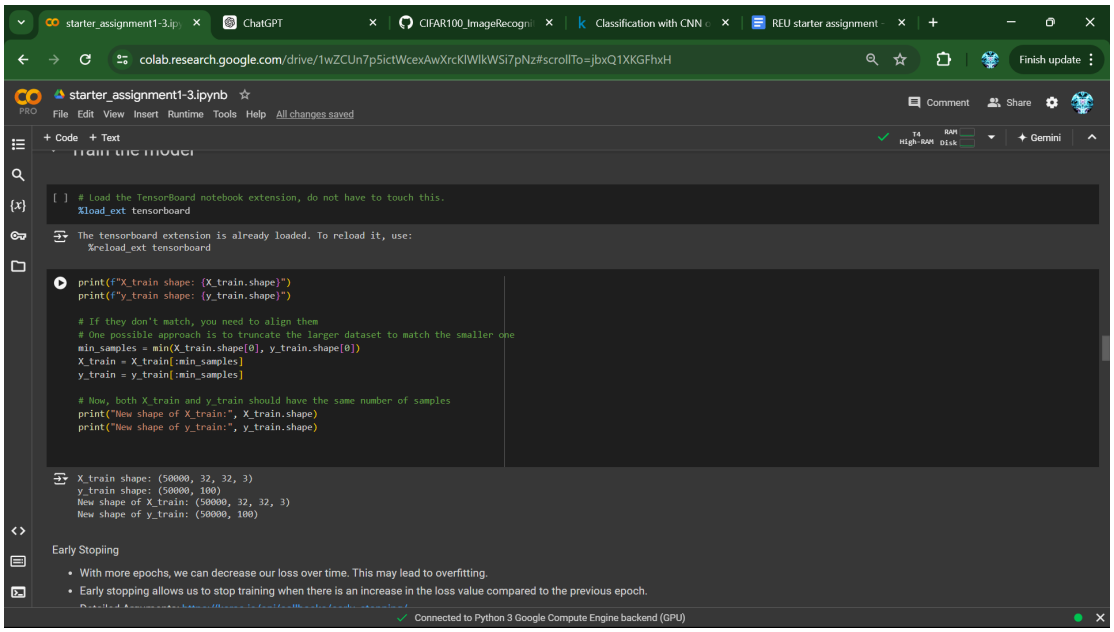
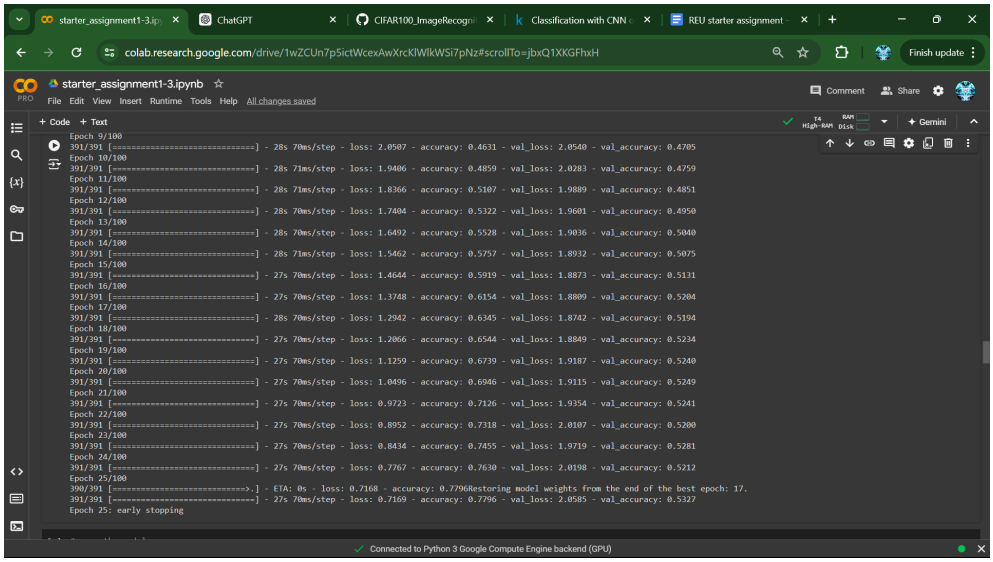
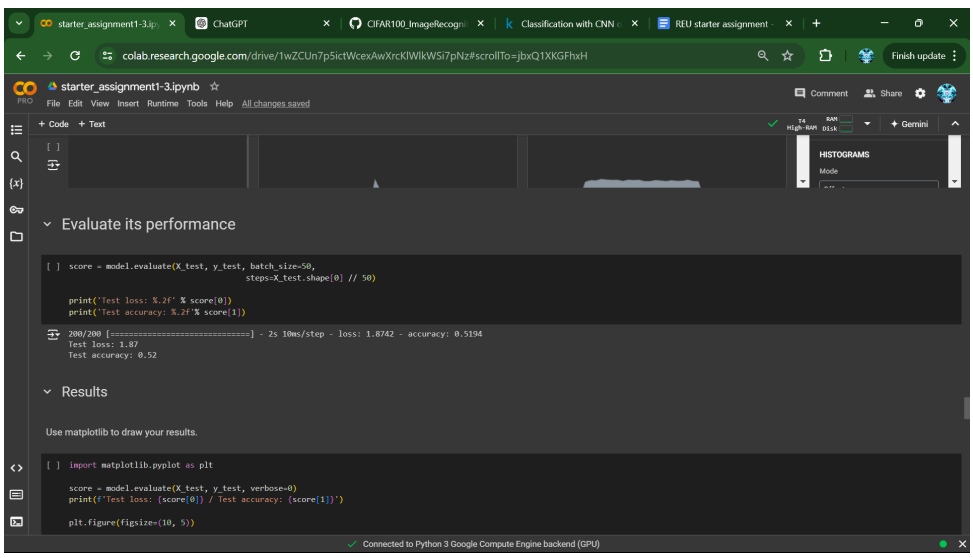
For this assignment, I stacked multiple convolutional layers to classify each image to its corresponding class. The more epochs I used, the higher the validation accuracy, and the lower the loss history. I only used 25 epochs due to lengthy processing times, gpu restrictions, and time constraints. But I was able to see genuine improvement in the accuracy, reaching 50% accuracy with just 25 epochs.

