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CS109

Contest
October 16, 2020

Probability for Computer Scientists Contest

It is our happy job to announce that this quarter we are going to host the seventh Stanford CS109 Probability for Computer Scientists Contest. This contest is meant to give you space to have fun with the material, to be inspired, and to be inspiring. This contest is open to all students in CS109 this quarter.

For the contest, create a probability driven project of your choosing that highlights concepts from the class and does something interesting. Each of you is eligible to submit one entry for the contest, where an entry consists of a screen capture and a short write-up of the probability theory behind your work. An optional proposal form will be due **Monday, November 2 at 11:59 PM** Pacific Time.The final contest entries will be due **Saturday, November 14 at 11:59 PM** Pacific Time. We will release the results as soon as possible and no later than Wednesday, November 18.

Genuinely Optional

As mentioned this contest is genuinely optional. I appreciate that many of you are busy—and my intention is not to create any more obligatory work. When I say optional I really mean it. We will only apply bonuses for the contest *after* we have calculated final grades for the class. Thus, if you don't participate, you will get the exact same final grade in CS109 as you would have received had there been no contest. We don't recommend that you work on your contest entry if it means you won't have time to study for the last quiz or complete the last problem set.

Evaluation Criteria

The entries will be evaluated by the CS109 staff on the following dimensions:

- **Creativity**. We are looking for original ideas that showcase unique thought. This dimension will be reflected in how novel your work is. Similarly, we encourage work that is aesthetically interesting.
- **Impact**. We will give special consideration to work that seems to have the potential for positive social benefit.
- **Academic Sophistication**. This dimension is based on the difficulty of the underlying probability, how well the ideas relate to the concepts presented in CS109 and how well you are able to articulate your ideas. More rules before.

An entry does not have to be strong in all dimensions of evaluation. For example, a submission that is an expression of a truly creative idea would be well received, even if it does not use the hardest concepts from CS109 and doesn't have much social benefit.

Prizes

There will be one grand prize. If you win a grand prize you will get the highest honors of a gift card of unknown denomination to a local business of your choice that offers digital giftcards (or, if unavailable, to Amazon). You will also have your two lowest quizzes replaced with a 100% (we will announce winners before the third and final quiz so you can decide if you want to take the quiz). In addition, we will award two finalists with gift cards of smaller denomination and lowest quiz replaced with a 100%. We will reward all other serious contest entries with runner-up prizes, based on the amount of effort that was included, and the extent to which the work demonstrates understanding of the CS109 material.

We will recognize and appreciate all of your efforts—I realize that many of you are busy, and my intention is not to create insurmountable barriers to learning probability this quarter. We'll provide some feedback and advice on your initial ideas through an optional proposal submission (to be discussed next).

Optional proposal

We'd like to help you succeed in your endeavors and carve out a contest plan that will work for you this quarter! You will have the option to submit a *really* short proposal (e.g., topic, initial plans) on which we can give feedback. This is completely optional, and you can definitely submit a final contest submission without sending in a proposal.

You can submit your project idea(s) to Gradescope under "[Optional Contest] – Proposal Submission." We will review all proposals submitted by **Monday, November 2 at 11:59 PM** Pacific Time and give feedback by the end of that week.

Final Submission Format

Your submission will have two parts: (1) a demonstration video and (2) a short write-up. This is the minimum needed to explain what is cool and probabilistic about your submission.

The demonstration video could just be a screen capture that shows your program running. The idea behind this submission format is to allow you to use any programming language without having to worry about your program running on our machines. The write-up does not have to be formatted in any particular way. It is another medium for you to explain to us why your submission is interesting. You should include a probabilistic explanation of your program.

Use the two submission parts in anyway you like. If your idea is best expressed via a write-up, submit a short and sweet video. If your entry is best expressed via a video, keep your write-up minimal.

Final Submission Instructions

All entries must be submitted electronically.

1. Upload your video to Youtube. Your video should be public or accessible by link.
2. **Insert a link to your video at or near the top of your write-up,** and submit your write-up as a PDF on Gradescope under "[Optional Contest] – Written Report with YouTube Link."
3. Submit your code on Gradescope under "[Optional Contest] – All Code."

Official Contest Rules

1. Entries to this contest are beholden to the Stanford Honor Code.
2. Only students registered in CS109 are eligible to submit entries in the contest. Only one entry per person will be accepted.
3. ~~No groups are allowed. Individual work only.~~ As of October 25th, you can work up to pairs of two for this project. However, projects submitted by two-person teams will be held to a higher standard, so that those who elect to work solo are not at a discernible disadvantage.
4. You can code your submission in any programming language.
5. Your submission **must be sent by 11:59 PM Pacific Time on Saturday, November 14**. Late entries will not be accepted, and you cannot use late days for the contest.
6. You may ask Lisa and Jerry or the TAs for help during office hours; however, they will give priority to students working on problem sets.
7. You are free to use any of the probability ideas we have gone over in class.
8. If you use a concept we didn't cover, the concept should be close enough to the material that you could explain it in terms of concepts we have learned in CS109.
9. This should not be a project you have made for a grade in another class.
10. To keep things fair, we are not going to allow students to use deep learning libraries (e.g. TensorFlow, PyTorch, etc.).

Ideas

This is a short list of ideas. We want to neither limit nor constrain your thinking. Our prior belief is that people could make some sort of artistic program (think the *Monument to Change as it Changes* art installation in front of CEMEX). Students could recreate a probabilistic program such as Shazam, perhaps with their own twist. Students could work through a hard proof. Students could implement a randomized algorithm, like Monte Carlo Tree Search. An entry could posit a probabilistic model for something in the real world, simulate it and analyze the resulting distributions. You could even make a program that visualizes a probability phenomena. Hopefully these ideas pale in comparison to what you have in mind.

You can submit a machine learning project, but an entry that simply uses a black box algorithm won't be considered particularly creative.

Here are some winning submissions from previous quarters of CS109 to give you a sense of what is possible:

- Modernizing Reddit community moderation: User Toxicity, Self-Promotion, and Sleep
- Recidivism Risk: Algorithmic Prediction and Racial Bias
- A Better Way to Reform the Electoral College
- On the Verge: Modeling Species Extinctions using the Galton-Watson Branching Process
- Shut the Box

- Monte Carlo Tree Search for Tic Tac Toe

Don’t be intimidated. Everyone is welcome. Go learn and create!