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Assignment 2 Part 1

**GPU Task 1**

In this task, I completed two experiments. For the first one I trained the Alexnet network for 2 epochs on 16 pictures of beagles, some “Louis” and some “not Louis”. After 2 epochs it performs at chance, classifying images of both classes as Louis with slightly above 50% certainty (Figure 1A). For the second one, I trained it for 100 epochs. This time it gets the classifications correct with at or near 100% confidence (Figure 1B). However these tests are with images from the training data rather than images the model has never seen before, and the model is likely overfitting.

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|  |  |
| A | B |

**Figure 1:** A: Results after 2 epochs. Top image is of Louis, bottom image is not. B: Results after 100 epochs.

**GPU Task 2**

The purpose of this task was to learn about how validation data can be used to monitor a model’s performance with new data while it trains. In this task I trained a neural network to detect dogs versus cats. First the data has to be preprocessed to a size compatible with the AlexNet, and organized into folders where the folder name is the category label, and with 25% of the data set aside as a validation set. Then I trained AlexNet for 5 epochs. The validation data had above 80% accuracy after the 5 epochs as shown in Figure 2, and it categorized a picture of a dog correctly with greater than 90% probability.

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**Figure 2:** Dogs vs. Cats with 5 epochs. The plot shows the training and validation loss and accuracy. The image of a dog is correctly classified as a dog.

**GPU Task 3**

The purpose of this task was to deploy a trained model in an application. I imported the architecture and weights from the model from task 2 into a new caffe classifier object in a jupyter notebook. The notebook calculates the predicted probabilities for each class for test images, selects the argmax and prints one statement if it a cat and another if it is a dog as shown in Figure 3. This process can be consolidated into a single script that simply shows the output instead of the image with the output.

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**Figure 3:** Example outputs for images of dogs and cats in the deployment application.

**GPU Task 4**

**GPU Task 5**