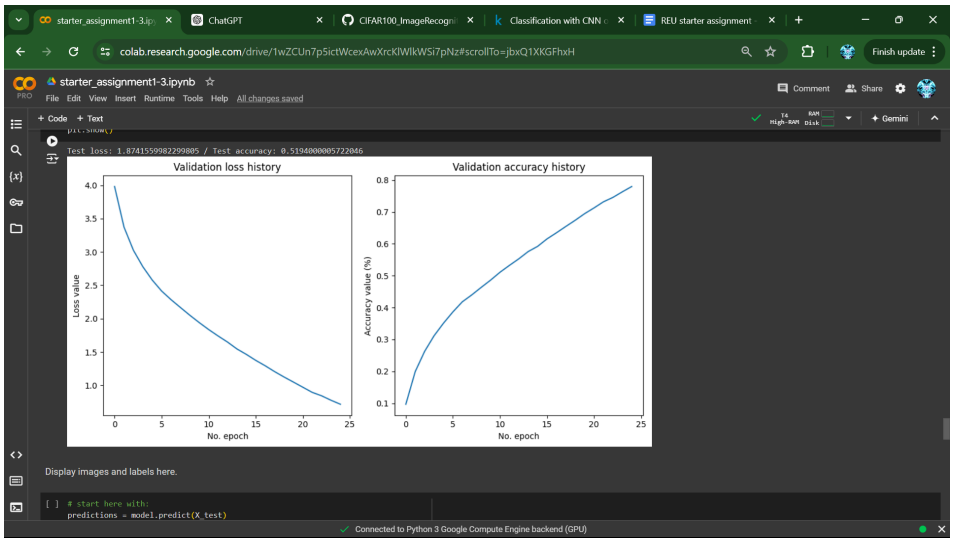


This was one of the problems that took me much research and trial/error to figure out. I had essentially had my y_train sample size differ from my X_train sample size. The error message that it displayed was very ‘wonky’ and I didn’t understand the error at first. So after much research, I set both variables to [:min_samples] meaning the number up to the minimum number of samples (which happened to be 50,000). This solved everything from this block to the future ones!

