

Progress for week 8

TFP was continued to be employed with overall successful results. A mean function was introduced by adding using the residual method $y - y'$ where y is the data and y' is the mean function. This results in a zero data input to the GP and does not require to have a non-zero mean function in the GP. For the mean function Equation 1 from Barnes et al 2007 was taken, shown below:

$$G(t) = t^{0.5189} \text{ (Note Barnes uses } t \text{ in Myr)}$$

$$F(B-V) = 0.75 * (B-V - 0.4)^{0.601}$$

$$R = G(t) * F(B-V)$$

Figure 1 compares the results and the data

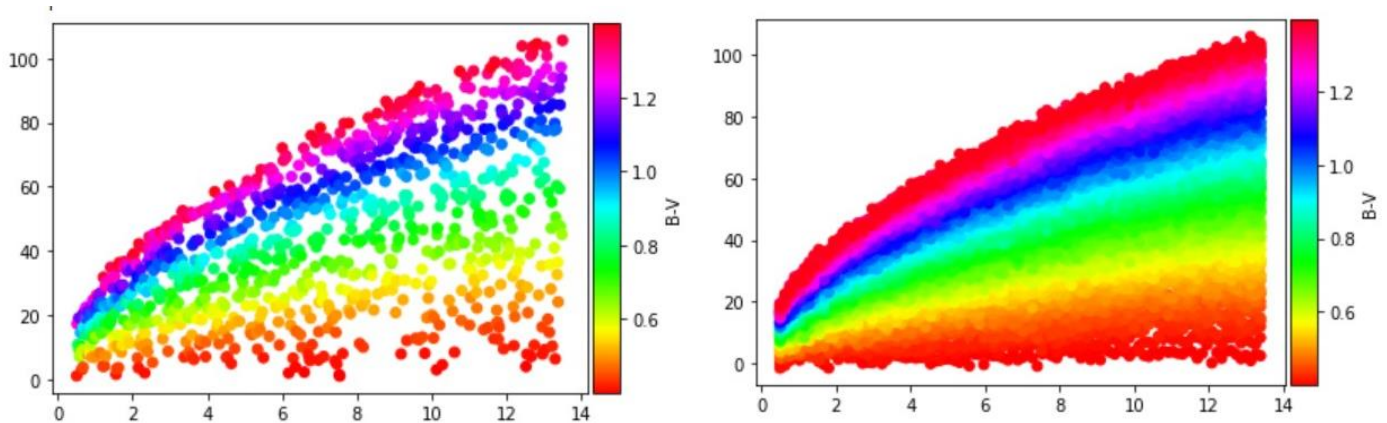


Figure 1: (a) Data Input and (b) GPR prediction

Visually the model looks very successful. However, to determine the success of the model more quantitative models were introduced. Shown in Figure 2 is Data vs Prediction plot, ideally, within model uncertainty, this should be a $y=x$ line (shown in red). This graph shows that, as predicted, the issues from last weeks model were caused by a zero mean function.

