

Machine Learning

General Information

Course Number	CSC-572
Credit Hours	3 (Theory Credit Hour = 3, Lab Credit Hours = 0)
Prerequisite	Databases and Programming
Course Coordinator	None

Course Objectives

This course is designed to introduce machine learning and its techniques, algorithms and models. Machine Learning is an interdisciplinary field consists of computer algorithms and data handling techniques. It is applied in many fields such as speech recognition, image processing, internet searching trends, computer vision, bioinformatics, business and any other field having large and complex datasets. Machine learning is collection of tools to handle data sets and to learn from them to make decision. These techniques include supervised learning, un-supervised learning, Bayesian decision theory, nonparametric methods, multivariate analysis and statistical testing.

Evaluation

1.	Semester Project	10%
2.	Assignments	10%
3.	Quizzes	05%
4.	CP & CB	05%
5.	First Mid Term Exam	15%
6.	Second Mid Term Exam	15%
7.	Final Term Exam	40%

Text BOOK:

S. No	Book Title
1.	E. Alpaydin, (2014). Introduction to machine learning. MIT press

REFERENCE BOOKS:

S. No	Book Title
1.	T. M. Mitchell, Machine Learning, McGraw-Hill Education.

Detailed Course Outline

Week No.	Topic	Reference Material
Week No. 1 (24-01-2019)	<ul style="list-style-type: none">• Introduction to Machine Learning• Need of Machine Learning• Importance of Machine Learning• Types of Machine Learning• Classification and Regression• Applications of Machine Learning• Growth of Machine Learning• Machine Learning: State-of-the-art	Chapter 1 and Notes
Week No. 2 (31-01-2019)	<ul style="list-style-type: none">• Classification<ul style="list-style-type: none">• Types of Classification Algorithms• Binary or Binomial Classification• Multi Class or Multinomial Classification• Logistic Regression• Support Vector Machines	Chapter 2 and Notes
Week No. 3 (07-02-2019)	<ul style="list-style-type: none">• KNN• Decision Trees• Random Forest• Iris Dataset Prediction using Scikit-Learn• Scatter Plot of Iris Dataset using matplotlib	Chapter 8, 9, and Notes
Week No. 4 (14-02-2019)	<ul style="list-style-type: none">• Introduction to Neural Networks• Activation Functions• Single Layer Perceptron• Multi-layer Perceptron• Feed Forward Neural Network	Chapter 11 and Notes
Week No. 5 (21-02-2019)	<ul style="list-style-type: none">• Back Propagation Neural Network• Ensemble Learning Techniques<ul style="list-style-type: none">• Voting and Averaging• Stacking• Bootstrap Aggregating / Bagging	Chapter 11, 17, and Notes

	<ul style="list-style-type: none"> • Boosting 	
Week No. 6 (28-02-2019)	<ul style="list-style-type: none"> • Introduction to Regression • Regression Theory <ul style="list-style-type: none"> • How Regression works? • Regression- Features and Labels • Linear Regression <ul style="list-style-type: none"> • Regression training and testing • Regression- Forecasting and Prediction • The best fit slope • The best fit line • Linear Regression - Cost Function • Linear Regression – Gradient Descent 	Chapter 2, 4, and Notes
Week No. 7 (07-03-2019)	<ul style="list-style-type: none"> • Regression Types • Multivariate Linear Regression • Polynomial Regression • Logistic Regression • Multiple Features in Linear Regression • Implementation of Regression (Scikit-learn) 	Chapter 4, 5, and Notes
Week No. 8 (14-03-2019)	<ul style="list-style-type: none"> • Introduction to Clustering <ul style="list-style-type: none"> • k-means clustering, • hierarchical clustering, 	Chapter 7 and Notes
Week No. 9 (21-03-2019)	<ul style="list-style-type: none"> • Introduction to Dimensionality Reduction <ul style="list-style-type: none"> • PCA Algorithm 	Chapter 6 and Notes
Week No. 10 (28-03-2019)	<ul style="list-style-type: none"> • NLP <ul style="list-style-type: none"> • Word and Sentence Tokenization • Stop words removal • Stemming and Lemmatization • POS tagging • Named Entity Recognition 	Notes
Week No. 11 (04-04-2019)	<ul style="list-style-type: none"> • Text Classification • Sentiment Analysis 	Notes
Week No. 12 (11-04-2019)	<ul style="list-style-type: none"> • Image and Video Mining • Image and Video Classification 	Notes

Week No. 13 (18-04-2019)	<ul style="list-style-type: none"> • Introduction to Speech Recognition 	Notes
Week No. 14 (25-04-2019)	<ul style="list-style-type: none"> • Introduction to Deep Learning 	Notes
Week No. 15 (02-05-2019)	<ul style="list-style-type: none"> • Introduction to Reinforcement Learning • Introduction to Recommender Systems 	Chapter 18 and Notes
Week No. 16 (09-05-2019)	<ul style="list-style-type: none"> • Introduction to Large Scale Machine Learning 	Chapter 18 and Notes