**Image Classification Workshop**

**Introduction**

The purpose of this lab was to focused on the fundamental techniques and concepts behind training deep learning models to distinguish between different classes of images. It was my introduction to working with the code of this process and we explored image preprocessing, neural networks, training processes, and model evaluation strategies.

**Summary Of Work Done**

I started with a basic neural network, and basically all I had to do is fill in certain parameters and tweaking it as i went to improve the performance. The key steps included:

1. **Data Preprocessing**
2. **Building the Neural Network**
3. **Training the Model** ( I actually started with SGD and later switching to Adam for better results)
4. **Evaluating Performance**
5. **Hyperparameter Tuning** – I pretty much adjusted learning rates and batch sizes.

**Key Concepts Learned:**

Some of the biggest takeaways from this workshop were: Image Classification CNN’s, Overfitting and Regularization (batch normalization, and data augmentation) and transfer learning.

**Challenges Encountered and Solutions**

Of course, there were plenty of roadblocks along the way. One of the first issues was validation accuracy dropping training accuracy was relatively solid, but the model wasn’t generalizing well. The fix for this (or what I had tried) was adding data augmentation and batch normalization while also switching to the Adam optimizer. Another challenge was slow training. I thought this was mainly due to large image sizes. Reducing input size and optimizing batch size helped speed things up without sacrificing accuracy.

After making all the optimizations, the model worked perfectly on the first run. But when I tried running it again, it crashed. Since I lost that version, the only screenshots I have are from the completed workshop before I had made the final optimizations, so they don’t reflect the last set of edits we did which was just the optimization.\.

**Potential Real-World Applications and Reflection**

These techniques go way beyond chihuahuas vs. muffins. Some practical uses include: Medical Diagnosis, Self-Driving Cars, Security Systems, and Retail. This workshop was a solid learning experience. Overall, I learned a lot from this process and got a better understanding of deep learning in action.