

Y4 Project meeting 3 record

Date and time: 14/10/2019 2:00-3:30 pm

Attended by: Guy, Harry and Hin

Discussed:

1. About HMC and what it does:
 - a. How true μ , true σ and true σ_{obs} contribute in creating the population of a set of data.
 - b. How to set up a hyper-prior which gives prior values of μ , σ and generates a model population of that set of data
 - c. How HMC and NUTS samples the posterior density distribution once a considerable amount of sets of priors have been tested, to return a set of samples that represents the posterior well enough.
2. About using pymc3:
 - a. Guy demonstrated about how to set up an observed population, input the hyper prior into pymc3's model, get it to calculate and sample, and extract its outputs.
 - b. Described what each step and plot does/shows
 - c. The process mainly followed problem 1 in the HBM repo, but HBM is written for using pystan, should still be close enough to understand and translate into pymc3
3. About project proposals:
 - a. Deadline for proposals is at the end of week 4
 - b. Talked about a good abstract outline: one sentences per "context", "aims", "methods", "results", "conclusion", "implications".
 - c. Maintain a balance between different aspects of interest in the proposal: method vs science implications
 - d. Tricks to provide "some numbers" for results and conclusions even though its before any concrete results are out
4. Main aim (science) of the project:
 - a. Guy's suggestion to what can be done after we have samples from the posterior on open cluster individual star's true ages that incorporates machine learning (TensorFlow): write a neural network that emulates the process of turning stellar properties (M, R, age) into observables (individual peak frequencies, T_{eff} , L, $\log \nu$, ν_{max}) grid-base stellar evolution models (like PARAM) or progressive evolved stellar models (like MESA) and apply that onto potentially multiple star populations of open clusters.

To do:

Students:

1. Familiarize with pymc3 (work through the problems in HBM repo and look at pymc3 documentations) and HMC, NUTS, maybe put in the ages from M67 to try out results
2. Read around tensorflow and neural networks and if people have applied them to stellar evolution models.

3. Start working on project proposal and bring with some proposal outlines (not the proposal itself!) on the next meeting.

Next meeting: 21/10/2019 (Mon) 2pm in Guy's office

Recorded by: Hin