Adaptive Single Hidden Layer Perceptrons

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Abstract

In this report, we study single hidden layer perceptrons and use supervised learning to analyse their performance on the classification of two dimensional pointset data. We modelled our network using our own Python code and assessed its performance by quantifying its accuracy on classification tasks in which the network had to assign class labels to four planar data sets. We first compared the use of two training methods, Gradient Descent and Stochastic Gradient Descent, and found that Stochastic Gradient Descent improved the performance of the network on all four data sets compared to Gradient Descent. We then modified the Rectified Linear Unit (ReLU) to form an activation function with parameter ε, called Smooth Rectified Linear Unit (SReLU). We assessed whether this activation function improved the performance of the network, first when the value for the parameter ε was set manually and second, when the parameter ε was learnt within our network. When comparing ReLU and SReLU, in both the non adaptive and adaptive case, we found that SReLU performed better in all accounts.