Boston University Metropolitan College

Machine Learning

MET CS767

Learn from Anywhere Course Format, Offered Simultaneously On Campus and Remote

Farshid Alizadeh-Shabdiz, PhD, MBA
alizadeh@bu.edu
Office hours: by appointment

Class location: KCB, 106
Wednesday 6pm – 8:45pm

Course Description
Theories and methods for automating and representing knowledge with an emphasis on learning from input/output data. The course covers a wide variety of approaches, including Supervised Learning, Neural Nets and Deep Learning, Reinforcement Learning, Expert Systems, Bayesian Learning, Fuzzy Rules, and Genetic Algorithms. Each student focuses on two of these approaches and creates a term project.

Prerequisites
MET CS 521 and either MET CS 622, MET CS 673 or MET CS 682.
MET CS 677 is strongly recommended.
Or, instructor's consent.

Learning Objectives
Students will accomplish the following.

(1) Understand the goals and applications of Machine Learning
(2) Apply the principal ML technologies
(3) Implement more than one of these techniques in a significant manner

Reference Books

- We'll use parts of "Machine Learning" by Marsland (2nd edition) ISBN-13: 978-1466583283.
- A good book on deep learning is “Fundamentals of Deep Learning” by Buduma (O’Reilly).

Courseware
List course website (Blackboard, CourseInfo, or other), as well as any web links that will be necessary for the class

Spring 2021 COVID-19 Policies

Classroom Rotations: Classrooms on campus have new capacities that follow guidelines issued by state and local health and government authorities related to COVID-19 and physical distancing. Before the beginning of the class, and throughout the semester, I will be reaching out to students who have indicated that they want to attend the classroom in-person. Our classroom holds **limited** students, and therefore we will have rotations of students that come to class on campus if number of face-to-face students exceed the limit. You will be asked to attend remotely on the week that you have rotated out the classroom.

Compliance: All students returning to campus will be required, through a digital agreement, to commit to a set of Health Commitments and Expectations including face coverings, symptom attestation, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.

You have a critical role to play in minimizing transmission of COVID-19 within the University community, so the University is requiring that you make your own health and safety commitments. Additionally, if you will be attending this class in person, you will be asked to show your Healthway badge on your mobile device to the instructor in the classroom prior to starting class, and wear your face mask over your mouth and nose at all times. If you do not comply with these rules you will be asked to leave the classroom. If you refuse to leave the class, the instructor will inform the class that they will not proceed with instruction until you leave the room. If you still refuse to leave the room, the instructor will dismiss the class and will contact the academic Dean's office for follow up.

Boston University is committed to offering the best learning environment for you, but to succeed, we need your help. We all must be responsible and respectful. If you do not want to follow these guidelines, you must participate in class remotely, so that you do not put your classmates or others at undue risk. We are counting on all members of our community to be courteous and collegial, whether they are with classmates and colleagues on campus, in the classroom, or engaging with us remotely, as we work together this fall semester.

Class Policies

1) **Assignment Completion & Late Work** – all the assignment has to be submitted in person or by email, or on courseware site. No late work will be acceptable.
2) **Academic Conduct Code** – Cheating and plagiarism will not be tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code:

   http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

Grading Criteria

The course grade will be based on

- Active class participation (10%)
- Assignments and Quizzes (30%)
- Final project (30%)
  - Project proposal and progress reports (5%)
  - Design and implementation (15%)
  - Final presentation and final report (10%)
- Final exam (30%)

Assignments are expected to be submitted by their respective due dates. Late submissions are not accepted.

Tentative Class Syllabus

Lectures, Readings, and Assignments subject to change, and will be announced in class as applicable within a reasonable time frame.

The course will cover many machine learning subjects including

- Introduction to Machine learning
- Gradient Descent
- Genetics Algorithm
- Fuzzy rules and fuzzy logic
- Bayesian learning
- Principal component analysis (PCA)
- Independent component analysis (ICA)
- Intro to Neural networks and deep learning
- The Perceptron
- The Multilayer Perceptron

- Neural network training
- Convolutional Neural Networks – CNN
- Recurring Neural Networks – RNN
- Generative Adversarial Networks (GAN)
- Reinforcement learning