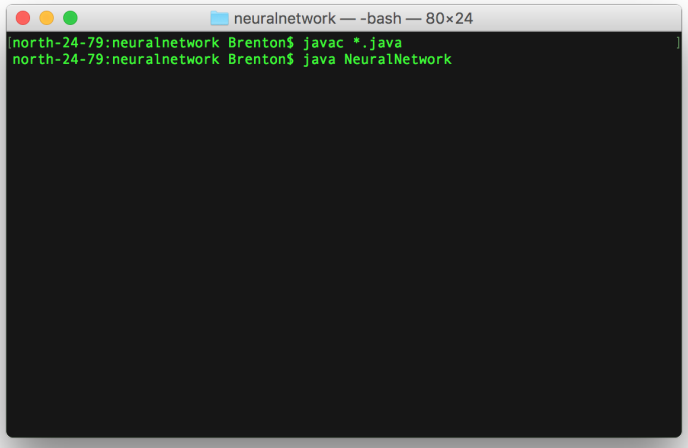
How to use the Application

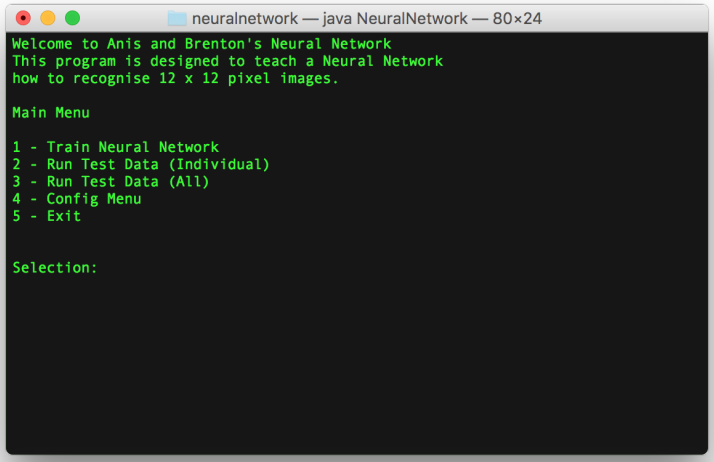
Compiling and Launching the Application

1. Unzip the project.
2. Open Terminal or command prompt.
3. Change the directory to the folder you unzipped.
4. Run the following command: javac *.java
5. On successful compile, run the following command: java NeuralNetwork



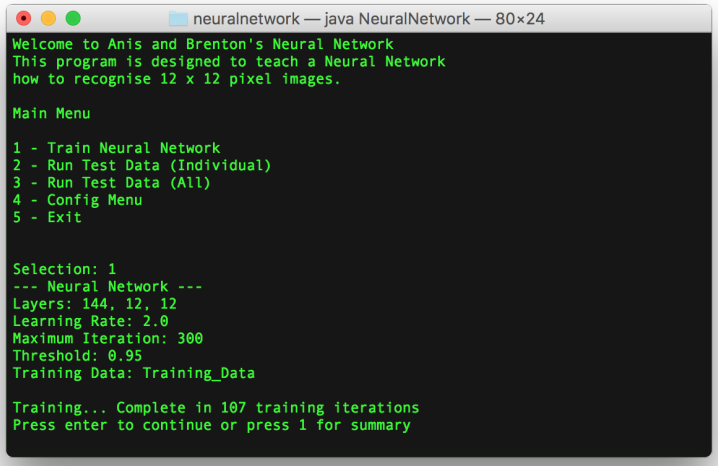
Main Menu

This is the main menu of the application. From here you are able to perform all the main tasks of the application through input into the terminal. Selections are made by entering a number for the appropriate function you wish to perform and pressing enter.



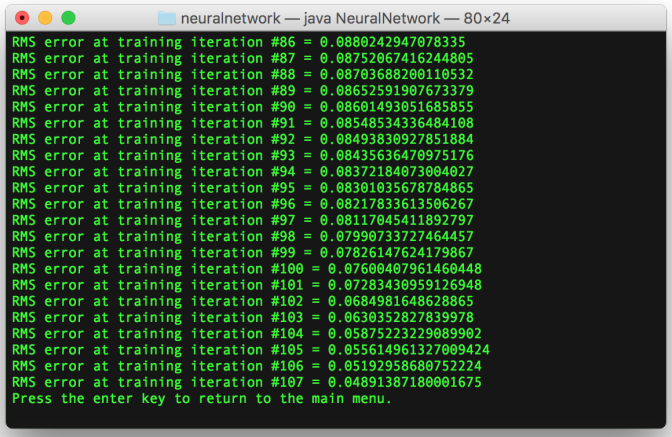
Training the Network

In order to use the network, it must first be trained. PLEASE NOTE: An error message will appear if an attempt is made to use the neural network before it is trained.



