CSE 416 A Au 21: Introduction To Machine Learning

Lecture:

Instructor: Emilija Perković
Lectures: MW 3:30 - 4:50 PM @ MLR 301
Office hour: W 5:10 - 6:10 PM you need to register in advance.

LAB/Quiz Section:

Sections AA/BA, F 3:30 - 4:20 PM: Timothy, Brian.
Sections AB/BB, F 3:30 - 4:20 PM: Ronak, Sahil.
Sections AC/BC, F 4:30 - 5:20 PM: Timothy, Brian.
Sections AD/BD, F 4:30 - 5:20 PM: Ronak, Sahil.

TAs:

Timothy Akintilo, office hours Thursdays 2:00pm-3:30pm on zoom.
Teaching weeks 1-5 section AA/BA and section AC/BC on zoom.

Brian Burns, office hours Fridays 2-3:30pm on Zoom.
Teaching weeks 6-10 sections AA/BA and AC/BC in person at LOW 113.

Ronak Mehta, office hours Tuesdays 3:30-5:00 PM on Zoom.
Teaching weeks 1-5 sections AB/BB/AD/BD on Zoom.

Sahil Verma, office hours Tuesdays 1:00 PM - 2:30 PM on zoom.
Teaching weeks 6-10 sections AB/BB and AD/BD on Fridays on zoom.
Goals

It is hard to imagine anything more fascinating than automated systems that improve their performance. The study of learning from data is commercially and scientifically crucial for members of a modern society that has machine learning applications in almost every system we encounter. This course is designed to provide a thorough grounding in machine learning methodologies, technologies, and algorithms. The course topics draw from classical statistics, machine learning, data mining, and statistical algorithms. It will also equip you with tools and examples to decide when using machine learning for a particular task is appropriate or effective.

The course is broken up into five overarching case studies

1. Regression
2. Classification
3. Clustering and Similarity
4. Recommender Systems
5. Deep Learning

Students entering the class should have a pre-existing working knowledge of probability, statistics, and algorithms. However, the class has been designed to allow students with a strong numerate background to catch up and fully participate.

**A sincere and giant thank you goes to Hunter Schafer, who authored most of the materials we use for this course.**

Prerequisites:

- Programming: CSE 143 (Links to an external site.), CSE 160 (Links to an external site.), or CSE 163 (Links to an external site.)
- Statistics: STAT 311, STAT 390, STAT 391, IND E 315, or Q
Software and Textbooks

There is no official textbook for the course yet (we are currently working on one!), so any readings or videos will be posted on the course website, EdStem, or Gradescope. **These slides and readings are all you need to learn to succeed in this course.**

If, however, you want to learn more, the following textbooks are good references for parts of our course, and are freely available online!

- **Introduction to Statistical Learning (ISLR)** - (Links to an external site.)
  - Gareth James, Daniela Witten, Trevor Hastie, and Rob Tibshirani
- **Elements of Statistical Learning (ESL)** - (Links to an external site.)
  - Trevor Hastie, Rob Tibshirani, and Jerome Friedman
- **Computer Age Statistical Inference (CASI)** - (Links to an external site.)
  - Bradley Efron and Trevor Hastie
- **Deep Learning Book (DLB)** - (Links to an external site.)
  - Ian Goodfellow, Yoshua Bengio, and Aaron Courville

Required Course Work

See Schedule and Notes for slides and deadlines.

There will be four categories of coursework you will do in this class:

**Checkpoints (after each lecture)**

There will be a “Checkpoint” for you to take on EdStem after each lecture. Each checkpoint will consist of 4-8 questions that help you test your understanding of concepts covered in the pre-
lecture content and lecture. The questions are intended to be straightforward to answer and are provided to help you better assess your learning through the course. Each checkpoint should not require more than 20-30 minutes.

Checkpoints will be due 30 minutes before the next class. So for a class on Wednesday, the checkpoint for that day is due the following Monday at 3:00 pm. The checkpoints are set up to inform you whether or not your answers are correct, and you can submit as many times as you want. Please see Schedule and Notes, for precise checkpoint deadlines.

You will submit Checkpoints on EdStem in the “Lessons” tab under that day’s lesson.

**Homework (weekly)**

These are more extended programming and conceptual assignments that will assess your mastery of the skills and concepts covered in class that week. Each assignment is generally divided into two parts: One part is a programming assignment that will involve writing Python code, processing and analyzing data, and answering open-ended questions, all based on that analysis. The second part focuses on answering conceptual questions at a high level or might involve doing some calculations by hand.

