

Prediction Using Neural Networks and a Comparison With Linear Regression

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June 2021

Abstract

In this thesis, we are to compare two commonly used methods when working with prediction; neural networks and linear regression. We begin by covering the relevant theory for both methods. Further, we simulate three different data sets where one is a linear data set and the other two are non-linear. We are to train models using the two methods in order to then use these models for predicting values. First of all, how do we compare these two methods? In which situations do we prefer one method over the other? These are both methods used as machine learning algorithms and we will use techniques alike in this thesis. The calculations of the parameters of each method differ, which will lead to the results being different. Since linear regression can have a hard time fitting to a non-linear data set, one interesting factor is how well the neural network will handle the same situation. There are techniques available when working with linear regression so that the method is applicable to non-linear data. This is, however, done manually with a basis function. The comparison is made using three different performance measures. These are calculated for each model in order for us to obtain the one that fits best for each of the methods. We conclude that the neural network fits the data well for all the data sets used in this thesis. However, linear regression has a clear advantage in the linear data set, not only when comparing the performance measures but also for further observation since a linear regression model is much easier to analyse. For the non-linear data sets, we can observe a difference in the two methods. Where the neural network still performs well, we now see a worse outcome from the linear regression model.

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