Guru Nanak Dev Engineering College, Ludhiana
Department of Information Technology
B. Tech (IT) Scheme 2018

Subject Code: PCIT-114
Subject Name: Introduction to Machine Learning

Programme:B.Tech.	L:3 T: 1 P: 0
Semester:6	Teaching Hours:48
Theory/Practical: Theory	Credits:4
Internal Marks:40	Percentage of Numerical/DesignProblems:20%
External Marks:60	Duration of End Semester Exam (ESE):3 Hours
Total Marks: 100	Course Type: Professional Core Course

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Apply Supervised Learning, Unsupervised learning, Deep Learning, Visualization techniques
2	Recognize and formalize a task as a machine learning problem
3	Interpret and present the predicted model
4	Identify suitable algorithms to tackle different machine learning problems
5	Apply machine learning algorithms to real datasets
6	Make powerful and accurate predictions.

Pre-requisites: Basics of Mathematics, AlgorithmsIntro-level algebra, Proficiency in programming basics.
Additional Material Allowed in ESE: NIL (Mention anything like graph, calculator etc, if required in exam)

Detailed Contents:

Part-A

Introduction to Machine Learning:

Difference between Machine Learning and traditional programming, Applications of Machine Learning, Why Machine Learning is the Future. [4L]

Regression:

Simple Linear Regression, Multiple Linear Regression, Polynomial Regression, Support Vector Regression, Decision Tree Regression, Random Forest Regression. [10L]

Classification :

Linear, Non-linear, Multi-class and Multi-label classification, Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Logistic Regression, K-Nearest Neighbors (K-NN), Support Vector Machine (SVM),Naive Bayes, Decision Tree Classification, Random Forest Classification. [10L]

Part-B

Clustering:

Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, K- Mode Clustering, Self-Organizing Map, Expectation Maximization, Gaussian Mixture Models. [12L]

Fuzzy Logic:

Introduction to Fuzzy Logic, Fuzzy Set, Fuzzification, Membership Functions: trimf, trapmf, gaussmf, gauss2mf,gbellmf, Defuzzification [12L]

Textbooks:

1.Jason Brownlee "Master Machine Learning Algorithms" Edition, v1.13, 2018
2. Alpaydin E., Introduction to Machine Learning, MIT Press (2010).
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Francis Bach "Deep Learning (Adaptive Computation and Machine Learning series)" MIT Press (2017)
4. Aurelien Geron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", Shroff/O'Reilly; First edition (2017)

Reference Books:

1. Michie D., Spiegelhalter D. J., Taylor C. C., Machine Learning, Neural and Statistical Classification. Overseas Press (2009).
2. N. J. Nilson, Introduction to Machine Learning, Stanford, Online Link
http://robotics.stanford.edu/people/nilsson/mlbook.html (Accessed on 30 July 2020)

Online Learning Material:

1. Machine Learning A-Z™: Hands-On Python & R In Data Science Created by Kirill Eremenko, Hadelin de Ponteves, SuperDataScience Team, SuperDataScience Support
https://www.udemy.com/machinelearning/ (Accessed on 30 July 2020)
2. The 5 Clustering Algorithms Data Scientists Need to Know
https://towardsdatascience.com (Accessed on 03 July 2020)
3. Crash Cource on Machine Learning by Google
https://developers.google.com/machine-learning/crash-course/ (Accessed on 03July 2020)