Department of Computer science and Engineering

Proposed Syllabus Structure
for
Data Analytics & Machine Learning

Preamble:

Data Analytics & Machine learning is an emerging field of information technology. Recently a big corporate house enquired at the time of campus interview whether the course on Data Analytics & Machine learning is offered here. Machine learning part of this course is needed for data modeling, that is for preparing data for data analysis, and Statistical methods are applied on data for Data Analysis and Data Mining.

Huge number of vacancies for the post of Data Analytics exits both in corporate houses and government agencies, particularly for analyzing Big Data. Academy of Technology wants to offer the course "Data Analytics & Machine learning" as a free elective in the sixth semester to the B. Tech. of CSE students. It can be extended to the other streams like IT and ECE. This will not only enhance their job opportunity through the placement cell but also they can take up their project work, in this new field, in final year.

The passed out students will be fit to take up the job of Data Analyst.

Data Analytics & Machine Learning

Prerequisites: Basic probability theory, Object oriented programming concepts
Course Name: Data Analytics & Machine Learning
Paper Code: CS605D
Credit: 3
Contact hours/Week: 3L
Total Class:40L
Course Objectives: Objectives of the course is to introduce the concepts of data modeling techniques using Machine Learning for Data Analytics to increase the job opportunities of B. Tech. students in corporate sectors as well as government agencies, and they can take up their project work from the seventh semester in this field of emerging technologies. Students will learn about state-of-the-art Machine Learning techniques and how to apply them in real life problems.

Details of Syllabus

Module No	Unit No	Topic	Class
		Review of Statistical methods	
1	1.1	Descriptive Statistics	1
	1.2	Probability Distributions (Binomial , Poisson, Normal)	2
	1.3	Sampling Distributions (Chi-squared, t, F)	2
2		**Inferential Statistics**	
	2.1	Estimation.	2
	2.2	Test of Hypothesis	2
3		**Regression &Analysis of Variance (ANOVA**	
	3.1	Regression	1
	3.2	ANOVA	3
4		**Introduction to Machine Learning**	
	4.1	Introduction and Concepts, Differentiating algorithmic and model based frameworks	1
	4.2	Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression,	2
	4.3	K Nearest Neighbours Regression & Classification	1
		Supervised Learning with Regression and Classification techniques -1	
5	5.1	Bias-Variance Dichotomy Model Validation Approaches	1
	5.2	Logistic Regression	1
	5.3	Linear Discriminant Analysis Quadratic Discriminant Analysis	1
	5.4	Regression and Classification Trees	1
	5.5	Support Vector Machine (SVM)	1
		Learning , Regression and Classification techniques	
6	6.1	Supervised and Unsupervised Learning concepts	1
	6.2	Regression and Classification techniques	1
	6.3	Neural Networks , Clustering, Association Rule Mining	4
	6.4	Deep learning Concepts	1
	6.5	Challenges for Big data |Analytics	1
		Prescriptive analytics	
7	7.1	Creating data for analytics through Active learning	2
	7.2	Creating data for analytics through Reinforcement learning	2
8		Python Machine Learning & Data Analysis Tutorial/Lab	6
		TOTAL	**40**

TEXT BOOK:

[1] Montgomery, Douglas C., and George C. Runger. Applied Statistics and Probability for Engineers. John Wiley & Sons, 2010

[2] Artificial Intelligence: A Modern Approach, Stuart Russel & Peter Norvig, Pearson, 2009

[3] Machine Learning: A probabilistic perspective ,kevin P. Murphy

[4] Pattern Recognition and Machine Learning, Chris Bishop

[5] The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Trevor Hastie, Robert Tibshirani, Jerome Friedman

REFERENCE:

[3] Business Intelligence: A Managerial Perspective on Analytics, Ramesh Sharda, Dursun Delon, Efraim Turbal, David King, Prentice Hall

[4] Modellind Techniuqes in Predictive Analytics, Thomas W Miller, Pearson

[5] Introduction to Machine Learning with Python, A. C. Muller & S. Guido, O'Reilly.