Machine Learning for Accounting
Accountancy 577
Spring 2020

Instructional Staff

Head Instructor: Linden Lu (zllu2@illinois.edu)

Associate Instructor: TBD

Office Hours: TBD

Course Description

This course introduces machine learning algorithms and their applications in accounting problems. It covers classification, regression, clustering, text analysis, time series analysis. It also discusses feature importance and model optimization.

This course provides an entry point for students to be able to apply proper machine learning algorithms on business related datasets to solve various problems. By end of the course, combined with the skills learned from ACCY576, students should be able to complete an entire data analytics process with Python.

Contact Hours

This course will meet for 8 weeks, in the second half of a normal semester.

Each week contains 8-12 contact hours comprised of various combinations of the following:

- 1.5 hours of live session (i.e., lecture and discussion)
- 1-3 hours of structured and guided video tutorials
- 2-3 hours of practice activities appropriate for academic credit
- 1-2 hours of discussion board activity
- 1-3 hours of group work

Course Objectives / Learning Outcomes

- Understand and apply introductory and advanced machine learning techniques
- Develop and apply algorithmic systems that allow for optimal
- Acquire analytical skills applicable to different data types, including textual analysis, time-series analysis, and network analysis

Elements of This Course
This course will come to you through two online platforms – (1) the Illinois Compass2g course management system, which will be your main point of contact as students registered for University of Illinois graduate course credit, and (2) Coursera's platform where you will register and complete two courses taught by me.

The Compass2g site will be your "home base" for the course. However, the course materials will actually reside in two main locations. One is in Compass. The other is the Coursera platform, where you will engage via two related, but separate Coursera courses.

To complete this course, you must register for the Verified Certificate in BOTH of these Coursera courses.

Each of the Coursera courses comprises half of the baseline content for this for-credit course. In addition to this baseline content, the for-credit course requires you to complete multiple exercises (provided outside of the Coursera platform, in Compass). For your convenience, this Compass website will link directly to all required videos, readings, quizzes, and exercises in the Coursera platform.

Course Materials
The course is comprised of the following elements, separated by the Coursera and Compass platforms.

- **Coursera Courses**
  - **Lecture videos –** For each module, there will be a series of video lectures you will be required to view. You may either stream these videos directly in the platform, or you can download the videos for offline playback (via the 'download' icon).
  - **Readings –** There are also module-specific readings, which can be found on the Module Readings page.
  - **Quizzes –** Each module has lesson-specific Practice Quizzes and one or more Module Quizzes. The practice quizzes help you review and recall module content, and provide feedback based on your answers. However, these quizzes do not count toward your overall course grade. Module quizzes are required, and do count toward your course grade. You may attempt each Module Quiz up to two times every four hours, up until the quiz deadline indicated for the week. At the time of the deadline, your highest score achievement will be used as your final Module Quiz score. You may work at your own pace on quizzes, as there is no time limitation for completion.
  - **Exercises –** Some modules have additional exercises. These exercises are required and count toward your overall course grade.
  - **Discussion forums** – Posting in the Coursera discussion forums is optional, as we have our own discussion forum for this course.

- **Compass Materials**
    - **Additional exercises –** Some modules have required exercises. The nature of these exercises varies on multiple dimensions, including their form (i.e., open-ended vs. quiz-based), specific requirements, whether they are completed individually or in groups, etc. Refer to the specific instructions in each module for details.
    - **Case analyses –** You will conduct formal case analyses. These analyses will involve written communication and quantitative analyses. Refer to the specific instructions in each module for details.
    - **Final exam –** Please refer to the course website for the final exam, which will take place in the last week of the course.

Grading
Please remember that no late submission of assignments, quizzes or exams will be accepted. The following table explains the breakdown for all activities that are required in order to pass the class.

Location of the Material	Assignments	Quantity	Overall % of final grade
Coursera	Module Quizzes	8 total; 1 for each module	Pass
	Mini-Project (Peer Assessment)	TBD	
Compass	Formal Case Analysis	TBD	TBD
	Additional Exercises	TBD	TBD
	Participation	Throughout course	TBD
	Final Exam	1	TBD
	Total		100%

Course Outline

- Module 1: Machine Learning and Accounting
    - Lesson 1: Introduction to Machine Learning
    - Lesson 2: Data Pre-Processing
    - Lesson 3: Introduction to Machine Learning Algorithms
- Module 2: Fundamental Algorithms I
    - Lesson 1: Decision Tree

