Yeshiva Capstone Syllabus

Spring 2025
Prof. Rowe

Overview

The goal of this capstone is to create a reproducible process for conducting the data analysis for the following study. This is known as reproducible science and acts as the foundation for applying the scientific method in the computing era.

During this capstone we will conduct a study to determine if soil moisture sensors can act as a proxy for precipitation. Automatically measuring precipitation can be difficult. Manual procedures involve placing a graduated tube and measuring precipitation and different time intervals. This requires manually emptying the tube. Alternatively, a tipping bucket can be used to measure precipitation. This approach requires counting the number of times the bucket fills up and tips over. Newer approaches use sound or capacitance to measure the intensity of rainfall. These data are calibrated to a rate.

We will attempt to use a capacitive soil moisture sensor to measure accumulated precipitation. In this approach, we expect that soil moisture will increase as rain falls. The amount of precipitation should be proportional to the change in soil moisture. We want to know how reliable this works in practice and what limitations this approach might have.

Schedule

Date	**Topic**	**Project Lead**
21 January	Orientation (grading, Kanban, study goals)	N/A
28 January	Precipitation sensors	Sreyash Mudiam Venkata
4 February	Soil moisture sensors	Ratna Anvesh Alluri
11 February	No class	Rachael Ojopagogo
18 February	Reproducible science	Praveen Maranur
25 February	Model design	Abdul Sameer Mohammed
4 March	Performance metrics	Ashritha Reddy Devarampally
11 March	No class	Yaswanth Harish Chinta
18 March	Model development	Sreyash Mudiam Venkata
25 March	Model development	Praveen Maranur
1 April	Performance evaluation	Rachael Ojopagogo
8 April	Model limitations	Ratna Anvesh Alluri

22 April	Model tuning	Yaswanth Harish Chinta
29 April	No class	Ashritha Reddy Devarampally
6 May	Final performance evaluation	Abdul Sameer Mohammed
13 May (pending)		

Grading

Criterion	Percentage	Description
Attendance	10%	Attending class sessions and not being late
Class participation	25%	Being proactive in answering questions, being disciplined about following kanban process, making tangible contributions in group work
Project leadership	15%	Ensuring Kanban board is properly updated, ensuring updates are complete and have sufficient detail
Assignments	50%	Completing assignments with a high level of quality

Work quality

The purpose of this class is for you to demonstrate what you have learned in this master's program. You are expected to think independently and critically and push your abilities. Using generative AI to assist you as a tool is fine, but you need to add value beyond what generative AI can produce. ChatGPT produces average work, so if your work cannot be differentiated from ChatGPT, you will receive a C.

F: Worse than ChatGPT
C: Same quality level as ChatGPT
B: Some effort was made to produce original work and challenge yourself
A: Produced original work high in quality (methodology, detail, exposition) that pushed your abilities

Late work

In general, late work will not be accepted. The only exceptions are if there is a death in your immediate family or you are experiencing a medical emergency.

Classes

Most class time will be dedicated to presentations from students. The purpose is for you to practice presenting to others. Students will have around 10 minutes to summarize their work. In general the structure should follow this format:

- summary of the goal

- main conclusions
- challenges overcome
- open questions
- Q&A

As part of the participation grade, students are expected to ask questions of other students. The more thoughtful the questions, the higher the participation grade.

Regarding cameras and video, since this is an online course, I strongly suggest you turn on your camera. In my experience, there are higher quality discussions when people have their video on, mainly because it is harder to *not* pay attention. It also builds rapport within the class, which is valuable. That said, this is not a requirement, but those not using video will have their participation grade reduced.

Kanban

We will use a Kanban board for tracking work progress. Work will be done individually but as part of the overall project. The capstone is designed this way so you gain practical experience working with others in a structured way that is commonly found in industry.

Related to this, each student will play the role of project lead for a portion of the course. In this role, you will be required to assign some tasks, monitor the Kanban board and ensure your classmates are making sufficient progress.

Homework questions

Questions about assignments should be done within Github. This provides transparency so others can also see the answer to the question. Put the question in the relevant assignment card.

Contact

I generally check Yeshiva email once a day. I will respond to most emails within 48 hours.

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