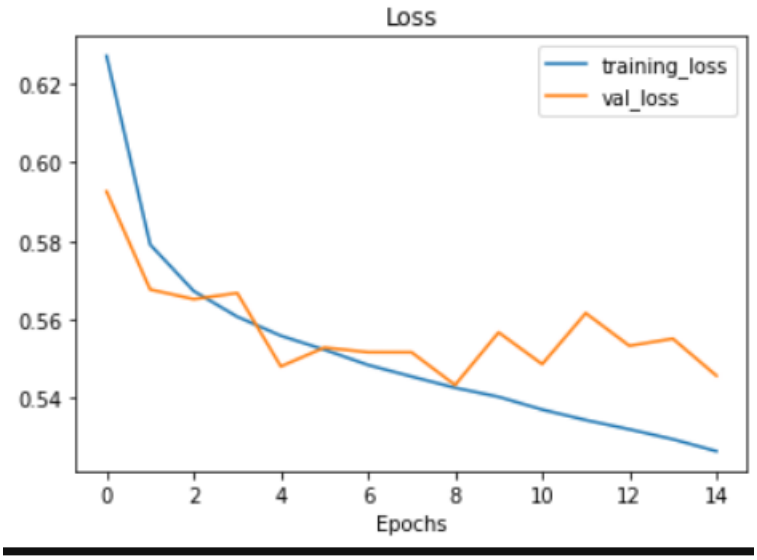
E2E Deep learning Project

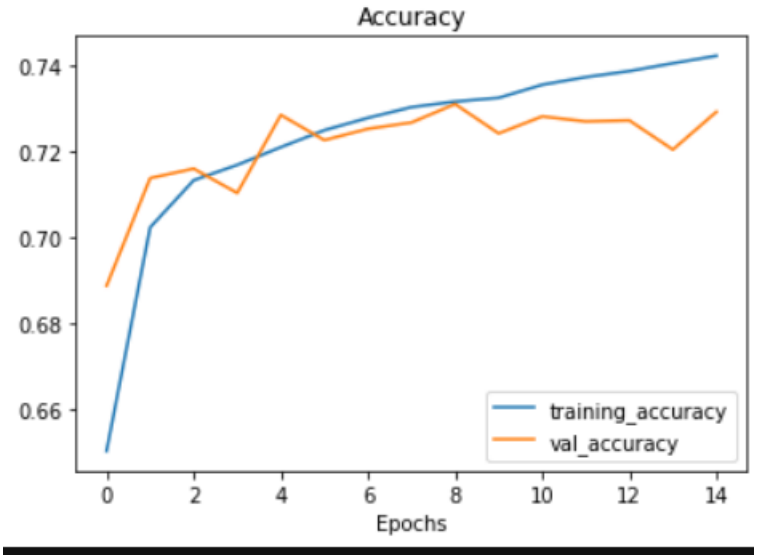
Common Task 1

Classification of Electron and Photon

The given dataset of 32x32 matrices having two channels. I have used a CNN model with just 4 convolution layers and a single max pooling layer. This was done so as to incorporate as much as possible data for training as testing with more layers came at a computational cost at this amount of data.

The model was trained for over 10 epochs





The ROC AUC score was around 79.34%. With a few more layers of convolution layers as well as getting more of the data, the ROC score can go higher.

