Syllabus Overview

CSE 4309 – Machine Learning

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About the Course

- This course is aimed to be an introduction to machine learning.
- Expectations:
  - Basic understanding of probability and statistics.
  - Calculus (derivatives, integrals, gradient vectors).
  - Linear algebra (vector and matrix operations).
  - Solid algorithmic background.
  - Solid programming background.

Expectations: Statistics

- You are expected to have a basic understanding of:
  - Probabilities.
  - Probability densities.
  - Joint probabilities.
  - Conditional probabilities.
- Prerequisites: IE 3301 (probabilities).

Expectations: Algorithms and Linear Algebra.

- You should be able to analyze the space and time complexity of various algorithms.
  - You are expected to understand big-Oh notation (and Theta notation, Omega notation, etc).
- You are expected to understand and be able to use/implement basic data structures:
  - linked lists, priority queues, trees, graphs.
- You should be familiar with matrix operations.
- Prerequisites:
  - CSE 3318 (algorithms), used to be CSE 2320.
  - CSE 3380 or Math 3330 (linear algebra).

Expectations: Programming

- You are expected to be expert programmers.
- Being expert programmers means (among other things) that:
  - You have no trouble converting pseudocode to real code.
  - You can debug your own code.
- No programming or debugging help will be offered in this class.
- Programming assignments should be done in:
  - Python 3.8.3
  - numpy version 1.18.5

More on Programming

- I have had students whose programming background was far from sufficient.
- Examples:
  - Not knowing how to write functions and structure programs modularly.
  - Not knowing how to find the smallest number in an array.
  - Not knowing how to extract a subarray from an array.
- Based on past experiences, I try not to take it for granted that students have the appropriate background.
- Hence, assignment 1.

Assignment 1

- Will be posted on Canvas soon.
  - Due Thursday next week.
- Assignment 1 is there to verify that you have an adequate knowledge of the required background in algorithms, calculus, probability, and linear algebra.
  - If you have the right background, the tasks should be extremely easy.
- If you do not have the right background, the assignment gives you the opportunity to do something about it:
  - Review the material.
  - Discuss with the instructor how to better prepare.
  - Drop the class if you find it necessary.
- I am adding some more tasks this year, primarily to test coding skills, based on observations from last year.

Preparing for the Real World

- I want the course to prepare, to the extent possible, students for professional life in the real world.
- In the real world there are rules and responsibilities.
  - You are responsible for understanding the rules and carrying out your responsibilities.
- In the real world, your supervisors and your customers care about you getting the job done.
  - Your evaluations will depend on the quality of your work.
  - If you do not get the job done, nobody will care about the reasons or excuses.

Grading

- Grades depend **exclusively** on assignments.
- No homework scores will be dropped.
- All assignments are weighted equally.
- Little extra credit will be given.
  - Any extra credit will be given to all students.
  - Do not ask for individual extra credit opportunities to improve your grade.
- No make-up work will be given to individuals who want a better grade.

Grading

- Grading is based on performance.
  - 90% = A, 80% = B, 70% = C, 60% = D.
- Grading criteria do **not** include:
  - Effort.
  - Class participation.
  - What grade you need to qualify for financial aid, for a job, for graduation, etc.
- **All requests for leniency in grading will be ignored**.

Grading - FAQ

- (Towards the end of the semester) I would like a grade of X, but I am afraid I may get a grade of Y. What can I do?
  - Answer: Make sure your assignment/exam scores exceed the threshold for grade X. If not, nothing else can be done.
- (At the end of the semester) I REALLY need a grade of X, but I got a grade of Y, which will cost me my ___ (fill in any choice of: job, financial aid, 4.0 GPA, self esteem…). Can I get bumped up? Or, can I get make-up work? Or, extra credit work? Or something?
  - Answer: No.

Grading - Recap

- If your goal is an easy A (or an easy B, or an easy C), this may not be the right class for you.
- If your goal is a light course load, this may not be the right class for you.
- This is one of the most advanced courses we offer.
  - You decide if you want to take it.
- Machine learning has become an extremely important computer science area.
- The goal is to train students to be competitive for the most demanding machine learning jobs out there.
  - This goal is not compatible with either easy grading or light workload.

Assignments

- You must submit on Canvas.
- Late penalty: 1 point per hour.
  - No exceptions, except for medical/personal emergencies documented in writing.
  - Network/computer crashes will not be accepted as an excuse.
- Every semester, some people get 0 in an assignment (or more), because they submitted the wrong file(s).
  - Then they ask for leniency, because they did all the work, and just made a silly mistake in submitting.
  - Sorry, there will be no leniency on this issue.
  - Verify your submission every time.

Regarding Submission Problems

- If, for whatever reason, you cannot submit on Canvas, then you can send us your assignment by e-mail.
- In that case, e-mail (**before the deadline)** your submission files to me and to the teaching assistant.
  - If you e-mail us after the deadline, you still get the late penalty.
- Use your UTA e-mail, so that you can prove that you sent your message on time.
- Check with us ASAP to make sure we received your e-mail.
- You will still need to provide ASAP very convincing documentation that you really had problems with Blackboard.