Once the network is trained, a message appears confirming that the network is trained. The application then asks the user if they wish to print a summary of the training iterations. This

shows the rms error after each training iteration. The user can either press enter to continue or press 1 and then enter to print the summary.



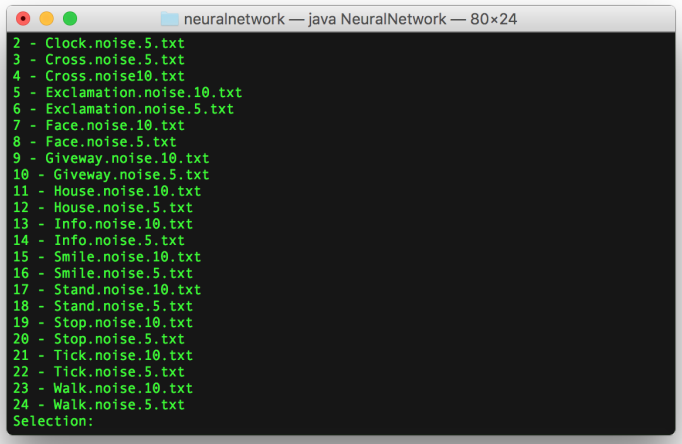
When the summary is printed to the screen, the application also creates a CSV file containing all the RMS Errors for that training set. This is saved to the location where the application is being executed from.

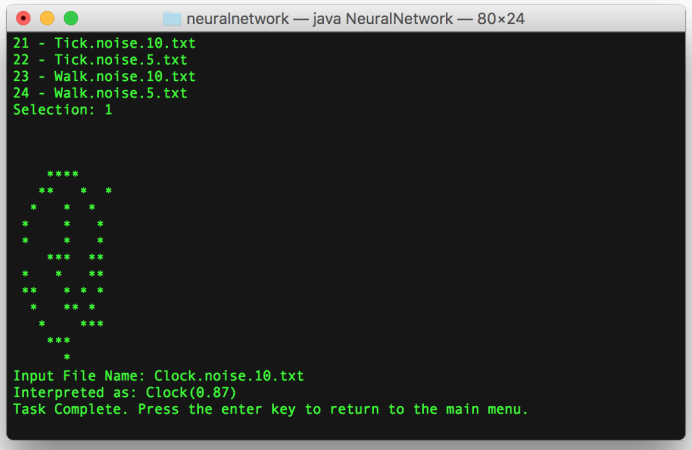
Testing the Network

To test the neural network, the user has the choice to either run an individual piece of test data or run all the test data that is currently loaded into the system. The location of test data files or training data can be changed through the config menu. (See Below: Set Training Data and Set Test Data)

Run Individual Files

Selecting this option will allow the user to then chose any one of the test data files the system found. The user simply selects which file to run by entering its corresponding number and pressing the enter key.



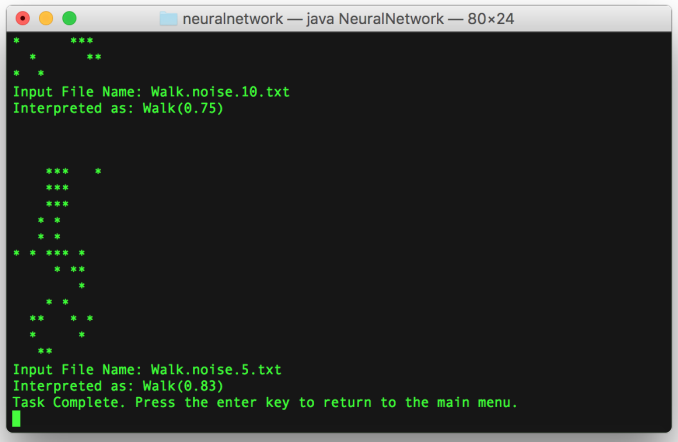


As you can see above, it displays back to the user the name of the input file and what the neural network interpreted the image as. If any other images in the neural network have an output

above 0.5, they will then be listed in descending order.

