**README**

**CNN Design and Creation**

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**Prelude:** Contains all python scrips required for altering CNN models and performing 10-fold cross validation. Also contains ability to save models and graph individual training sessions. Also within this file are a collection of already trained and saved models, which can be used for visualization of kernel output.

**File Structure:**

An overview of the file structure is included below:

* **Trained Models:** Folder containing saved models from testing, including their accuracies and their overall structures. Can be used in the visualization scripts or can be loaded for predictions. Not all models were saved to save disk space; the models
* **General Testing:** The main script used to generate and training models. Contains an easily modified structure with the base structure loaded. Implements 10-fold cross validation and will output the performance metrics on the terminal. These are summed and give a std and mean for accuracy, loss and epoch number. Note that currently a stop function for validation accuracy is implemented, however during training this was replaced with a loss based stop function.
* **GraphingSave:** Python script which will train a model, and then graph the loss and accuracy over that training period. Used to generate training plots used in the final report.
* **Initial Testing:** Python Jupiter notebook which highlights our initial studies into training CNNs. It for the most part outdated.
* **SingleTrainingSave:** Python script which will run a given model, and then save it in the current directly with its final accuracy. Used to generate the saved models (note it may be better in the future to save the best model from 10 fold cross validation, however this was not done as it increases training time)
* **Train+ConfusionMatrix:** Python script which trains a model, and then generates a confusion matrix based on its performance.
* **NOTE** – You will need to change the directories in these code folders

**Running the Code:**

1. Install Anaconda on your computer using the following link: <https://docs.anaconda.com/anaconda/install/index.html>
2. Create a new environment with tensorflow installed: <https://docs.anaconda.com/anaconda/user-guide/tasks/tensorflow/>
3. Relocate to the directory where the code is stored.
4. Also install the pillow and sklearn using:

* Pip3 install pillow
* Pip3 install sklearn