Assignment Resubmission Policy

- Students can resubmit any assignment on Canvas until the end of Monday, December 13.
- **For the purposes of making an A, the resubmission will NOT be considered.**
  - A-level performance should mean getting it right the first time.
- For the purposes of making a B, the **average** of the resubmission score and the original submission score will be used.
- For the purposes of making a C or a D, the resubmission score will **replace** the original submission score.
- Overall rationale:
  - Maintain high standards for making an A.
  - Give students more opportunities to catch up and pass the class.

Attendance

- You do not have to attend lectures.
- However, if you do not attend lectures, you are still responsible for understanding the material.
  - Do not expect a private lecture during office hours or by e-mail.

Class Participation

- Class participation is not part of the grading criteria.
- However: asking questions, and trying to answer questions, can help you in understanding the material.
  - If you have questions and you do not ask in class, where are you going to get the answers?
- If you do not understand something, always feel free to raise your hand and ask a question.

Course Website

https://athitsos.utasites.cloud/courses/cse4309_fall2021/

- The course website will be the main source of information for this class.
- The link to the course website is posted on Canvas and on my home page.
- Canvas will only be used for assignment submissions
- All other material will be available on the course website.
  - The schedule and lecture slides, will be available on the "Schedule and Lecture Slides" link.
  - Assignments will be available on the "Assignments" link.

Syllabus

- A link to the syllabus is posted on Canvas.
- There are detailed policies on grading, submissions, etc.
- **You are responsible for reading and understanding what the syllabus says.**
- **Do not ask for exceptions from any syllabus policy.**
- If you did not read, or did not understand the syllabus, you are responsible for the consequences.
  - See comments earlier on getting ready for the real world.

Getting Help (1)

- The teaching assistant and myself are available for help.
- Feel free to use our office hours (on Microsoft Teams), posted on the website.
- Feel free to send e-mails with your questions.
- If you send us an e-mail, always CC the TA and me, to maximize chances of getting a reply fast.
- **Do not expect responses to frantic queries in the last minutes/hours before an assignment is due**.
  - If you send us assignment-related questions the day that the assignment is due, we may not manage to respond to you before the deadline.
  - The earlier you start, the more chances you will have to ask questions, and to get your questions answered.

Getting Help (2)

- The instructor and TA duties do **not** include programming help and debugging.
  - (See comments earlier on preparing students for the real world outside the university.)
  - Personally, I just cannot look at your code for a few minutes and spot bugs. So, it is not that we do not want to help, but that (usually) we cannot.

Using Existing Libraries/Tools (1)

- Every semester, I get many questions of the type:
  - "Can I use this existing library/tool for the assignment"?
- Answer: I do not know. Use at your own risk.
- Assignments specify that you need to implement specific methods and report specific results.
  - Instructions for how to implement those specific methods are provided on the assignment page and on the course slides.
- I expect, and I recommend, that you implement the specified methods from scratch, using the provided instructions.
- Existing libraries/tools may implement variations that, while reasonable and useful, do not match the specifications on the assignment.
  - If that happens, it will count as wrong.

Using Existing Libraries/Tools (2)

- If you use existing libraries/tools:
  - If your output complies exactly to the assignment specifications, great!
  - If not, it will count as wrong. Do not blame the library or tool, you made the choice to use it.
  - The teaching assistant and I will not spend time to check if your proposed library/tool complies with the assignment specifications. We do not recommend the usage of such tools anyway, so we have no reason to help you do it.
- Implementing methods from scratch provides a different level of understanding than simply using existing libraries. This is why we recommend implementations from scratch.
- Assignments are also the basis for the semester grade. To get a good grade, you should be able to understand and implement the concepts discussed in the slides.

Assignment-Related Questions

- Assignments are used to evaluate performance.
- You are free to ask any assignment-related question, at any time, but we may not give an answer.
  - Before the deadline, we may not answer some questions, if we judge that figuring out those answers is part of your evaluation for that assignment.
  - After the deadline, we will answer any questions. Remember, you can resubmit assignments where you got poor grades.
- Overall, you should always feel free to ask a question.
  - Sometimes, instructions or slides may have an ambiguity. Your questions can help us identify and resolve such ambiguities.
  - If in doubt, ask. If we feel that we can only answer after the deadline, we will let you know. We will never hold it against you that you asked a question.

Electronic Communication

- Please use your UTA e-mail for electronic communication with the instructor and the teaching assistant.
- We monitor chat on Teams ONLY during lecture and office hours.
  - We may not notice messages you post outside those hours, or we may respond very late.
- We do not monitor any other means of communication (Canvas, MyMav, …).
  - If you make comments on Canvas, we will assume that they are notes to yourself.