Stony Brook University

Individual Development Plan

Name
Henry Shi

Date
6/23/20

Professional Goals & Motivations

What are my educational and career aspirations?
How do I think these aspirations can be best met through my undergraduate research?

I would like to obtain a B.S. in Physics and Astronomy by May 2022.
I would like to get accepted into a PhD Astronomy program.
I hope to obtain a PhD and become a researcher in astrophysics academia.
In order to attain my goals, I hope to learn to manage my time on independent projects, and I hope to build firsthand experience in scientific research.

Talents or Strengths

What are my talents and strengths?

-Plotting functions and implementing MCMC algorithms in Python
-Can break up larger tasks into smaller tasks
-Background in applied real analysis, linear algebra, statistics, astronomy, and modern physics
-Can identify and propagate errors in experiment
-Curious and self-motivated

Development Opportunities

What knowledge or skills do I need to enhance?

-How to extract parameters from data
-How to evaluate the fit of a model to a dataset
-How to do MCMC sampling
-How to manage my time for long-term tasks

SMART Goals & Action Steps

Goals are: **S**pecific, **M**easurable, **A**chievable, **R**ealistic, **T**ime-bound
What goals do I have for the semester? Academic year?
What specific actions can I take to achieve these goals?

-Start by solving simple inference problems by using Bayes Theorem and sampling to calculate values of mean and standard deviation and their confidence intervals of the distribution. Accomplish this for 1 problem by Friday June 26th.

-Implement MCMC algorithm to sample over the PS1 dataset to obtain 1 estimate of H0 by July 17th.
--In order to accomplish this task, I will implement a rigorous algorithm to minimize the chi-square of the data with respect to the formula for distance modulus, From the model I will obtain parameters for matter density, equation of state, and Hubble constant.

-Solidify my background in probability and statistics by reading Chapters 1-9 of "A FIRST COURSE IN PROBABILITY" by Sheldon Ross from 8/1 - 8/21.
--To accomplish this I will read 3 chapters per week. I will take 2 days to read each chapter, giving myself 1 day of slack per week to clarify my understanding with the relevant mentors.

-Gain a theoretical understanding of MCMC, inferences, and probability by reading Chapters 2 and 3 from deeplearningbook.org and Chapter 8 from the Elements of Statistical Learning textbook during 8/1 - 8/21.
--I will take 1 week to read each chapter. I will spend 2 days reading the chapter and taking notes, 1 day asking questions about concepts, 2 days doing the relevant problems, and 1 day reviewing my solutions with a mentor. 1 day of slack per week.

Revision Date

Mentor Name & Signature