#ret #disorganized #incomplete

0.1 | **ISOS**

1) Think back on the three different projects you did this term: your history of science presentation, story of science, and ethical issues roundtable. Which are you proudest of, and why?
    1) I am most proud of our history of science presentation. We decided to do something different, something completely out of all of our comfort zones, and we pulled it off. I learned a lot, got an entirely new experience, and people in class loved it.
2) Is there a habit of learning/habit of mind/student skill that this term in ISOS made you want to improve in yourself (e.g. procrastination, using work periods, participating in discussion, focusing on class, note-taking, chunking out projects)? (Be kind to yourself! It's been a hard year, and learning/growing as a scholar is a life-long process.)
    1) Organizing outside of class meeting time and group work is especially hard in the purely digital world. This is a skill that is new to me, but I expect to have to use a lot more in our increasingly technological reality. Thus, I would like to improve it.
3) How might you apply what you learned in ISOS this year (considering both fall and spring) to being a scientist in your science classes or to using scientific information to make informed choices as a citizen?
    1) Learning about the extent of p-hacking was quite startling for me. I will definitely take it into account when ingesting scientific information in the future.

0.2 | **Japanese**

Please reflect on your learning this past semester in the following areas. Write a few sentences for each question (#1-3). You don't have to answer all the sub-questions; they are just suggestions. Please answer in English.

1) Highlights

What were some of the highlights for you in Japanese this semester? What work are you most proud of? What have you learned this semester? How have you grown this semester, either academically or personally?

The work I was most proud of this semester was my Travel Project on Beppu. I felt like I could actually use Japanese to communicate my research and knowledge. Sometimes in language classes it's easy to get caught up in individual forms or sentence structures; during the Travel Project I got a chance to take a step back and use everything I've learned this semester together.

2) Challenges

What area(s) challenged you the most this semester? How did you deal with these challenges? What can you do to improve in these areas? What can I do to help you improve?

One of the most challenging projects for me this semester was the Doshisha Pen Pal E-mail assignment. It felt like one of the first "real world" assignments we did this year. To improve, I want to start using Japanese more in daily life.

3) Goals

What were your goals for this semester? What are your goals for next semester? What topics or skills do you want to study next semester? What are your long-term goals in Japanese? How can I help you reach those goals?

My goal this semester was to try and become more 'fluent,' in the sense that the barrier between meaning and sentence in Japanese is reduced. I definitely feel like I achieved this, but I also feel like I increased the complexity of the sentences, and thus meaning, I am able to communicate. For next semester, I want to get better at speaking consistently.

0.3 | **Biology**

1) Reflect on the biology concepts you've learned about this school year, from the structure and function of macromolecules to evolution and everything in between. Write a brief paragraph that tries to weave your biology learning into a coherent whole (i.e. look for connections between the main concepts we explored and weave them together in a way that's meaningful to you).
    1) We started off by reviewing the central dogma and talking about how structure — and lack thereof — relates to function. We then moved on to talking about cell replication with meiosis and mitosis, and the replication of DNA which encodes the earlier analyzed macromolecules. Following from this, we went to a broader level and analyzed mutations as well as alleles and inheritance. We learned about the different types of mutations, and different inheritance patterns. We then went even more abstract, and talked about genetics and the concept of race. For our penultimate learning, we did both a high and low level of abstraction project, combining earlier learnings. We analyzed SNP, which by definition are only mutations of a single nucleotide, yet have massive abstract implications. We dived into the lab side of SNP by learning about PCR and gel electrophoresis. We finally talked about evolution, then went back and used our knowledge of evolution to further analyze our SNP. We started off small, learned about more and more abstract concepts, then finished it all off with a project that requires both deep and abstract analysis.
2) Earlier in the term, you engaged deeply with one particular scientific paper. More recently, you reviewed many more papers for your SNP project. Reflect on how your ability to engage with the scientific literature has evolved over the course of the term:

- Describe the progress you've made so far.
    - I've gotten much better at telling if an article is not going to be useful to me earlier in the reading process. This is a skill that comes up a lot more when doing research on an obscure / not well understood area. Through the semester, the process of research to knowledge got a lot faster, even if my actual reading speed of any given article didn't improve drastically.
- Detail the challenges you're experiencing.

  - A challenge with this most recent research project was differentiating between facts and speculation, and dealing with multiple sources of conflicting information. The mix between facts and speculation was much less clear than I was used to, and even that which seemed like facts were rebutted in other papers. I ended up being very conservative in my claims, and trying to point out what was speculative very clearly.
  - Another large challenge was dealing with the many paywalls when doing research, which I do not have a solution for yet.
- Brainstorm what you could do to keep improving.
  - Of course, though not an interesting answer, practicing will help me improve. In fact, it already has. More specifically, I want to get better at tailoring my search engine searches to the information I want to get. I also found that crawling through linked sources of helpful articles often led to more helpful articles, which is a strategy I undervalued in the past. I want to practice this more as well.

0.4 | ML

Please write 1–2 sentences per question, or as much as you need to answer the question.

Do not write your answers in the school website! If you reload the page by accident, your work is gone. Write them in Docs or Word or your favorite text editor and then copy them in.

Questions

1. *Share an example of a difficult problem you solved in one of your projects.*
   1. During one of our first assignments, the CNN exploration, I thought it would be interesting to try and detect a gradient with manual filter setup. I coundn't figure out a good way to do this given the constraints of the assignment. After struggling for a while, I eventually came to a "solution" where I would value the bottom right more and the top left less, so given a gradient going the right direction it would cancel itself out and return a positive value; however, this was not a very good solution. I would like to revisit the problem and work with more layers to try and get it working.

