Machine Learning CSCI 421/ CSCI 578
Spring 2021
Instructor: Oladunni, Timothy
Office Location: Bldg. 42, Room 112 E
Class Location: Virtual
Instructor's Email: Timothy.oladunni@udc.edu
Class Hours: 6pm to 8:50 W
Office Hours: WF 3:30pm to 5:30pm

Course Description

The veracity, velocity, volume and variety of data available since the early 90's has posed a major challenge to the traditional data analytical methodologies. Machine learning (ML) is a branch of artificial intelligence that studies the use of algorithm and statistical models that can 'sniff' through these large piles of data, learns its pattern and discovers hidden knowledge. The task is performed without explicit programming.

Application of ML crosses the traditional boundary of science. Its application includes; business intelligence, mechanical or electrical fault prediction, infectious disease prediction, autonomous vehicles and air crafts, speech recognition, image analysis etc.

We will familiarize ourselves with the main building blocks of ML with application to real world problems. Our approach will be a combination of statistics, linear algebra, calculus and computer programming.

Prerequisites

Students are expected to be proficient in the following areas before registering for this class.

  I.   Linear algebra
  II.   Python Programming
  III. Discrete mathematics
  IV.   Statistics
  V.   Calculus

Learning outcome:

- Data analysis and exploration
- Feature extraction and reduction
- Application of ML to real world problems

Tentative Schedule

Week	Topic	Date	Project
Week 1	• Regression I	01/13	
Week 2	• Regression II	01/20	**Project 1**
Week 3	• Classification I	01/27	
Week 4	• Classification II	02/03	**Project 2** **Project 1 is Due**
Week 5	• Resampling Methods I	02/10	
Week 6	• Resampling Methods II	02/17	**Project 3** **Project 2 is Due**
Week 7	• Linear Model Selection & Regularization I	02/24	
Week 8	• Mid-Term Exams	03/03	**Project 3 is Due** **Final Project Proposal**
	• Spring Break	03/10	
Week 9	• Linear Model Selection & Regularization II	03/17	**Final Project Proposal Presentation**
Week 10	• Moving Beyond Linearity I	03/24	
Week 11	• Moving Beyond Linearity II	03/31	**Project 4**
Week 12	• Tree Based Methods	04/07	
Week 13	• SVM	04/14	**Project 4 is Due**
Week 14	• **Presentation/Demo**	**04/21**	
Week 15	• Final Exam	**04/28**	**Final Project is due**

Evaluation

Final grade will be based on the following:

Project 1 5%

Project 2 5%

Project 3 5%

Project 4 5%

Final Project 35%

Mid-Term 20%

Final 25%

Text Book

1. Introduction to Machine Learning Third Edition by Ethem Alpaydın
2. Pattern Classification Richard O. Duda, Peter E. Hart, David G. Stork
3. An Introduction to Statistical Learning: With Applications in R by Daniela Witten, Trevor Hastie, Robert Tibshirani and Gareth M. James