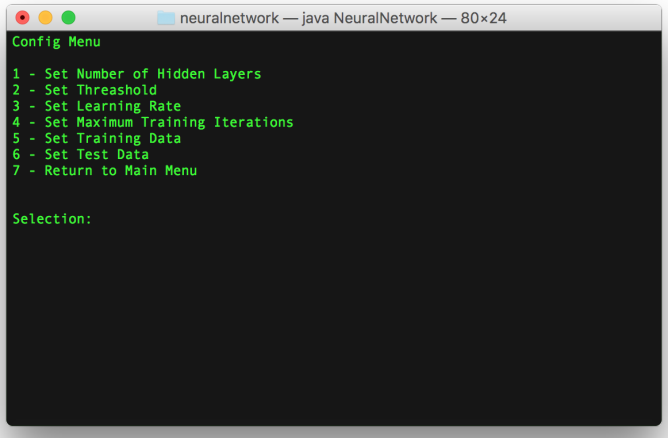
Run All Files

This option will run all the files currently loaded into the program against the neural network.



Config Menu

The config menu allows the user to change various settings within the application.



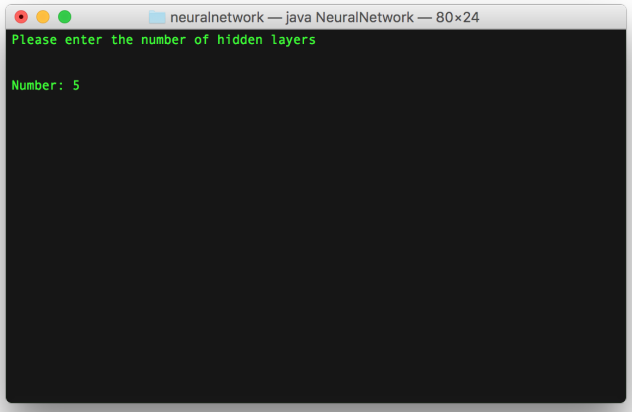
The user has the ability to change:

- The number of hidden layers including the number of neurons per layer.

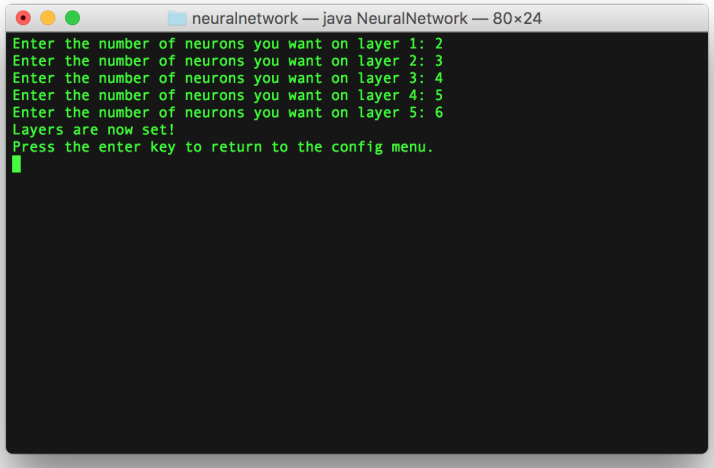
- The ability to set the threshold (so the neural network is accurate as the user wants it to be).
- The ability to set the learning rate of the network.
- Set the maximum number of training iterations the computer can take to train the network.
- Set the location of the training data
- Set the location of the testing data

Set Number of Hidden Layers

The user is prompted for the number of hidden layers.

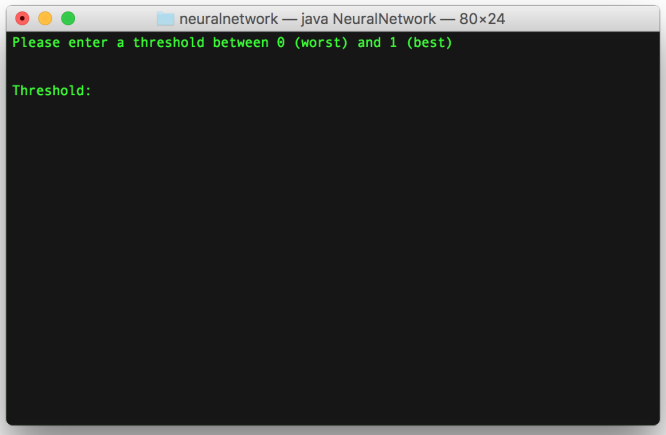


For each corresponding layer entered, the user will be prompted for the number of neurons they want on corresponding layer.

