Miles Pletcher – CSE432 Final Project Report

Before beginning this project, I researched each of the recommended approaches and tried to figure out which ones I could implement to modify Homework 6 to achieve better accuracy. As it stood, my HW6 neural network performed at 78% accuracy. Adding a dropout layer, using a modified version of the ReLU function, and changing the number of layers and filters (there could only be a maximum of 10) were what I thought to be the best methods of making my neural network more efficient.

The first thing I did was add a dropout layer, but that actually decreased the accuracy slightly, bringing it down to 74%. Since the dropout layer decreased accuracy when combining it with six convolutional layers, I took out the dropout layer and instead implemented SWISH—also known as SiLU—an alternative to ReLU. Unlike ReLU, SWISH is similar to Leaky ReLU as it allows a small number of negative weights to be propagated through, while also being smooth. This increased the accuracy to 80% without the dropout layer.

I then removed one convolutional layer as I had reached 10 layers in total, which improved accuracy to 82%. Finally, I changed the number of filters on the fourth convolutional layer from 16 to 32, and from 32 to 160 on the fifth layer, increasing the accuracy to 83%.

The 83% accuracy on my proposed model was done mainly through trial and error, as seen by the decrease in accuracy the first time the dropout layer was added to the neural network. My model increased in accuracy when I used the SWISH function and removed the last convolutional layer.

Originally, progressing through each layer revealed more filters until Conv4 and Conv5, which both only had 16 filters, with the last convolutional layer having 160 filters. I found that increasing the number of filters more gradually than the increase from 16 to 160 seen in the original model improved accuracy; removing the last convolutional layer increased runtime as well. Even more impressive was that by Epoch 10, the updated model was 75% accurate, compared to the original model I created for Homework 6, which was only at 66% accuracy at Epoch 10.

Overall, the model I created for this project improved upon both the accuracy and the runtime of my original model, while having fewer convolutional layers.