**Y4 Project meeting 4 record**

Date and time: 21/10/19, 14:00-15:30

Attended by: Guy, Harry and Hin

**Discussed:**  
**1.** Mass loss function = poorly understood and poorly handled by MESA  
 **a.** Mass loss happens up the RGB through pulsations or gas is stolen by companions. Then red clump stars have to shed mass to be able to form white dwarfs **b.**We can ignore mass loss for now by only considering stars that are main sequence sub-giants or 1st ascent RGB. As such we won’t look at stars with radii greater than 8R☉. All red clump above this radius.   
**2.** The loss function for neural nets: use it to tell if the neural net is doing a good or a bad job  
quantitative difference between what the neural net is currently outputting and what you want it to output, is used to calculate the loss function  
 **a.** Mean Squared Error: MSE = 1/N Σ(Ytrue - Y)2  
- Over weights things that are more wrong.   
- Under weights things that are slightly wrong  
- Is equivalent to minimizing the negative log likelihood if all the data has the same uncertainty.  
- Should be used when the data contains noise  
 **b.** Mean Absolute Error: MAE = 1/N Σ|(Ytrue – Y)|  
MESA doesn’t output values with uncertainties so use MAE  
**3.** Discussion of project overview   
(for details see Fourth-Year-Project/meeting-records/meeting\_notes/Week 4 meeting notes.docx)

**4.** Coherent oscillations (occur in hotter stars): the oscillations always look like a sine wave  
Sun like oscillations = stochastic oscillations: stochastically excited and randomly damped  
Coherent modes can be measured to a higher precision than the approximations made by the neural net but you should strive the limiting factor to be the uncertainty on the observation not the method.  
**5.** Backwards modelling is bad because you cannot get a probability of an observation given the model. Can’t do Bayesian stuff  
**6.** Random forests  
- Don’t have the property that give you the back propagation  
- Neural nets allow you to calculate how the loss functions changes if you change any of the weights or biases but you cannot do this with random forests.   
- Random forests mitigate overfitting but do still overfit  
**7.** overview of optimizing neural nets and preventing overfitting  
**8.** Discussion of proposal skeleton  
**9.** Potential parts to the project  
- We could calculate grids ourselves  
- We don’t need to restrict ourselves to asteroseismic clusters, however the age uncertainties will be worse than with asteroseismic data  
- We might want to run tests on the neural net without any mode frequencies at all to check things are sensible, to make sure there aren’t any glaringly obvious errors.  
**10.** Contacting Guy  
- Create an issue on github and assign it to Guy. Give info about the issue and what file the issue is in etc.

**To do:**Students:  
1. Bring filled in annual review forms to next meeting

Tutor: reminders

Next meeting: 30/10/19 (Wed) 13:30 in Guy’s office

Recorded by: Harry