PHY 7097: Machine Learning
Fall Term 2022
Syllabus

Instructor: Konstantin Matchev
Instructor's webpage: www.phys.ufl.edu/∼matchev
Instructor's e-mail: matchev@ufl.edu

Synopsis

This is a one-semester introductory course on machine learning. You will be introduced to the fundamentals of analyzing and interpreting scientific data; you will learn to apply modern machine learning tools and techniques to problems commonly encountered in physics research, such as classification, regression, and others (for a very detailed outline of the exact topics covered, refer to the class diary linked to the course webpage). Along the way, you will also acquire valuable programming, plotting, statistics and presentation skills. The course is very interactive and will feature hands-on tutorials using Jupyter notebooks run on google colab.

Prerequisites

Some knowledge of python is helpful but not required.

Time and Location

The class will meet in room NPB 1220 on Tuesdays during periods 5-6 (11:45 am - 13:40 pm) and on Thursdays during period 5 (11:45 am - 12:35 pm).

Office Hours

Official office hours will be held on Thursdays (12:50 pm - 13:40 pm). However, you are encouraged to ask questions at any time — before, during, and after class. If you get stuck, always try googling your question first before asking the lecturer or your classmates.

Required Materials

There is no required textbook. Some useful resources are listed under the "References" link on the class web page.

Class Webpage

The class web page will contain the most up-to-date information about the class. There you will find the class diary, this syllabus, useful references and the rubric for the final project assignments. Please check for updates regularly, especially if you miss a lecture.

The grades, the homework assignments, the homework solutions, and any relevant Jupyter notebooks will be posted on the course webpage on canvas.

Homework Assignments

There will be periodical homework assignments which will be peer-reviewed anonymously. Late homework will be accepted but marked down. Note that you are allowed to hand in the homework BEFORE the due date. Solutions should be complete, legible and functional. The homework constitutes 40% of the grade (30% given for the homework submission and 10% for the peer grading).

Class lecture and data challenge

You will be asked to teach one class lecture and design a corresponding data challenge illustrating the topic of the lecture with a publicly available dataset from some area of physics. This will constitute 30% of the grade.

Final Projects

The course will end with a final project presentation from each student, worth 30% of the grade. You will have an opportunity to choose the topic for your final project yourself, and it may or may not be related to your current research — this is completely up to you. If you have difficulties choosing a topic, feel free to ask me for advice, I will then suggest different options.

Grading Policy

The homework will contribute 40% towards the final grade, the class lecture + data challenge another 30% and the final project presentation will count for 30%. You may refer to the Physics Department policy on incomplete grades. For additional details regarding grading policies, see the university website: catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A guaranteed grading scale has been announced:

A: 80%
A^-: 75%
B^+: 70%
B: 65%
B^-: 60%
C^+: 56%
C: 52%
C^-: 48%
D^+: 44%
D: 40%
D^-: 36%

These thresholds may be lowered if appropriate but they will not be raised.

Accommodations for Students with Disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Academic Honesty

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class."

Online Evaluations

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

Advising and Counseling

Due to the nature of the environment at the university, it is not uncommon for students to experience stressful situations, and "study harder" sometimes does not seem to work. If you find yourself in this situation, you are encouraged to seek confidential counseling, see: http://www.counseling.ufl.edu/cwc/.

Zoom Code of Conduct

The UF Student Honor Code and Student Conduct Code continue to apply to online behavior. You are expected to be professional and respectful while attending class on Zoom, if we ever need to switch to an online mode of instruction.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Physics IDEA (Inclusion, Diversity and Equity Alliance)

Physics is practiced and advanced by a scientific community of individuals with diverse backgrounds and identities and is open and welcoming to everyone. The instructional team recognizes the value in diversity, equity and inclusion in all aspects of this course. This includes, but is not limited to differences in race, ethnicity, gender identity, gender expression, sexual orientation, age, socioeconomic status, religion and disability. Students may have opportunities to work together in this course. We expect respectful student collaborations such as attentive listening and responding to the contributions of all teammates.

Physics, like all human endeavors, is something that is learned. Our aim is to foster an atmosphere of learning that is based on inclusion, transparency and respect for all participants. We acknowledge the different needs and perspectives we bring to our common learning space and strive to provide everyone with equal access. All students meeting the course prerequisites belong here and are well positioned for success.

For more info and additional resources, see the Physics IDEA webpage.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A class lecture is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To publish means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.