    - Lesson 2: Random Forest
    - Lesson 3: Support Vector Machine
- Module 3: Fundamental Algorithms II
    - Lesson 1: Logistic Regression
    - Lesson 2: K-Nearest Neighbor
    - Lesson 3: Naive Bayes
- Module 4: Model Optimization
    - Lesson 1: Introduction to Overfitting
    - Lesson 2: Feature Selection
    - Lesson 3: Model Selection
- Module 5: Introduction to Clustering
    - Lesson 1: Introduction to Clustering
    - Lesson 2: Introduction to Spatial Clustering
    - Lesson 3: Introduction to Density-based clustering
- Module 6: Introduction to Text Analysis
    - Lesson 1: Introduction to Text Analytics
    - Lesson 2: Introduction to Text Classification
    - Lesson 3: Sentiment Analysis
- Module 7: Introduction to Network Analysis
    - Lesson 1: Graph Concepts
    - Lesson 2: Graph Analysis
    - Lesson 3: Social Media
- Module 8: Introduction to Time Series Analysis
    - Lesson 1: Working with Date and Time
    - Lesson 2: Analyzing Time Series Data
    - Lesson 3: Introduction to Statistical Time Series Analysis

Course Communication
You will find multiple venues to communicate with the instructor, your classmates and technical support. There is a **Course Communication** folder with links and details about who to contact or where to post to get the fastest response. Links to those communication venues can also be found at all times, on the left side menu in the course page.

Course communication venues include:

- **Course Q&A** forum is for you to post any questions or comments about course content or course logistics. This forum will be monitored regularly by the instructor and course support staff. The forum is open to the class and you are also encouraged to respond to the questions and comments posted by your classmates as well.
- **Technical support** will link to a discussion forum. This will be used for any questions or comments about the technology tools used in the course. *(Note: If you are having a technical issue or questions about, please send as many details as possible, including whether you are using a Mac or PC, what browser you are using, etc.) Screenshots are always helpful. As a first line of defense against technical issues, always make sure your computer's operating system is up to date, as well as your browser and Java version.*

Firefox and Safari are the preferred browsers for the Compass environment (Internet Explorer is not supported by Coursera).

Of course, feel free to email the instructor or the teaching assistants if you have a personal issue, or if some other question you do not feel is appropriate to post on the course-wide (i.e., public) forums.

Building Emergency Procedures
This course is provided online. However, if you are on campus, the following guidelines apply to this course.

In the event of a tornado warning, please seek shelter in the Wohlers Hall basement or the Armory, or in the BIF basement between 8 am and 4:30 pm weekdays (the nearest designated University tornado shelters). If a tornado is imminent, the BIF basement stairwells also can be used on an emergency basis. In the event of a fire in BIF, exit BIF and proceed to 141 Wohlers Hall. In the event of threat from a shooter on campus, lock down the classroom and move to a place of safety within the classroom. If you encounter a suspicious package, do not touch the package; alert campus security, and refrain from cell phone usage until the situation is resolved. More detailed information and action instructions are available in the Building Emergency Action Plan.

Campus Emergency Statement
Emergencies can happen anywhere and at any time, so it's important that we take a minute to prepare for a situation in which our safety could depend on our ability to react quickly. Take a moment to learn the different ways to leave this building. If there's ever a fire alarm or something like that, you'll know how to get out and you'll be able to help others get out. Next, figure out the best place to go in case of severe weather – we'll need to go to a low-level in the middle of the building, away from windows. And finally, if there's ever someone trying to hurt us, our best option is to run out of the building. If we cannot do that safely, we'll want to hide somewhere we can't be seen, and we'll have to lock or barricade the door if possible and be as quiet as we can. We will not leave that safe area until we get an Illini-Alert confirming that it's safe to do so. If we can't run or hide, we'll fight back with whatever we can get our hands on. If you want to better prepare yourself for any of these situations, visit police.illinois.edu/safe. Remember you can sign up for emergency text messages at emergency.illinois.edu.

Sexual Misconduct Policy and Reporting
The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here:

http://wecare.illinois.edu/resources/students/#confidential. Other information about resources and reporting is available here: http://wecare.illinois.edu.

Food/Housing Insecurity Statement
Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support and alert the course instructor.

University Honor Code
Academic integrity and honesty are essential and non-negotiable. It is your duty to not only understand and abide by University guidelines (Article I, Part 4 of the Student Code) but also to promote a culture of ethical behavior within your group and class. Violations will be handled via Department, School, and University policies.

According to the University policy, violation of academic integrity is a serious offense. In the context of all assignments in this course, violating academic integrity is copying of answers from other students or any other source, rather than authoring them. Quoting from other sources with proper citation is permitted, but that cannot be the entire answer. Quotations may only constitute part of your answer, and must be merely for clarification or documentation purposes. Your answers must show that you have understood the material and can argue the case on your own. Anyone found in violation of academic integrity in this course will be subject to the penalties discussed in the Student Code. These penalties include, among others, failure for the course or dismissal from the University.