Parul University

Subject Syllabus

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	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, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**Introduction:** Learning Problems, designing a learning system, Issues with machine learning. Concept Learning, Version Spaces and Candidate Eliminations, Inductive bias	10	6
2	**Supervised and Unsupervised Learning:** Decision Tree Representation, Appropriate problems for Decision tree learning, Algorithm, Hypothesis space search in Decision tree learning, inductive bias in Decision tree learning, Radial Bases, Functions, Case Based Reasoning	20	9
3	**Artificial Neural networks and genetic algorithms:** Neural Network Representation, Appropriate problems for Neural Network Learning, Perceptrons, Multilayer Networks and Back Propagation, Algorithms, Remarks on Back Propagation Algorithms, Case Study: face Recognition	20	9
4	**Bayesian Learning:** Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least squared Error Hypothesis, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier , Bayesian Belief Network, EM Algorithm Case Study: Learning to classify text.	20	9
5	**Fuzzy Logic:** Classical Logic and Fuzzy logic, Fuzzy Rule based systems, Fuzzy Decision making, Fuzzy Classification, Fuzzy Pattern Recognition, Applications	20	8
6	**Optimization Techniques:** Derivative based Optimization – Descent Methods – Genetic Algorithms – Ant Colony Optimization – Particle Swarm Optimization, Case Study - fraud detection, health care usingSoft computing techniques.	10	4

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 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.

Course: BTech **Semester:** 6

Prerequisite: Data structure, automata, and languages, Mathematics, Python | 203105101 - Fundamentals of Programming

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	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

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.

List of Practical

1.	**Write a program to demonstrate the working of the decision tree-based ID3 algorithm.**
2.	**Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.**
3.	**Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering a few test data sets.**
4.	**Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task.**
5.	**Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.**
6.	**Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm.**
7.	**Write a program to implement the K-Nearest Neighbour algorithm to classify the iris data set.**
8.	**Implement linear regression and logistic regression.**
9.	**Compare the various supervised learning algorithm by using appropriate dataset.**
10.	**Compare the various Unsupervised learning algorithm by using the appropriate datasets.**