

303105353 - Machine Learning

Course: BTech

Semester: 6

Prerequisite: Data structure, automata, and languages, Mathematics, Python. | 203105212 - Python Programming Laboratory

Rationale : This course provides a broad introduction to Artificial Intelligence. AI techniques for search and knowledge representation also apply knowledge of AI planning and machine learning techniques to real-world problems.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	0	3	20	20	-	60	-	100

SEE - Semester End Examination, T - Theory, P - Practical

Reference Books

1.	Real-World Machine Learning (TextBook) By Henrik Brink, Joseph Richards, Mark Fetherolf DreamTech
2.	Christopher M. Bishop, —Pattern Recognition and Machine Learning , Springer 2011 Edition.
3.	Elements of Statistical Learning By Hastie, Tibshirani, and Friedman Soft Computing for Problem Solving, AISC , Springer
4.	Data Mining: Tools and Techniques By Jiawei Han and Michelline Kamber
5.	Data Mining: A practical Machine Learning Tools and techniques By I H Witten, Eibe Frank, Mark A Hall Elsevier

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	IntroductionIntroduction Introduction to Machine Learning – Learning Paradigms – PAC learning – Basics of Probability – Version Spaces Machine Learning in Practice Data collection – Preprocessing (Missing values, Normalization, Adopting to chosen algorithm etc.,) – Outlier Analysis (Z-Score) - Model selection & evaluation – Optimization of tuning parameters – Setting the environment – Visualization of results.	20	9



2	Supervised Learning – Linear and Non-Linear examples – Multi-Class & Multi-Label classification – Linear Regression – Multilinear Regression – Naïve Bayes Classifier – Decision Trees – ID3 – CART – Error bounds	20	8
3	Supervised Learning - K-NN classifier – Logistic regression – Perceptrons – Single layer & Multi-layer – Support Vector Machines – Linear & Non-linear, Semi Supervised Learning	20	9
4	Unsupervised Learning Clustering basics (Partitioned, Hierarchical and Density based) - K-Means clustering – K- Mode clustering – Self organizing maps – Expectation maximization – Principal Component Analysis, Reinforcement Learning	20	8
5	Evaluation Metrics ROC Curves, Evaluation Metrics, Significance tests – Error correction in Perceptrons.	10	6
6	Ensemble Learning Bagging and Boosting, Random forests, Adaboost, XG boost inclusive.	10	5
Total		100	45

**Course
Outcome**

After Learning the Course the students shall be able to:

1. Discover the basic issues and challenges in Machine Learning including data and model selection and its complexity
2. Understand the underlying mathematical relations within and across Machine Learning algorithms.
3. Assess the different Supervised Learning algorithms using a suitable Dataset.
4. Evaluate the different unsupervised Learning algorithms using a suitable Dataset.
5. Design and implement different machine learning algorithms in a range of real-world applications.