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| **BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT**  **(An Autonomous Institution, Affiliated to VTU, Belagavi)**  **Master of Computer Applications**  **Scheme of Teaching and Examination: 2022-23** | | | |
| **SEMESTER – III** | | | |
| **Machine Learning** | | | |
| Course Code | 22MCA301 | CIE Marks | 50 |
| Contact Hours (L:T:P) | 3:0:2 | SEE Marks | 50 |
| Total Number of Lecture Hours | 42L 28P | Exam Hours | 3 |
| **Credits: 04** | | | |
| **Course objectives:**  This course will enable students to   1. Understand the fundamental issues and challenges of machine learning 2. Analyze data, model selection and model complexity 3. Understand the strengths and weaknesses of many popular machine learning approaches. 4. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning. 5. Design and implement various machine learning algorithms in a range of real-world applications. | | | |
| **Module – 1** | | | |
| **Introduction:** Implication and Scope of Machine Learning concepts and its Importance in Economic growth of Nation, Impact of the course on Societal Problems / Sustainable Solutions / National Economy, Career Perspective, Overview of the course in current Innovations and Research Trends.  **Overview:** Data objects and Attribute types, Overview of Machine Learning Algorithms – Basics of Supervised and Unsupervised Algorithms.  **Machine Learning Basics:** Well posed learning problems, Perspectives and issues in Machine Learning, Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version Space, Candidate Elimination Algorithm.  (09 Hours) | | | |
| **Module – 2** | | | |
| **Decision Tree Learning –** Decision Tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, Problems based on ID3 algorithm, Issues in decision tree learning.  (08 Hours) | | | |
| **Module – 3** | | | |
| **Bayesian Learning –** Introduction, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, Naïve Bayes Classifier, Bayesian belief networks.  (08 Hours) | | | |
| **Module – 4** | | | |
| **Unsupervised Learning –** Association Analysis - basic concepts and methods, Frequent itemset Generation, Apriori algorithm, FP-Growth Algorithm, Categorization of Major Clustering Methods, K-Means– Partitioning Methods, Hierarchical Methods.  (08 Hours) | | | |
| **Module – 5** | | | |
| **Evaluating Hypothesis –** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms, Instance based learning: Introduction, K-Nearest Neighbor learning.  **Recap:** Summary of Machine Learning concepts (09 Hours) | | | |
| **Laboratory** | | | |
| **Programs covering the following concepts:**   1. Web Scraping 2. Data Pre-processing 3. Linear Regression 4. Find-S Algorithm 5. K-NN Algorithm 6. SVM Algorithm 7. Naïve-Bayes Classifier 8. K-Means Clustering | | | |
| **Course outcomes:**  The students will be able to:  CO1: Explore the Machine Learning concepts.  CO2: Build suitable Decision tree for a given data set.  CO3: Apply machine learning algorithms for the given problems.  CO4: Perform statistical and probabilistic analysis of machine learning techniques.  CO5: Implement machine learning algorithms for a given use case. | | | |
| **CIE:**   * CIE is based on Theory and Laboratory Components of the course. * Theory component is evaluated for 60% of CIE i.e., 24 Marks and Laboratory component is evaluated for 40% of CIE i.e., 16 Marks. * CIE involves tests, assignments, case studies, reports etc. | | | |
| **SEE:**   * SEE will be conducted for 100 marks. | | | |
| **Text Books:**  1**.** Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education  2. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining Concepts and Techniques, Morgan Kauffman Publishing  3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc, 4th Edition.  **References:**  1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd Edition, Springer series in statistics.  2. Ethem Alpaydin, Introduction to Machine learning, 2nd Edition, MIT Press. | | | |