

## L04 Chihuahua or Muffin Reflective Journal

This lab is about building a neural network that can be trained to tell the difference between pictures of chihuahuas and muffins. This lab imports PyTorch so we can train the model with deep learning using photos of the chihuahuas and muffins as test data. A smaller set of photos is used to validate the data.

I was excited to learn about building a neural network and this lab provides that experience. After importing the deep learning libraries, I defined the image sizes and changed the class name to DogMuffin. This lab builds on concepts that work with breaking down image pixels into matrices so they can be analyzed by the model. This is at the core of image classification because the pixel data can be grouped into patterns that the model learns from. In this case the algorithm is looking at chihuahuas and muffins. There are similarities in the patterns of these two objects in some instances. The orientation of the blueberries on the muffins tends to look like the eyes and nose of similarly-colored chihuahuas and the model must use the training data to distinguish between the two.

I encountered a major issue with loading the transforms for the training data. After checking for syntax errors, I realized that I didn't clone the repository properly. Upon proper cloning, I re-ran the code and everything executed without issue.

The algorithm trained in only three epochs which prevents overfitting. We don't want our model to perform so well on the training data that it effectively memorized the images. With only three epochs, we prevent overfitting while giving the algorithm three opportunities to pass both forward and backward. Also, if the model simply memorizes the training data, there's a good chance it will perform poorly on the test data, because it didn't actually learn well. The training would be poor in this case.

In the end, the model performed well enough. Only four chihuahuas and one muffin received the wrong label. This could be fixed with a few more epochs or more training data.

Image classification has many applications, and I believe it's important for human facial recognition. Modern security measures at major venues like sports arenas now use facial recognition to identify legitimate ticket holders. In my personal experience with this technology, I added my face to the registry and only a minute later I walked through the gate and a human greeter said my name and welcomed me in to an Astros game. Cameras at the entrance tracked my face in real time as I moved toward the entrance and I never had to stop walking. The speed of this process was a surprise and shows the power of what neural networks are capable of in a short amount of time.

This computer vision lab was thorough in explaining what goes on between the input and output of deep learning. Working with the PyTorch framework was great hands on experience, and using a somewhat popular case of chihuahua or muffin made this more relatable. This helped demystify tensors because that concept is new to me. It's great learning how to leverage python to do the heavy lifting on these technical math concepts.