Syllabus for CMSC 491/CMSC 691: Special Topics:
Data Driven Design of Autonomous Systems
Spring 2020

Course:
Lecture Time: M, W, 1:00 - 2:15 pm, Math & Psychology 008
Office Hours: M, W, 2:20 - 3:20 pm, and by appointment, Location: ITE 360

Instructor: Dr. Ting Zhu, E-mail: zt@umbc.edu

Grader: Venkiteswaran, Vandana <JZ79730@umbc.edu>

Class web page: All class materials are available at http://blackboard.umbc.edu

Course Descriptions: Big data features high volume, high velocity, and high variety. The tremendous big data generated from natural systems, engineered systems, and human activities require new capabilities in algorithms and systems to explore insights and make decisions. To address the challenges of big data, this course discusses the recent advances of data driven design for autonomous systems: algorithms, systems, and big data analytics at scale. It consists of an overview of representative data mining, statistics, machine learning algorithms (particularly deep learning), computational photography, simultaneous localization and mapping, augmented reality, 3D scene understanding, and etc.

Textbook: No required textbooks.

Other References:
- Many recent papers in leading conferences/journals will be discussed.
- Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville, MIT Press, 2016. [Link]

Enrollment Requirements: You must have completed CMSC341 or CMSC341H with the grade of C or better.

Materials to be Covered: The introduction of deep learning, big data algorithms, security and privacy issues of autonomous systems. Data collection, management, processing, and visualization, participatory/opportunistic sensing, stream, trajectory, and graph data management for heterogeneous urban data, streaming data processing, interactive visualization, spatial-temporal data analytics, data fusion, visual analytics, data-driven predictive modeling, and interdependency analyses.
Grading:
Your performance will be evaluated based on the following
Class Participation 10%
Paper Critiques 20%
Paper Presentation 30%
Project 40%

Scale for final grades: Grades will be assigned on the following scale. I reserve the right to lower or raise the scale as needed. This is generally only necessary to ensure borderline grades are appropriately assigned a letter grade although it may be necessary to adjust for overly hard or overly easy assignments.

A: 90 – 100
B: 80 – 89
C: 70 – 79
D: 60 – 69
F: < 60

Paper Critiques: Two paper critiques per week will be assigned in this semester. Each critique is due in email 2 hours before the corresponding class start. I also require you to hand in a hard copy (one page, single-spaced) of the critiques in class (before the class starts). Late submission is NOT allowed.

Paper Presentation:
Each presentation lasts for 50 minutes plus 25 minutes for question answering. The presentation should not only cover the in-depth discussion of the paper, but also all necessary background and related work for the class to fully understand the technical approach described in the paper.

Besides answering any questions raised by the class, the presenter will also be asked questions by challengers that are assigned by instructor. A challenger should ask critical questions about the paper and his/her performance will be counted in the ‘class participation’.

The evaluation criteria of presentation include clarity, organization, technical content, and question answering. Each student (excluding the presenter) will score the presentation, and the average of all scores will be the score of the presentation.

Final Project: Each student needs to complete a project on a selected problem. Detailed requirements of the final project will be handed out in the middle of the semester.

Academic Integrity Statement: “By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC’s scholarly community in which everyone’s academic work and behavior and held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is
not limited to, suspension or dismissal. To find useful information about avoiding plagiarism infractions through appropriate citations, or to read the full policy regarding student academic misconduct for the graduate school, please see http://www.umbc.edu/provost/integrity.”