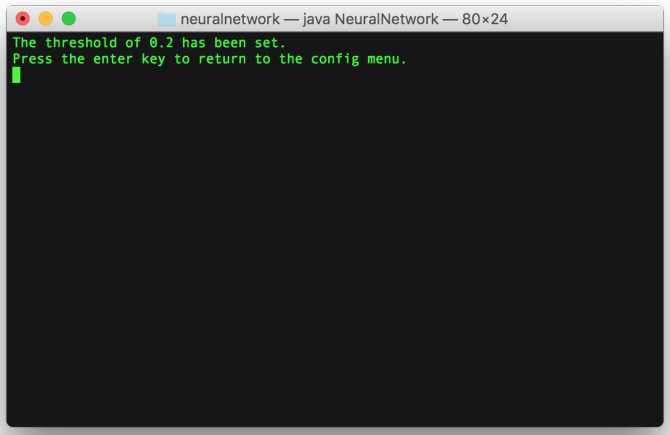


Set Threshold

The user is prompted to enter a threshold between 0 and 1. This threshold is the accuracy to which the neural network should be trained to.

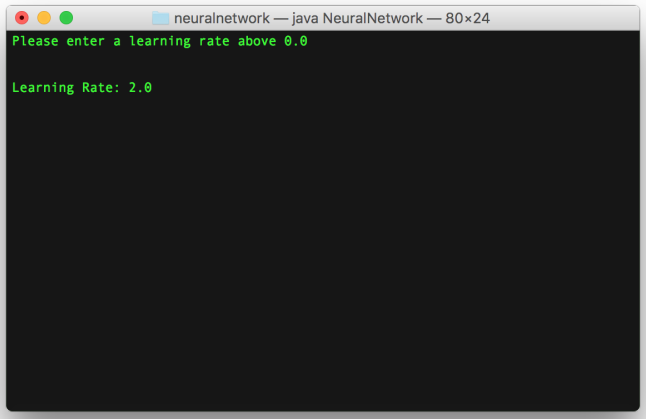


A confirmation box appears to confirm users changes to the threshold.

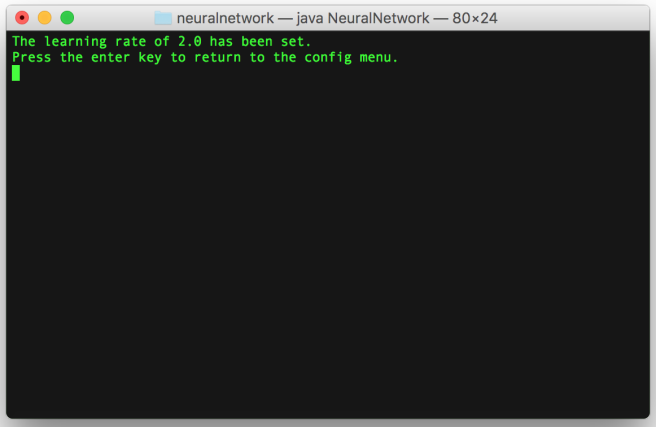


Set Learning Rate

The user is prompted to enter a learning rate. This number must be above 0.0.

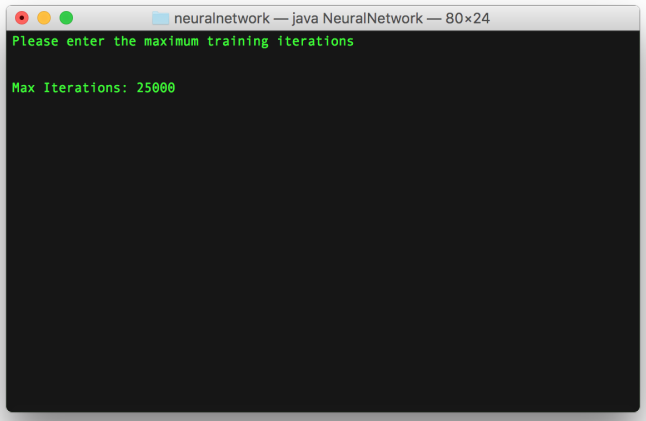


A confirmation box appears to confirm the users change to the learning rate.

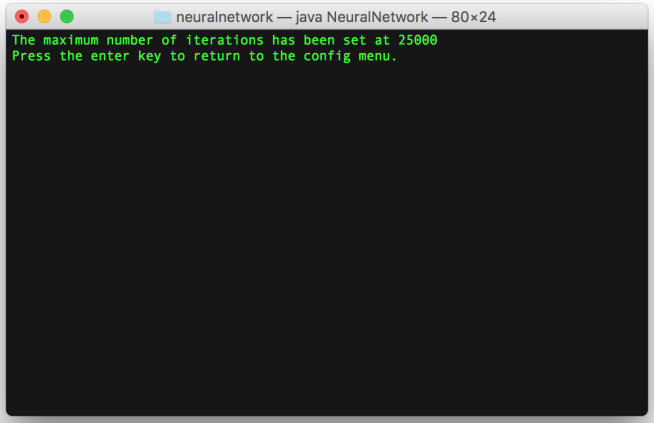


Set Maximum Training Iterations

The user is prompted to enter the number of training iterations. This number must be above 0.