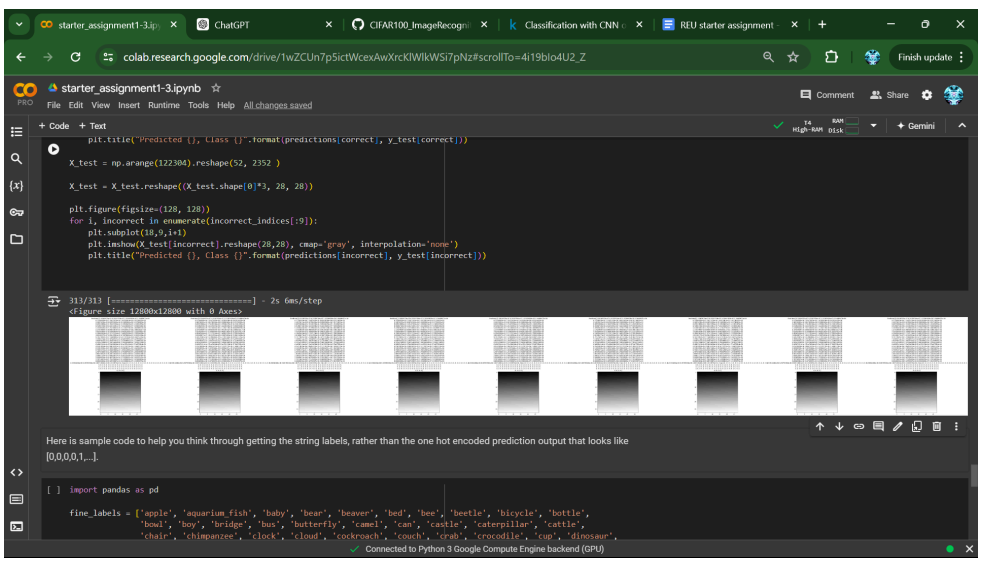


This is displaying the number of epochs. I couldn't do much as it kept stopping early (as shown). But I did buy colab pro to get better/faster results!

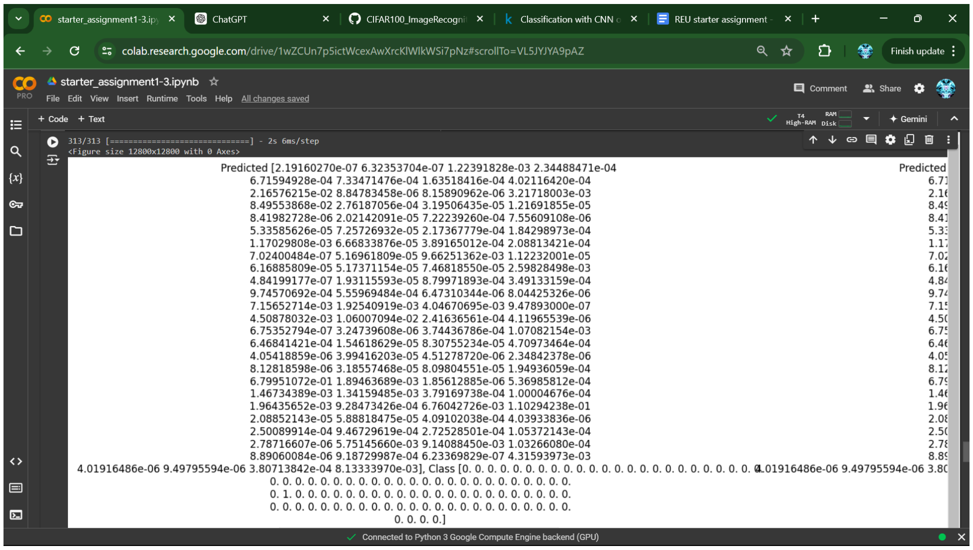




This is just showing the graphs of my validation loss and accuracy history. As you can see, as the number of epochs grows, my loss decreases while my accuracy increases (reaching 0.8 on the graph).



This is showing the images and labels.



