MATH 6397: Pattern Recognition and Machine Learning

Lectures: TTh 10:00 – 11:20 online

Instructor: Krešimir Josić
Office: I will not be in my office regularly this semester. My regular office is PGH 624.
Office Hours: By appointment
Telephone: (713) 743-3485 (Office), but please use Slack or email.
e-mail: kresimir.josic@gmail.com

Course Format:
This course is being offered in the Synchronous Online format. Synchronous online class meetings will take place according to the class schedule. There is no face-to-face component to this course. All lectures and discussions will be delivered online. Please note the policy on recording at the end of this document.

Prerequisites:
Undergraduate calculus sequence, undergraduate probability, differential equations and two semesters of linear algebra.

Text:
We will use the following two books: Data-Driven Science and Engineering by Steven L. Brunton and J. Nathan Kutz, and Pattern Recognition and Machine Learning by Christopher M. Bishop. The first book is a useful resource. I highly recommend that you buy it. However, since we will mostly follow the online lectures, this is not absolutely necessary.

Topics Covered:
This course is devoted to the mathematical methods of finding patterns in data. I will teach the course in the form of a seminar, and I expect a bit of discussion in class. The first part of the course will follow the book Data Driven Science and Engineering. Please go to the website databookuw.com for an overview of the topics in the book. The exact choice of topics, and time we spend on them will depend on feedback from students.

I will not compete with Prof. Steve Brunton who has produced excellent online lectures to accompany the book. I will assign the viewing for each course, and will give a brief overview in class.

Viewing and Reading Assignments:
I will send reading assignments via email and Slack. For each class I will assign about 60 minutes of material to watch. I will send the assignment via Slack and email. I expect you to view this before each meeting, and will occasionally give you a quiz. Part of your grade will be determined by your score on this quiz.

Computational component:
The point will be to also look at the implementation. I will ask you to do this in Python, whenever possible, although Matlab is acceptable. The code is available online, and you will have a brief presentation where you will explain how the different ideas were implemented. I will assign 3-4 people to present with possible extensions to the code each week. Your grade will be based on these presentations, and you can expect to have a turn 10 days.
Python There will be several computational challenges that will require the use of Python. There are numerous helpful tutorials to help you get started. Please use the Jupyter environment, as it makes the presentation a lot easier to follow.

Git repository Please use a git repository for your homework, and to work on code cooperatively during the challenges. To grade your homework I will clone the repository with your homework answers (pdf please), and the accompanying code.

How to get in touch with me:

The best way to get in touch with me is via Slack if you have a quick question. I will set up a Slack channel for the course where you can discuss programming challenges and other questions. You can also contact me by email. Quick questions may be better suited for Slack, but I don’t mind emails.

Project:

There will be a research project for the course. You will be able to choose your own topic (as long as it is within the scope of the course). I am also happy to suggest a topic.

You will prepare a short oral presentation which you will deliver to the class. Every student will give a 10 minute presentation (time limit strictly enforced), and submit your slides to me. Presentations will be held during the time during which the final exam is scheduled.

Separate guidelines for the assignments will be provided.

Attendance:

Attendance is strongly encouraged. Each meeting will consist of an overview of the viewing assignment and discussion. This will be followed by the presentation and discussion of the implementation by the students.

Grades:

Grades will be assigned on the following basis:

50% class participation and presentations
30% project

Academic Honesty:

Dishonesty includes cheating on your homework, falsifying data, and misrepresenting the work of others as your own (plagiarism). I will take all instances of academic dishonesty very seriously. I urge you to read the sections of the student handbook discussing academic dishonesty and the disciplinary actions it entails.

Counseling and Psychological Services:

Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad or hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713- 743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the Lets talk program, a (virtual) drop-in consultation service at convenient locations and hours around campus.

Excused Absence Policy:

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any assigned work that contributes to the course grade or a satisfactory alternative. Please read the
full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

**Course Recording:**

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Center for Students with Disabilities. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructors recordings for their own studying and notetaking. Instructors recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

**Webcams:**

Access to a webcam is required for students participating remotely in this course.

**Syllabus Changes:**

Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through Slack and email.