Syllabus
CSC357 Advanced Topics
Machine Learning
Professor Leon Tabak
Block 5
January 13, 2020 to February 05, 2020

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1 Description of our course

We will examine the kinds of problems that computer scientists are solving with machine learning technology, together with some of the technical and ethical challenges they are encountering. We will study important algorithms that detect patterns in data, classify measurements, and predict future values. We will design and build applications with popular software that computer scientists use for machine learning.

2 Our meeting times and places

- My office is in West Hall 211.
- You may call me in my office at (319) 895 4294.
- You may send me electronic mail at l.tabak@ieee.org.
- I will be in my office and available to meet with you Monday through Friday from 3:00 p.m. until 3:30 p.m.
- We will all meet together in the classroom in the mornings and in the laboratory in the afternoons.

	Where	**When**
Classroom	West Hall 213	9 a.m. to 11 a.m.
Laboratory	West Hall 200	1 p.m. to 3 p.m.

3 Textbooks

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow (2^{nd} edition)
Aurélion Géron
O'Reilly Media 2019
ISBN: 9781492032649

You may use the first edition of this book.

We will also find articles, tutorials, and references on the Internet.

4 Etiquette for the Classroom

Please show respect to your classmates, to me, and to the seriousness of our enterprise by exercising the following courtesies:

- Please give your attention to whomever is speaking. You cannot view unrelated pages on the Web and be part of our class' discussion at the same time.
- You learn from your classmates. Be generous in offering help to classmates in the laboratory. Take interest in your classmates' work. Encourage them. Compliment them for work that is well done. Give them a good audience when they stand at the front of the room to present their work. Show these courtesies to all of your classmates.
- Please do not interrupt the class by late entries or early departures. If you anticipate a need to be absent from all or part of one of our meetings, please notify me in advance of your anticipated absence.
- You may listen to music while working in the laboratory so long as you are still able to hear your name when called and you do not disturb neighbors.
- Please refrain from bringing food or drink into the classroom or laboratory. We can make reasonable exceptions for eating that is not noisy and foods that do not have strong smells.

  Acceptable beverages and foods include water, tea, and granola bars. Bringing breakfast to class is not courteous.

  Please clean up crumbs and spills. Please dispose of empty containers and leftovers.

- Please dress as you might for an employer in the software engineering industry.

  Software engineers dress casually, but neatly. You do not have to purchase new clothes!

  Please keep your shoes on. Wearing hoods, hats, or sunglasses (except when there is a medical reason for shielding the eyes) that hide your face is not courteous.

- Imagine that you are seeking employment. How will you present yourself to your prospective employer?

  Imagine that you are now employed in a software engineering firm. How will you speak to your teammates, the head of your team, and your company's clients?

  Imagine that your grandmother has purchased the company for which you work. She has joined you in the company's conference room to hear and see you walk through the code that you have written for the company (her company).

  Are there some words that you will keep out of your vocabulary during this hour?

5 Policies

Cornell College is committed to providing equal educational opportunities to all students. If you have a documented learning disability and will need any accommodation in this course, you *must* request the accommodation(s) from the instructor of the course and no later than the third day of the term. Additional information about the policies and procedures for accommodation of learning disabilities is available on Cornell College's Web site.

Please also familiarize yourself with the college's statement on academic honesty and its policies for dropping courses.

6 Goals

We will give special attention to three of Cornell College's Educational Priorities and Outcomes:

- Communication—working in teams, you will learn with one another and from one another. You will take a turn as the teacher, sharing with your classmates and instructor what you learn about machine learning.

- Knowledge—you will gain proficiency with tools and disciplines that have wide application in computer science. You will increase your technical vocabulary and develop your understanding of mathematics. You will learn how to speak confidently about a very important field.
- Vocation—in your search for tutorials and in your reading of predictions for the future of machine learning, you will become acquainted with leaders in this field. You will learn more about where opportunities lie and what the experts believe you must do to qualify yourself for opportunities.

7 Schedule & Evaluation of Work

Please arrive each day rested and prepared to contribute to our discussions. Show steady progress in your study of machine learning. When you anticipate a need to be late, to leave early, or to be absent, please give advance notice.

7.1 Our roles

Imagine that we are all in a boat. Some of us are sitting on the port side. Some of us are sitting on the starboard side. Each of us has our two hands on one oar. We will make progress only if we all pull on our oar. To go far we need strength **and** coordination!

I am not yet an expert on machine learning. You and I will be learning together. You will be a student and a teacher. I will be a student and a teacher. We are partners.

7.2 Proposed goal

Let's try to read Chapters 1–7 and 10–11 of *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*.

7.3 Daily work (team work)

You will work in a team of four or five people. Each day you and your teammates will share a lesson with the class. The team will earn a grade for each of these daily lessons. All members of the team will share the same grade.

Include in your daily lessons:

- a 5–10 minute presentation
- a one page handout for your instructor and each of your classmates

- a few questions to test your audience's understanding during and/or at the end of your presentation

You might delegate one member of your team to present a lesson, but you should rotate this responsibility so that every member gets experience presenting to the class.

7.4 Weekly report (individual work)

Each week you will produce a longer lesson. For this lesson you will earn an individual grade.

For each week's lesson, write 3–5 well-organized and neatly formatted pages. Although this will be an individual effort, you may draw upon work that you produced with your team during the week or build upon lessons that other teams have produced.

7.5 What makes a lesson

Here are some elements that you might choose to include in a lesson. Do not try to include all of these different kinds of elements in a single lesson!

- an explanation of concepts or methods
- step-by-step instructions for the accomplishment of some task
- code that we can try and with which we can experiment
- notes on some part of our textbook
- a glossary of terms
- stylistic guidelines for writing code that others will be able to read and understand easily
- guidelines for a problem-solving discipline that will make us most productive
- links to tutorials or references that will help us learn more about how to use software to create machine learning applications
- a presentation and explanation of the results of an experiment (for example, with the help of tables and graphs)
- links to articles or videos that describe...
  - applications of machine learning

  - advice for how we can build careers in machine learning, data science, or software engineering

- invitations to your classmates to help you understand a difficult concept or master a challenging technique

7.6 Grading formula

	Activity	**Points**
	Daily Presentations	20
	Written Lesson 0 (Friday, 17 January 2020)	20
	Written Lesson 1 (Friday, 24 January 2020)	20
	Written Lesson 2 (Friday, 31 January 2020)	20
+	Written Lesson 3 (Wednesday, 05 February 2020)	20
		100