CS 474 FINAL PROJECT: SKIN CANCER DETECTION

COMPUTER SCIENCE AND MATHEMATICS

RORY ARNONE-WHEAT

Date: December 26, 2024.

1. Introduction

The selected project seems highly feasible as it is quite similar in nature to the project that we did for assignment 4. Since this project is based on image recognition, just like the project on determining handwritten numbers, I decided to use a Convolutional Neural Network. As such, I plan on using the keras package to build and implement the CNN. I plan on setting up the paper and writing this introduction on the Tuesday of break, looking through the documentation on Keras again and getting the Google Colab set up on Friday and setting a CNN with three Convolutional layers on Saturday of break.

2. Preliminary Results

This project came with dataset preparation built into the Jupyter Notebook file, so I was able to skip that part in the development process. For the initial model I built I had 3 convolutional layers followed by a max-pooling layer (to speed up computations). I then used a flatten layer to convert the 3D mapping to a 1D vector before passing it to the fully connected layer that sends to the output layer which is a binary output. To compile I used the Adam optimizer with the binary cross-entropy loss function as this is a binary classification.

This model was run for 10 epochs which started at an accuracy of 62.70% and by the second epoch had reached a training accuracy of 75.82%, already reaching the required higher than 75% baseline for the project. It jumped up to around an 80% accuracy for the third epoch and hovered around there until the 7th epoch where it hit an accuracy of 84.36%. The 8th epoch gave slightly inferior results, while the 9th gave an accuracy of 86.81%. The final epoch gave a test accuracy of 88.07%.

