Semester III **Hours/Week: 5**
20PDS3113 **Credits:4**

MACHINE LEARNING

Course Outcomes

On successful completion of the course, the students will be able to

1. List out the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. Define the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning
3. Identify the strengths and weaknesses of renowned machine learning approaches.
4. Explain machine learning concepts and algorithms
5. Develop and implement various machine learning algorithms in a wide range of real-world applications
6. Examine the ways of Association Rule Learning and Reinforcement Learning

Unit – I: Introduction **11 hrs**

Learning –Types of Machine Learning –Supervised Learning –The Brain and the Neuron – Design a Learning System –Perspectives and Issues in Machine Learning –Concept Learning Task –Concept Learning as Search –Finding a Maximally Specific Hypothesis –Version Spaces and the Candidate Elimination Algorithm –Linear Discriminants –Perceptron – Linear Separability –Linear Regression.

Unit – II : Linear Model **11 hrs**

Multi-layer Perceptron –Going Forwards –Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice –Examples of using the MLP –Overview –Deriving Back-Propagation –Radial Basis Functions and Splines –Concepts –RBF Network –Curse of Dimensionality –Interpolations and Basis Functions –Support Vector Machines

Unit – III : **Dimensionality Reduction And Evolutionary Models** **11 hrs**

Dimensionality Reduction –Linear Discriminant Analysis –Principal Component Analysis – Factor Analysis –Independent Component Analysis –Locally Linear Embedding –Isomap – Least Squares Optimization –Evolutionary Learning –Genetic algorithms –Genetic Offspring: -Genetic Operators –Using Genetic Algorithms –Reinforcement Learning – Overview –Getting Lost Example –Markov Decision Process

Unit – IV: Graphical Models **11 hrs**

Markov Chain Monte Carlo Methods –Sampling –Proposal Distribution –Markov Chain Monte Carlo –Graphical Models –Bayesian Networks –Markov Random Fields –Hidden Markov Models –Tracking Methods

Unit – V : Machine Learning Applications across Industries **11 hrs**

Healthcare – Retail - Financial Services – Manufacturing – Hospitality - Cloud Based ML Offerings

Text Book(s)

1. Stephen Marsland, “Machine Learning –An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2015.

Books for Reference

1. Theodoridis, Sergios,"Machine Learning: A Bayesian and Optimization Perspective",Elsevier Science Publications, 2020.
2. Aboul Ella Hassanien, Ashraf Darwish, Roheet Bhatnagar,"Advanced Machine Learning Technologies and Applications",Springer Publication, 2020.