FIN 397: Machine Learning in Finance
Spring 2022

Class Time: Thursday, 2:00p - 5:00p
Classroom: CBA 4.342
Course webpage: https://github.com/dpuelz/Machine-Learning-in-Finance

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Office hours: By appointment. Send me an email, and we'll find a time.

Course Description and Objectives

What drives variation in stock returns? How can machine learning help uncover significant economic drivers of this variation? This course will cover statistical learning with a focus on important problems in finance. We will investigate how to model the cross section of stock returns using many data sources and new techniques in machine learning, including trees, ensembles, and deep learning. The class will be a mix of lecture and discussion/analysis of newest papers in the field, with much weight placed on the latter. Time permitting, we will also discuss how practitioners are using these techniques in trading and investing.

We will focus on "asset pricing"-type papers that attempt to model the cross section of returns using new techniques in ML to estimate risk premiums. If time permits, we will also cover other areas of prediction in finance. Once a decent model is constructed for the cross section, there are many interesting directions to go: building new factors or trading strategies, investigating new economic relationships between returns and firm characteristics, etc. It will be a heavy workload of reading papers and replicating results (preferably in `R` or `Python`).

The following are the outline of topics:

I. Supervised learning and the cross section of returns

II. Causal inference and machine learning applied to economics and finance

III. Other advanced topics in financial market prediction

There is one required textbook for this class: *Machine Learning in Asset Pricing*. We will also rely heavily on scholarly papers. A useful methods reference that we will use occasionally is: *An Introduction to Statistical Learning*. It is free to download at that link. We may also use components of *The Elements of Statistical Learning* which is also free.

Course Evaluation

This is an advanced, PhD-level course. It is important that you are present and engaged during each class and participate in all discussions. There are no examinations for the course. Instead, we will take turns presenting papers and leading discussions of different research topics. The goal of this course is to generate new ideas for research papers that will be written and published. You will be evaluated simply on how close we get to this goal.

Students with Disabilities

Upon request, the University of Texas at Austin provides appropriate academic accommodations for qualified students with disabilities. Services for Students with Disabilities (SSD) is housed in the Office of the Dean of Students, located on the fourth floor of the Student Services Building. Information on how to register, downloadable forms, including guidelines for documentation, accommodation request letters, and releases of information are available online at here. Please do not hesitate to contact SSD at (512) 471-6259, VP: (512) 232-2937 or via e-mail if you have any questions.

Harassment Reporting Requirements

Senate Bill 212 (SB 212), which went into effect as of January 1, 2020, is a Texas State Law that requires all employees (both faculty and staff) at a public or private post-secondary institution to promptly report any knowledge of any incidents of sexual assault, sexual harassment, dating violence, or stalking "committed by or against a person who was a student enrolled at or an employee of the institution at the time of the incident." Please note that both the instructor and the TA for this class are classified by SB 212 as mandatory reporters. That means we MUST share with the Title IX office any information about sexual harassment/assault that is shared with us by a student, whether in-person, via electronic communication, or as part of any class assignment. Note that a report to the Title IX office does not obligate a victim to take any action, but this type of information CANNOT be kept strictly confidential except when shared with designated "confidential employees." A confidential employee is someone a student can go to and talk about a Title IX matter without triggering any obligation by that employee to have to report the situation so that it will be investigated. A list of confidential employees is available on the Title IX website. The professor and TA for this class are NOT designated confidential employees per SB 212.