-logistic-regression-66248243c148 • https://medium.com/@shiny_jay/ml-regularization-79a081666fbc • https://medium.com/@qempsil0914/courseras-machine-learning-notes-week3-overfitting-and-regularization-partii-3e3f3f36a287

March	Decision trees k-nearest neighbor classifier perceptron, multilayer perceptron, neural networks, back-propagation algorithm Practical: Query 13 to 14 Assignment 2	Reference [2], Chapter 3, page 52 - 60, 63 - 66 Reference [2], Chapter 8, page 231-233 Reference [2], Chapter 4, page 81-99
April	Support Vector Machine (SVM), Kernel functions Approaches for clustering, distance metrics, K-means clustering, expectation maximization, hierarchical clustering performance evaluation metrics validation methods Practical: Query 15 to 16 Revision & Doubt sessions Class Test 2	Reference [1], Chapter 7, section 7.3 Reference [3], Chapter 6, page 292 Reference [3], Chapter 9, page 424-426 Reference [1], Chapter 8, section 8.1, 8.5 https://www.kdnuggets.com/2020/05/model-evaluation-metrics-machine-learning.html https://www.analyticsvidhya.com/blog/2021/05/4-ways-to-evaluate-your-machine-learning-model-cross-validation-techniques-with-python-code/

References

1. Flach, P. (2015). Machine Learning: The Art and Science of Algorithms that Make Sense of Data. Cambridge University Press.
2. Mitchell, T.M. (2017). Machine Learning. McGraw Hill Education.

Additional References:

3. Christopher & Bishop, M. (2016). Pattern Recognition and Machine Learning. New York: Springer-Verlag