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20MC213 MACHINE LEARNING

Course Description and Objectives:

This course aims at various machine learning techniques and algorithms. Further, it creates scope for the students to analyze and evaluate the machine learning algorithms and able to select the appropriate learning technique for given real time problem.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand and apply the basic machine learning algorithms on real time data sets	1
2	Analyze the machine learning models and improve the performance	2
3	Design and develop the machine learning models for given problem statement	3
4	Evaluate the correct date pre-processing approach for real time scenario	4, 5

Skills:

- Implement classification, regression, clustering models for real work problems
- Improve the performance metric using various hyperparameters of machine learning model

Syllabus

UNIT – I   **9 Hours**

INTRODUCTION TO MACHINE LEARNING: Machine learning, Types of machine learning, Problems not to be solved using machine learning, Applications of machine learning; Preparing to model – Machine learning activities, Basic types of data in machine learning, Exploring structure of data, Data quality and remediation, Data pre-processing.

UNIT – II   **9 Hours**

MODELLING AND EVALUATION: Selecting a model- Predictive models, Descriptive models; Training a model (for supervised learning) – Holdout method, k-fold cross-validation method, Bootstrap sampling; Model representation and Interpretability – Underfitting, Overfitting, Bias-variance trade-off; Evaluating performance of a model; Improving performance of a model.

UNIT – III   **9 Hours**

BAYESIAN CONCEPT LEARNING: Bayes' theorem, Bayes' theorem and concept learning; supervised learning: classification – Example of supervised learning, classification model, classification learning steps, common classification algorithms.

UNIT – IV   **9 Hours**

SUPERVISED LEARNING: REGRESSION: Regression – example of regression, Common regression algorithms – simple linear regression, multiple linear regression, assumptions in regression analysis, improving accuracy of the linear regression model, logistic regression.

UNIT – V   **9 Hours**

UNSUPERVISED LEARNING: Unsupervised Vs supervised learning, Applications of unsupervised learning, Clustering; Basics of neural network: Exploring the artificial neuron, Types of activation functions, Architectures of neural network.

Test Book:

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Dos, "Machine Learning", 1st edition, Pearson, 2019.

Reference Books:

1. Stuart J. Russell, Peter Norving, "Artificial Intelligence: A modern Approach", 3rd Edition, Pearson, 2016.
2. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", 1st Edition, O'Reilly Media, 2017.