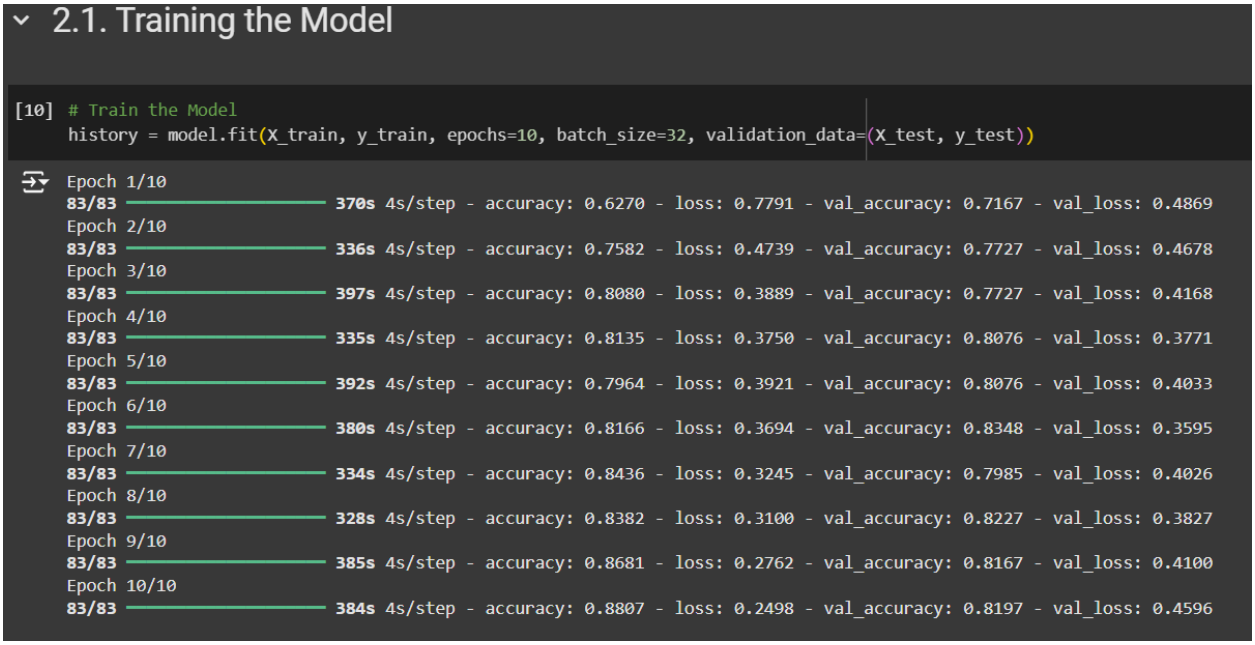

Figure 1. Training Data

The test accuracy was 81.96%

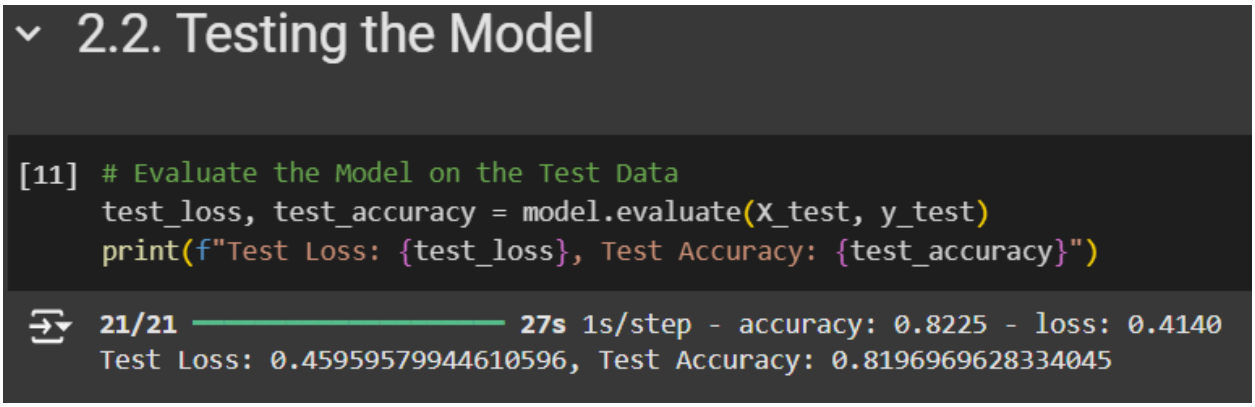

FIGURE 2. Testing Data

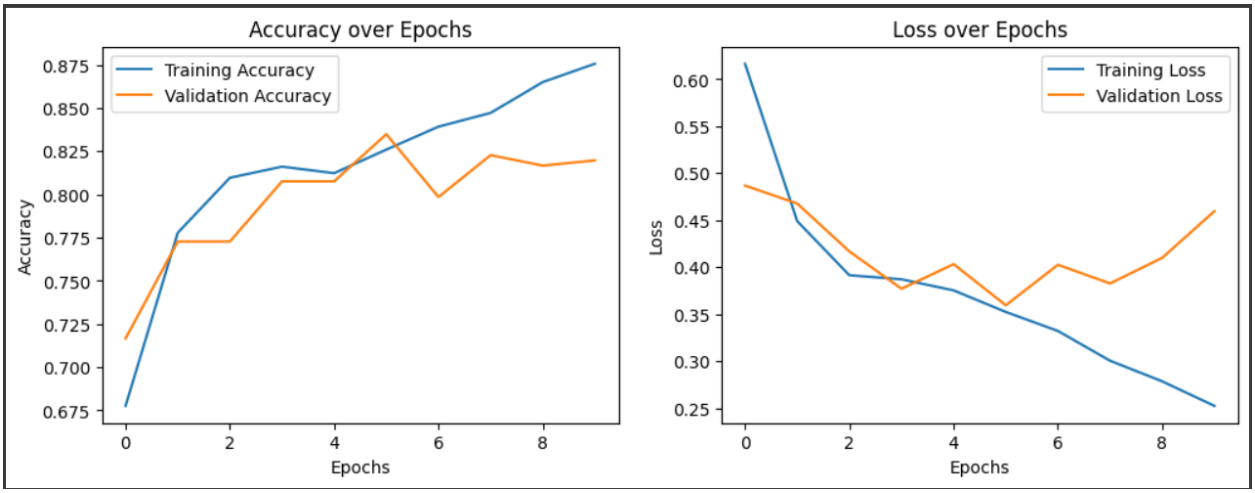

FIGURE 3. Accuracy and Loss Graph

3. TIMELINE

Set up M1 Paper	Nov 26
Finish writing M1 Paper	Nov 30
Research Keras	Nov 29*
Implement Google Colab	Nov 29
Set up initial CNN	Nov 30
Test initial CNN	Nov 30
Adjust initiall CNN based on results of testing	Dec 6
Finish aditional M2 submission requirements	Dec 6

TABLE 1. CS 474 final project timeline

*plus any additional research needed depending on results gained on the 30th

4. References

https://www.kaggle.com/datasets/fanconic/skin-cancer-malignant-vs-benign
https://keras.io/guides/