



Nadar Saraswathi College of Engineering and Technology,
Vadapudupatti, Theni - 625 531
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)

Format No.	NAC/TLP-07a
Rev. No.	04
Date	03-02-2023
Total Page	01

For the Academic Year 2023 - 2024 (Odd/Even Semester)

Staff Name	VIGNESH L.S	Dept. / Designation	AP/AI & DS	Strength	21
Course/Branch	B.Tech./AI & DS	Year / Semester	II/04	Credit	3
Course Code/ Subject Code/ Choice	<i>C403/AL3451</i>	Subject Name	MACHINE LEARNING		

SYLLABUS

COURSE OBJECTIVES:

- To understand the basic concepts of machine learning.
- To understand and build supervised learning models.
- To understand and build unsupervised learning models.
- To evaluate the algorithms based on corresponding metrics identified

UNIT I

INTRODUCTION TO MACHINE LEARNING

8

Review of Linear Algebra for machine learning; Introduction and motivation for machine learning; Examples of machine learning applications, Vapnik-Chervonenkis (VC) dimension, Probably Approximately Correct (PAC) learning, Hypothesis spaces, Inductive bias, Generalization, Bias variance trade-off.

UNIT II

SUPERVISED LEARNING

11

Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Perceptron algorithm, Probabilistic discriminative model – Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random Forests

UNIT III

ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING

9

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

UNIT IV

NEURAL NETWORKS

9

Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error backpropagation, from shallow networks to deep networks – Unit saturation (aka the vanishing gradient problem) – ReLU, hyper parameter tuning, batch normalization, regularization, dropout.

UNIT V

DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS

8

Guidelines for machine learning experiments, Cross Validation (CV) and resampling – K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms – t test, McNemar's test, K-fold CV paired t test

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Explain the basic concepts of machine learning.

CO2 : Construct supervised learning models.

CO3 : Construct unsupervised learning algorithms.

CO4: Evaluate and compare different models

TOTAL:45 PERIODS

TEXTBOOKS:

1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective, "Second Edition", CRC Press, 2014.

REFERENCES:

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
2. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997.
3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", Second Edition, MIT Press, 2012, 2018.
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016
5. Sebastain Raschka, Vahid Mirjalili , "Python Machine Learning", Packt publishing, 3rd Edition, 2019.

Staff In charge**HOD**