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2. *Of the concepts we discussed, which one(s) did you find most interesting or useful, and why?*
   1. The concept of word vectors was incredibly cool to me. It's amazing that we can mathematically represent natural language, and meaning, with ML. Just the concept of being able to subtract a word from another word still blows my mind.

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3. *What concepts did you find most challenging, and why?*
   1. Trying to wrap my head around how exactly LSTM Networks work was certainly a challenge. LSTM Networks have very complex architecture, and while I understand the abstract concepts, understanding all the smaller level components and extrapolating value from small component level variation is still something I struggle with.

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5. *What are some ways that you displayed good habits of mind or contributed to a good learning environment in the class?*
    1. ML is something I'm genuinely very interested in, and I think / hope that shows in my habits and work. While we don't have a lot of non-breakout-room-in-class time, when we do I try to contribute to discussions by asking questions which generally turn out to be strange-ish or question assumptions.

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6. *What was the most useful or memorable piece of feedback you received this semester, and how did you act on it?*
    1. While not a very large piece of feedback, asking if there was something simpler that I could use rather than an FNN was a memorable piece of feedback for me. It reminded me not to get caught up in all the cool things we have learned about and still approach problems from an analytical perspective.

0.5 | **Calc**

- How has our class influenced your worldview?
    - Calculus class was the first time I was introduced to ways of "solving" the unsolvable, in the sense that we are able to extrapolate to infinity and create arbitrarily accurate estimations on otherwise unsolvable problems. In a way, calculus has restored my faith in logical systems, showing me that despite Gödel's findings there are ways to find truth without actually knowing it.
- What is one thing you are proud of having learned in our class?
    - Frankly, I'm just proud to be here. After not being taught any math at my old school for ~5 years, I had to teach myself math over the summers to test into the level I'm at right now. But despite all the work, it was definitely worth it!
- How have you grown as a learner in our class?
    - Calculus class has a balance between super interesting deep concepts / problems and techniques that just need practice. This was a new experience for me, and I learned how to navigate that balance this year in calculus.
- What role did collaboration play for you in our class?
    - I did a lot of collaboration throughout the term. Having others to bounce ideas off of is always super helpful (whether or not I'm the one doing the bouncing), and when nothing works, having others to share the confusion with is also nice.
- What have you enjoyed about your experience in our class?
    - Not only are the concepts in calculus super cool, but the module options themselves are always very interesting and deep. I really enjoyed exploring these concepts and problems through the term.
- What would you change in our class?
    - It might be interesting to try out a slightly modified version of the current system where after each module, there is a day where students can further explore their topic or go explore another students topic without having to worry about deliverables. Could be a fun thing to try out! ## Calc Portfolio Essay

So, we are stuck with our world. Of course, gravity doesn't decay as the cube, and these guys aren't astronauts. We have these laws of the universe which just seem to exist, and we don't know why or even if there is a why. But the beauty of math is that we can not only imagine new worlds, but actually explore and create them in theoretical space. We can model them. We can go from, what if, to 3.13! In a sense, math is not tied to reality. This project made me realize that math, is inter-reality consistent! And that blew my mind. Thank you so much for watching throughout this entire semester, we really hope you learned something.

But if and only if R is smaller than 2, then there does exist only one possible answer, and therefore, there does exist a unique ESS. For k = 1. This was a super cool project, and was super fun. Thanks for watching, we hope you learned something.

So basically, what we're saying is that each of these approximation schemes have strengths and weaknesses depending on the nature of the function and the problem. It's kind of cool that there is no best method. Approximation is, by nature, something that will vary depending on the circumstance.

- loops calc on covid
- taylor series aproxmiations
- rieman sums
- evolutionary games
- gravity
- spinning spring

0.5.1 | **Writing?**

We started off the term working with loops, trying to think in terms in terms of CLDs. I focused on the concept of granularity in our loop diagrams, thinking about simplifying our loops so we could gain understanding without sacrificing accuracy. I also thought of ways to combine multiple granularity's with my nested CLD experiments. This first module for me was all about distilling — distilling the loops, distilling the presentation, and distilling the concepts. On the meta level, while the first module was primarily about going from meaning to math, the second and third modules were about going from math to meaning. We focused on approximations with the Taylor series, which allowed us to estimate the answer to problems with arbitrary accuracy. To me, this is one of the coolest concepts ever. I coined the term "The Math of Good Enough" and said that this was equal to math applied. This module made me think about the concept of "truth" in a whole new way. For module four, I spent a lot of time practicing different integration techniques. It felt like learning how to do magic tricks. The evolutionary games research project was one of the hardest and most interesting problems we solved this term. Working with evolutionary dynamics and the concept of Evolutionary Stable Strategies was new to me, and I realized that calculus techniques allowed us to understand emergent property in entirely new ways. Our next module focused on changing the rules of reality and analyzing the repercussions. I realized that math was inter-reality consistent, and using math we can explore these theoretical worlds — "we can go from, what if, to 3.13!" For our final module, I did the Spinning Spring problem. While at first I was quite disappointed that we coudn't "solve"

the problem, after programming the website and playing with the simulation with all my friends, I now realize that the iteration we did was a form of solving the problem and could still bring us truth. Calculus redefined my concept of "truth;" Guided by little glimmers of infinity, that which is unreachable, we were allowed to understand new parts of what is.

0.6 | **SOM**

Write 5-10 sentences (can be bulleted) reflecting on:

- What was the most valuable or important thing(s) that you learned in SOM this term?
    - I learned the importance of patience
    - I learned the importance of tactical silence
    - I learned about the start of life on earth
- How will you apply this information in your life moving forward?
    - I will practice patience
    - I will practice tactical silence
    - I will live with more curiosity sated.