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313/313 [==============================] - 2s 6ms/step
<Figure size 12800x12800 with 0 Axes>
```

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Predicted [2.19160270e-07 6.32353704e-07 1.22391828e-03 2.34488471e-04
 6.71594928e-04 7.33471476e-04 1.63518416e-04 4.02116420e-04
 2.16576215e-02 8.84783458e-06 8.15890962e-06 3.21718003e-03
 8.49553868e-02 2.76187056e-04 3.19506435e-05 1.21691855e-05
 8.41982728e-06 2.02142091e-05 7.22239260e-04 7.55609108e-06
 5.33585626e-05 7.25726932e-05 2.17367779e-04 1.84298973e-04
 1.17029808e-03 6.66833876e-05 3.89165012e-04 2.08813421e-04
 7.02400484e-07 5.16961809e-05 9.66251362e-03 1.12232001e-05
 6.16885809e-05 5.17371154e-05 7.46818550e-05 2.59828498e-03
 4.84199177e-07 1.93115593e-05 8.79971893e-04 3.49133159e-04
 9.74570692e-04 5.55969484e-04 6.47310344e-06 8.04425326e-06
 7.15652714e-03 1.92540919e-03 4.04670695e-03 9.47893000e-07
 4.50878032e-03 1.06007094e-02 2.41636561e-04 4.11965539e-06
 6.75352794e-07 3.24739608e-06 3.74436786e-04 1.07082154e-03
 6.46841421e-04 1.54618629e-05 8.30755234e-05 4.70973464e-04
 4.05418859e-06 3.99416203e-05 4.51278720e-06 2.34842378e-06
 8.12818598e-06 3.18557468e-05 8.09804551e-05 1.94936059e-04
 6.79951072e-01 1.89463689e-03 1.85612885e-06 5.36985812e-04
 1.46734389e-03 1.34159485e-03 3.79169738e-04 1.00004676e-04
 1.96435652e-03 9.28473426e-04 6.76042726e-03 1.10294238e-01
 2.08852143e-05 5.88818475e-05 4.09102038e-04 4.03933836e-06
 2.50089914e-04 9.46729619e-04 2.72528501e-04 1.05372143e-04
 2.78716607e-06 5.75145660e-03 9.14088450e-03 1.03266080e-04
 8.89060084e-06 9.18729987e-04 6.23369829e-07 4.31593973e-03
 4.01916486e-06 9.49795594e-06 3.80713842e-04 8.13333970e-03], Class [0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0.]
```

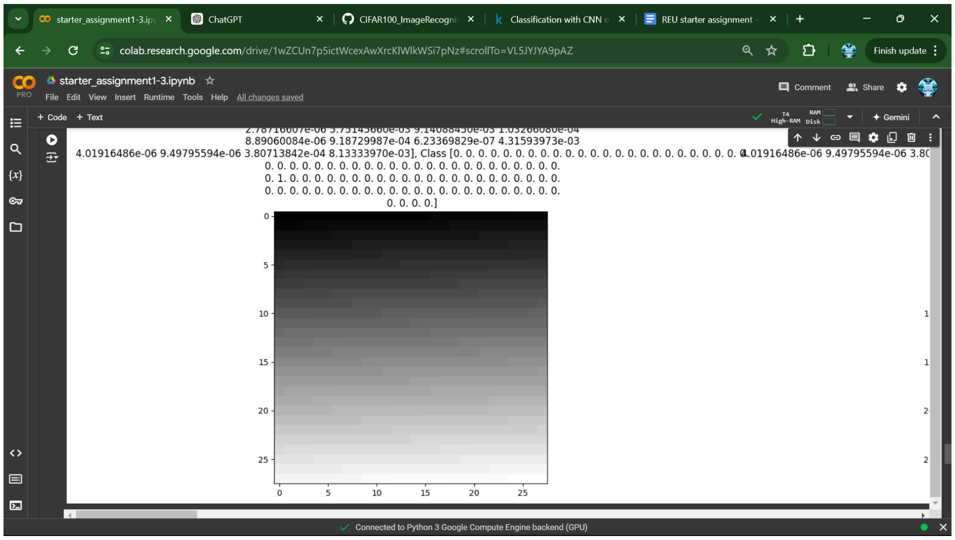

```
 8.89060084e-06 9.18729987e-04 6.23369829e-07 4.31593973e-03
 4.01916486e-06 9.49795594e-06 3.80713842e-04 8.13333970e-03], Class [0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
 0. 0. 0. 0.]
```

These two are a close up of the first one. I took a bit of formatting for it to not be all jumbled up together.

I think I was able to grasp the understanding of models and displaying results of those models. There were many errors along the way, but solving them helped me understand everything much better. My knowledge of building models and loading in data has definitely improved (as shown by the pictures above) and I can't wait to start my research!!