You will submit the Programming portion of assignments on EdStem and the Concept portion of the assignment on Gradescope. See homework guidelines for more details.

**Learning Reflections (weekly)**

To aid your learning process in this course, we will ask you to build up your reference sheet for each week so that you can better look back at what you learned each week. You will submit learning reflections on Gradescope. See learning reflections for
more details.

**Exam (one)**

There will be one exam during the quarter — see the course calendar for dates. More details about the exams will be published closer to their release.

**Getting Help from Staff & Peers**

Edstem serves as an online discussion forum. For most questions about the course or materials, this is the right place to ask: the course staff read EdStem regularly. On EdStem, you can also submit questions anonymously or privately to the course if you are more comfortable doing so.

The best way to meet with us is to visit our virtual Office Hours. Office Hours are scheduled times where you can meet with members of the course staff to discuss course concepts, get assistance with specific parts of the assignments.

**Grade Breakdown**

Your percentage grade in this course will be weighted using these categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Homework - Code Portion</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Homework - Concept Portion</td>
<td>8</td>
<td>15%</td>
</tr>
<tr>
<td>Checkpoints</td>
<td>18</td>
<td>10%</td>
</tr>
<tr>
<td>Learning Reflections</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>Exam</td>
<td>1</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100%</strong></td>
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We will also drop your lowest 2 Checkpoints and 1 Learning Reflection in your final grade computation.

There may sometimes be small extra credit opportunities, but these will not make a significant impact on course grades. The extra credit can affect your grade by potentially pushing you up to the next grade point if you are very close (e.g., 3.0 to 3.1). They are meant to be fun extensions rather than required parts of the course. Our advice is to complete extra credit for your learning or review. However, it is unlikely to be an efficient use of your time if you solely complete it to boost your grade.

Course Grades

Below we give some guidelines for the minimum amount of points required to reach a particular grade. These are minimum guarantees: your course grade could be higher than what this table suggests. Please do note that we do not make any guarantees of the course grades within these buckets.

<table>
<thead>
<tr>
<th>Percent Earned</th>
<th>Course Grade</th>
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<tbody>
<tr>
<td>90</td>
<td>3.5</td>
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<tr>
<td>80</td>
<td>3.0</td>
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<tr>
<td>70</td>
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<tr>
<td>60</td>
<td>2.0</td>
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<tr>
<td>50</td>
<td>0.7</td>
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Late Work

Each student receives six late days for the entire quarter. You may use late days on assignments, and each late day allows you to submit up to 24 hours late without penalty. For example, if homework is due on Wednesday at 9:00 pm, you could use two late days to submit on Friday by 9:00 pm with no penalty. Once a
student has used up all their late days, each successive day that an assignment is late will result in a loss of 10% on that assignment. The deduction will not be immediately applied but will be reflected in the final grades you see on Canvas by the end of the quarter. **It is your responsibility to track how many late days you have used in the quarter.** You do not need to contact the course staff if you want to use a late day; our tools are set up to allow you to turn in late by your choice. There is a short grace period for last-minute submission issues, but you should plan to avoid depending on it.

**Students with disabilities:**

If you would like to request academic accommodations due to a disability, do not hesitate to get in touch with Disabled Student Services, 448 Schmitz (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present this letter to me so we can discuss the accommodations you might need for the class.

**Academic Integrity:**

Collaboration and discussions are allowed and encouraged in this class, but copying or letting others copy your work amounts to plagiarism. This includes copying model solutions, e.g., from prior years. Although cheating seldom occurs, if it does, I will take the following action: assign a grade of 0.0 for the exam/homework where the cheating occurred, and report the incident to the Graduate School Committee on Academic Conduct, which will decide upon an appropriate University course of action.
**Religious Accommodations:**

Washington state law requires that UW develop a policy for the accommodation of student absences or significant hardship due to reasons of faith or conscience or for organized religious activities. The UW’s policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/).

Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).

**Student conduct:**

Follow the UW Student Conduct Code in your interactions with your colleagues and me in this course by respecting the many social and cultural differences among us, which may include, but are not limited to: age, cultural background, disability, ethnicity, family status, gender identity and presentation, citizenship and immigration status, national origin, race, religious and political beliefs, sex, sexual orientation, socioeconomic status, and veteran status.