Astr596: Project 4: Building a Universal Inference Machine
Growth Memo
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I felt a lot more confident during this project compared to the last couple, and I think I have produced better code for this project. Part of this is that I was able to stay on schedule far better; I think it helped a lot that submitting the last project allowed me to approach this one as a 'blank slate.' I was also able to grasp what we were being asked to do more easily since I'm doing more Markov chains to model disease spread in a different class, so I had more background going into the project.

I think the most time consuming part of this project was tuning both MCMC and HMC simulators. For the HMC simulators I had a recurring issue where I would randomly get 0% acceptance rates until I dramatically lowered L. I also had a difficult time writing the diagnostics functions as there wasn't a clear value that I could input to confirm that I was coding everything correctly. Having to debug both MCMC and diagnostics at the same time was very difficult for me, since I couldn't tell which code was leading to the erroneous outputs I was getting.

It was cool being able to revisit old code I had written (the leapfrog integrator); it wasn't as helpful as I had hoped since it was so enmeshed in the N-body project so I had a hard time extracting what was important; however, it was nice looking back and seeing how I had improved.

I also felt more confident using AI for this project; it was very helpful in moving forward in scenarios where I got stuck. I used it especially in my plotting functions, since I had a hard time with arranging the corner plots, and felt my code had a lot of repetitive lines that could've been cleared up for readability and speed. It was also useful for consolidating the information that was spread across different webpages, so I could look at one output instead of tracking several different tabs at the same time. I mostly reached for ChatGPT and Notebook LM; while ChatGPT isn't great for generating code it's very successful at debugging my code and finding errors in it. It also generates doc strings for me, which was great since I find them very time consuming to write out. Notebook LM is useful for searching all the webpages and project description files. I also had ChatGPT help me format the tables in Latex, since I find the formatting very tedious and prone to difficult-to-spot errors. I'm still trying to stay aware of my AI-useage so that I'm not relying on it too much, since I think I'm still at the stage where I would benefit from grinding out lines of code.

I also enjoyed the objective of the project; I thought it was really cool that we were able to derive such precise results from only 31 data points and an equation, and being able to measure such significant values such as the Hubble constant was really fun.