DAYANANDA SAGAR COLLEGE OF ENGINEERING BENGALURU-78

(An Autonomous Institution affiliated to VTU, Belagavi)

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Machine Learning Techniques

Course code: 18IS6DCMLT **Credits: 03**
L: P: T: S: 3:0:0: 0 **CIE Marks: 50**
Exam Hours:03 **SEE Marks: 50**
Total Hours: 40

Course objectives:

1. Understand the basics of Machine Learning
2. Differentiate supervised and unsupervised learning
3. To develop an understanding of different machine learning techniques and its application
4. To develop the design and programming skills that will help you to build intelligent machines

Course Outcomes: At the end of the course, student will be able to:

CO1	Understand the Machine learning applications, advantages and challenges
CO2	Identify the problems for machine learning. And select the either supervised, unsupervised
CO3	Analyze concept learning and Bayes decision theory
CO4	Ability to preprocess, analyze and apply classification techniques for the dataset
CO5	Evaluate and select suitable clustering technique for problem solving.
CO6	Ability to analyze the performance of neural networks.

Mapping of Course outcomes to Program outcomes:

	PO1	PO 2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO6	3	2	2	2	-	-	-	-	-	-	-	-	2	-	-

Unit	Contents of the Unit	Hours	Cos
1.	**Introduction:** What is statistical learning? – Why and How we estimate *f*, Trade-off between Prediction Accuracy and Model Interpretation, Supervised vs Unsupervised Learning, Regression vs Classification problems, Assessing Model Accuracy: Measuring the quality of fit, The Bias-Variance Trade-off. Examples of Machine Learning Applications.	**8**	**CO1,2**
2.	**Linear Regression:** Simple Linear Regression: Estimating the Coefficients, Assessing the Accuracy of the Coefficient Estimates, Multiple Linear Regression: Estimating the Regression Coefficients. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm.	**8**	**CO 3**
3.	**Bayesian Learning:** Introduction, Bayes theorem, Naive Bayes classifier. **Dimensionality Reduction**: Subset Selection, Principal Components Analysis. **Nonparametric Methods:** Nonparametric Density Estimation, Generalization to Multivariate Data.	**8**	**CO 3,4**
4.	**Clustering**: Mixture densities, K-means clustering, Expectation maximization algorithm, Mixtures of Latent Variable models, Supervised Learning after clustering, Hierarchical clustering, Choosing the number of clusters, **Decision Trees:** Univariate trees, Pruning, Rule extraction from trees, Learning rule from data, Multivariate trees.	**8**	**CO 5**
5.	**Multilayer Perceptrons:** The Perceptron, Training a Perceptron, Multilayer Perceptrons, Back propagation Algorithm, Training Procedures, Introduction to Deep Learning.	**8**	**CO 6**

Self-study component:

1. Logistic regression

2. Bayesian Belief Network

3.Reinforcement Learning.
4. Spectral Clustering
5. Convolutional Neural Network

Note:

1. Questions for CIE and SEE not to be set from self-study component.
2. Assignment Questions should be from self-study component only.

TEXT BOOK:

1. An Introduction to Statistical Learning, with Applications in R (2013), by G.James, D. Witten, T. Hastie, and R. Tibshirani.
2. EthemAlpaydın: Introduction to Machine Learning, 2nd Edition, The MIT Press Cambridge, Massachusetts Lo**nd**on, England, 2010.
3. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2018

Assessment Pattern:

CIE –Continuous Internal Evaluation Theory (50 Marks)
SEE –Semester End Examination Theory (50 Marks)
CIE=30 marks
Assignment=10 marks
AAT=10 Marks