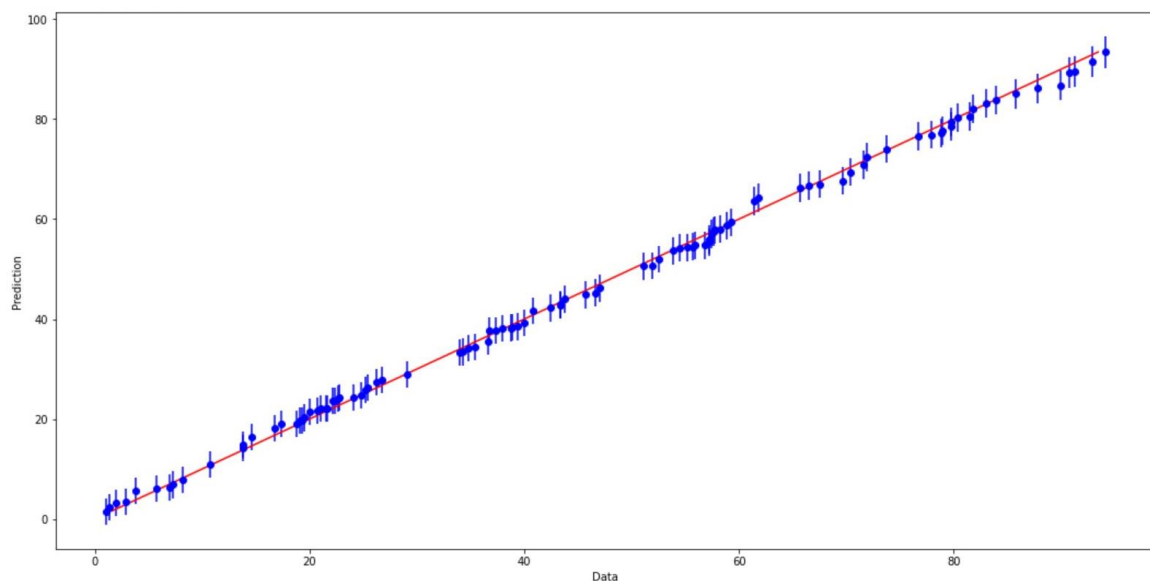


Figure 2: Data against GP prediction

The data points (with the exception of ~1% points) fall on the $y=x$ line within their uncertainty values. Figure 3 plots the histogram of the data difference divided by the standard deviation and shown against a normal distribution $N(0,1)$, the plot is a bit more narrow but cause not concern.

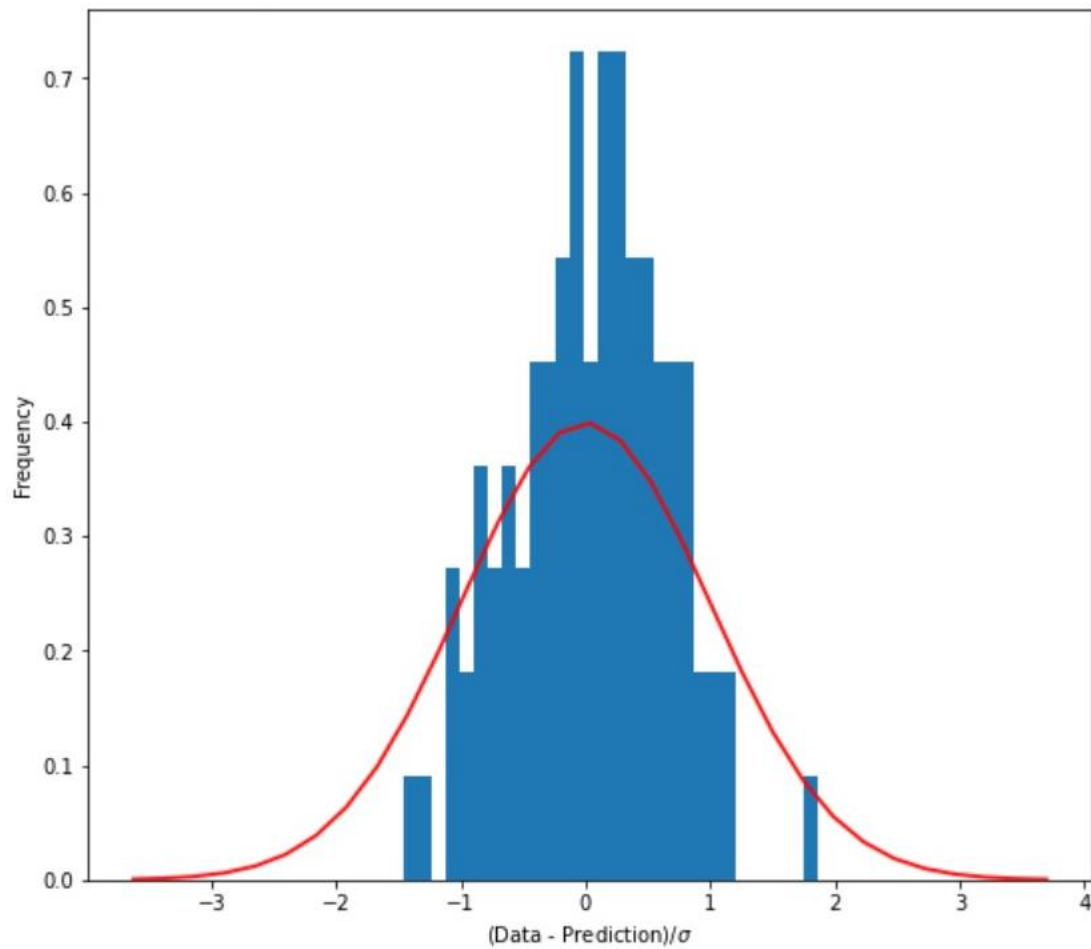


Figure 3: Histogram of deviation from data

Conclusion:

- Qualitatively and quantitatively the model seems to meet expectations
- The model can be used on further data

Aims for next week:

- Test the model on more complicated models, such as data that were built using stellar models