



DATS 6202 – Machine Learning I: Algorithm Analysis

Tue. 6:10 PM – 8:40 PM Thompkins 301

INSTRUCTOR

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Term: Spring 2018

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COURSE DESCRIPTION:

This course is an introduction to Machine Learning and its core models and algorithms. The objective of the course is to provide students an overview of machine learning techniques to explore, analyze, and leverage data. This course covers commonly used classification and regression based machine learning techniques. Students will be familiarized with broad machine learning and statistical pattern recognition topics, including: neural network training, tree based classification, and penalized regression. Students will use Python and R to complete the projects through the course.

LEARNING OBJECTIVES:

Students will be able to:

1. Understand machine learning algorithms and concepts.
2. Demonstrate Machine Learning technics using Python and R.
3. Apply the machine learning concepts to practical problems.

RESOURCES:

The following book is required for the course:

A - Python Machine Learning, 2015 Sebastian Raschk, (second edition)

B - Neural Network Design (2nd Ed) - Author: Hagan, Demuth, Beale, De Jesus-
Free Ebook (Web Link)

C - Machine Learning in Python Essential Techniques for Predictive Analysis -
Author: Michael Bowles

The following books are recommended as optional reading:

- Tom Mitchell, Machine Learning. McGraw-Hill, 1997.
- Richard Sutton and Andrew Barto, Reinforcement Learning: An introduction. MIT Press, 1998
- Richard Duda, Peter Hart and David Stork, Pattern Classification, 2nd ed. John Wiley & Sons, 2001.
- Data Science Handbook – Free online
- Data Science From Scratch First Principles with Python -Author: Joel Grus

SOFTWARE:

Python and R will be required for homework assignments and the projects.

TENTATIVE COURSE SCHEDULE (SUBJECT TO CHANGE):

Week	Topic	Date	Reading	Activity
1	Introduction.Overview of Machine Learning	1/17/18		
2	Neural Networks/AWS	1/24/18	B - 1-4	Homework
3	Neural Networks	1/31/18	B - 8-10	Homework
4	Neural Networks	2/7/18	B - 11 & 12	
5	Overview Machine Learning	2/14/18		Quiz NN
6	Decision Trees	2/21/18	C - 6 A 88-99	
7	Ensemble, Bagging, Boosting Random Forest/Case Study: Classification	2/28/18	C – 7 A -7	Quiz Classification
8	Mid-Term Project	3/7/18		
9	Spring Break	3/14/18		
10	Regression Review/Gradient Descent	3/21/18	TBD	Homework
11	Penalized Regression Ridge	3/28/18	C – 4	
12	Penalized Regression Lasso	4/4/18	C – 5	Homework
13	Elastic Net	4/11/18	TBD	
14	Coure Review.Project Preparation	4/18/18		Quiz Regression
15	Project Presentations	4/25/18		

GRADING AND EXAMINATION POLICY:

- HW/Class Participation – 25%
- Quizzes – 25%
- Mid-term Project – 25%
- Final Project - 25%

GRADING SCALE

93-100 A
90-92 A-
87-89 B+
83-86 B
80-82 B-
77-79 C+
73-76 C
70-72 C-
<70 F

SECURITY:

In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

DISABILITY SUPPORT SERVICES (DSS):

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations.

The University Counseling Center (UCC Phone: 202-994-5300) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems (Web Link). Services for students include:

- crisis and emergency mental health consultations
- confidential assessment, counseling services (individual and small group), and referrals

ACADEMIC INTEGRITY

The code of academic integrity applies to all courses in the George Washington School ("Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information."). In the spirit of the code, a student's word is a declaration of good faith acceptable as truth in all academic matters. Cheating and attempted cheating, plagiarism, lying, and stealing of academic work and related materials constitute Honor Code violations. These will not be tolerated. Please become familiar with the code. All students are expected to maintain the highest level of academic integrity throughout the course of the semester. Please note that acts of academic dishonesty during the course will be prosecuted and harsh penalties may be sought for such acts. Students are responsible for knowing what acts

constitute academic dishonesty. The code may be found at sea:
<http://www.gwu.edu/~ntegrity/code.html>

UNIVERSITY POLICIES:

Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities.