RBFN Implementation Approach

Pre/Post processing Justifications

Pre and post processing techniques where not used because of the nature of the type of model I used and because the nature of the type of data I received. No pre or post processing was done with prior knowledge in mind because no prior knowledge about the data was known. The model I used is based on exact interpolation RBFN therefore the use of the original data itself in the same vector form is viable.

While some pre processing could be performed on the data to reduce the negative effects of exact interpolation, the small sample size of the training data of only 1000 examples made me weary of making assumptions on an ideal smoothness of the data, so I chose to let my model fit exactly due to the nature of exact interpolation rather that processing the unknown small dataset and putting my own assumptions on it.

Free Parameter Choices and Justification

Generally, with an RBFN the 2 main free parameters are the centres and the weights. With the type of model, I used the centres are chosen inherently and the weights can be calculated inherently.

With exact interpolation the centres are taking directly from the training examples, so my centres are the datapoints vectors given in training. The downside of this approach to choosing centres is that it can be computationally expensive, however due to the small size of the training examples (1000 data points), this approach is viable as a way of choosing centres.

The approach I used for choosing weights is a standard approach used for exact interpolation of creating the weights from the inverse of the interpolation matrix multiplied by the actual outputs for each datapoint. I ensured that the matrix could be inversed by checking the rank of the interpolation matrix and I ensured the determinant of the matrix was not equal to or close to 0 to ensure the weights would hold valid meaning.

Critical Evaluation of Model

The predictive power of my model is highly dependant on the data itself. The nature of my model means it will have an incredibly high variance and 0 bias. Due to the small nature of the training set and the unknown source of the data, I went with this model to not make any assumptions on the data.

If the testing data follows a more smoothed trend, then my predictions will suffer. This downside could quite well be counteracted by applying a regularisation technique to calculating the weights, adding a smoothing effect to the predictions.