Marcus Millender

mmill41

CSC-570R – Data Science Essentials

**Week 10 – Deep Learning**

1. **What can be done with Multilayer Perceptrons, that isn't possible with a single layer of perceptrons?**

A single layer perceptron is restricted to linear calculations, meaning that it is unable to solve complex, nonlinear tasks. It has a limited mapping ability. Multilayer Perceptrons (MLPs), however, is a network of perceptrons, which allow mapping of an input layer to several hidden layers and output layers. Unlike a single layer perceptron, a multilayer perceptron is able to achieve supervised learning through back-propagation and unsupervised learning through the auto-associative structure.

1. **You are working on a classification task with 100 inputs and 3 outputs. You are using a MLP with one hidden layer that contains 50 neurons. Your classification accuracy is 78%. Which hyper parameters could be adjusted to improve your model?**

The model could be improved by increasing the number of layers, allowing the model to better calculate and learn a complex function. The Dropout Rate hyper parameter could be increased or decreased to solve under fitting and over fitting a set of data.

1. **In your own words, what is back propagation?**

Back propagation is an algorithm that works in two steps: a forward pass and a backward pass. In the forward pass, the output is predicted based on the propagation of a trained pattern throughout a the neural network from the input. In the backward pass, a back propagation occurs generating a delta based on the difference of the expected outputs and the actual output values. This motions causes learning by the continuously adjusting the weight based on the input and the output delta.

1. **Regarding Convolution Layers, what does the term 'patch size' mean?**

The patch size of a convolution layer is basically a reference to a single unit of measurement of the layer’s input: for example a 5x5 patch.

1. **What is Google's Inception Module and why would it improve on the convolutional layers you were show in class?**

Google’s Inception module uses multiple convolution inputs rather than one input, which allows a model to achieve a multi-level extraction of the inputs.