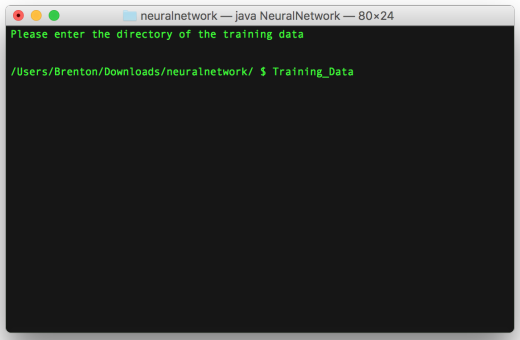


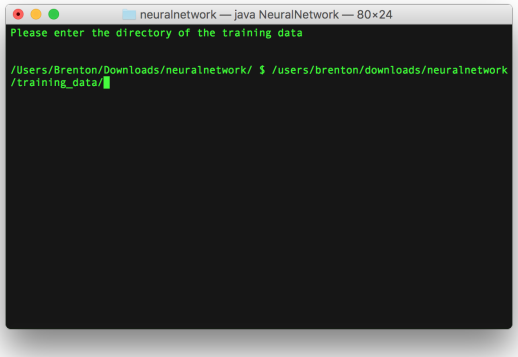
A confirmation box appears to confirm the users change to the max number of iterations.



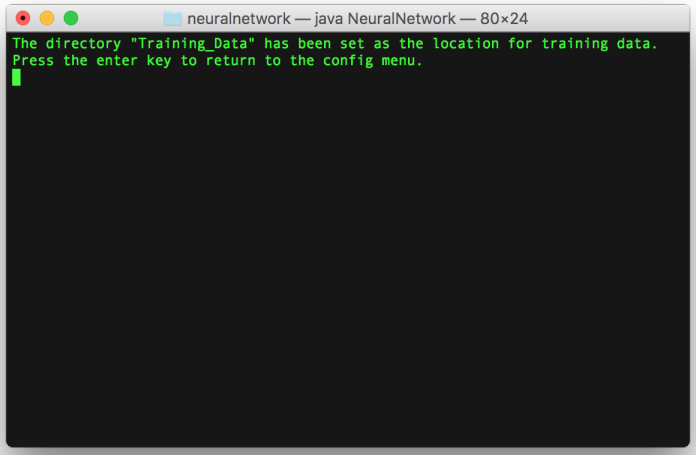
Set Training Data

The user is prompted to enter the new location of where they want their training data loaded from. This is the directory to a folder. Either a fully qualified path can be used or you can use a relative path from the current running directory of the application. This path cannot include the tilde “~” character.



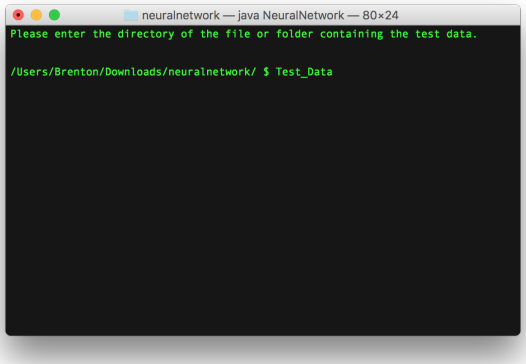


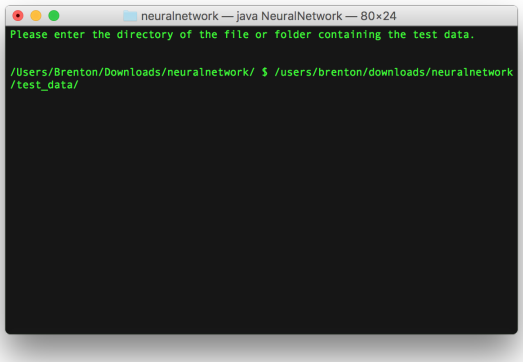
A confirmation box appears to confirm the users change to the training data files.



Set Test Data

The user is prompted to enter the new location of where they want their test data loaded from. This can be a folder or an individual file. Either a fully qualified path can be used or you can use a relative path from the current running directory of the application.





A confirmation box appears to confirm the users change to the training data files.