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ROC AUC: 0.7934
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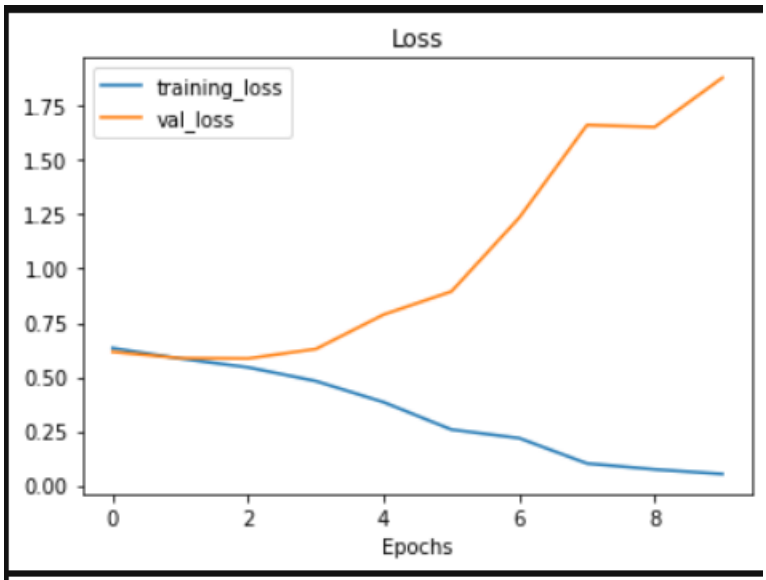
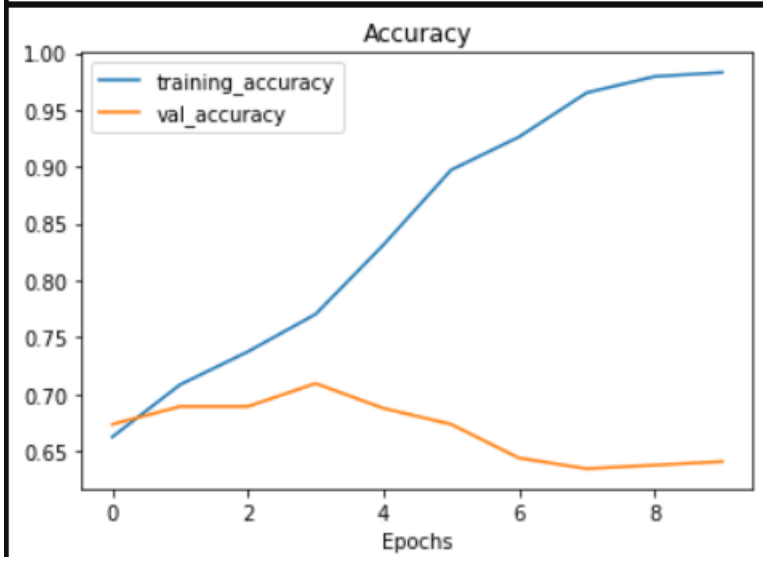
Task 2

Classification of Quark-Gluon

Given dataset of image array of 125x125x3. Have used a similar CNN model but with a few more convolution layers with a bit more filters, and dropout layers. The model was overfitting as seen from the graphs below. For this I have used 2 dropout layers but it's effect was not that noticeable.

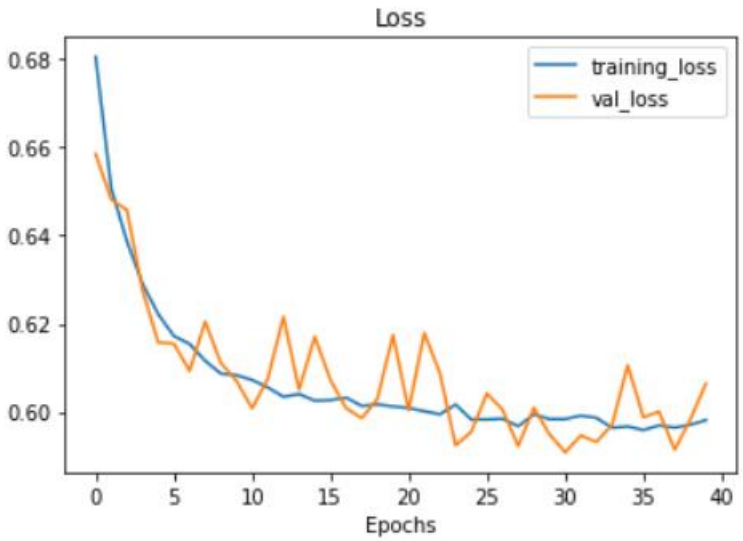


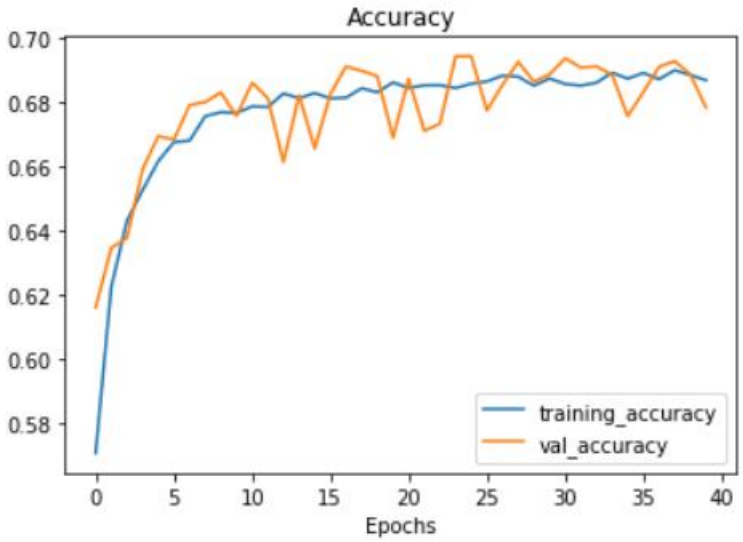


Test accuracy is 64% and ROC AUC score is 69%

Task 3 (updated)

Using swin transformer achieving a ROC-AUC score of 73%

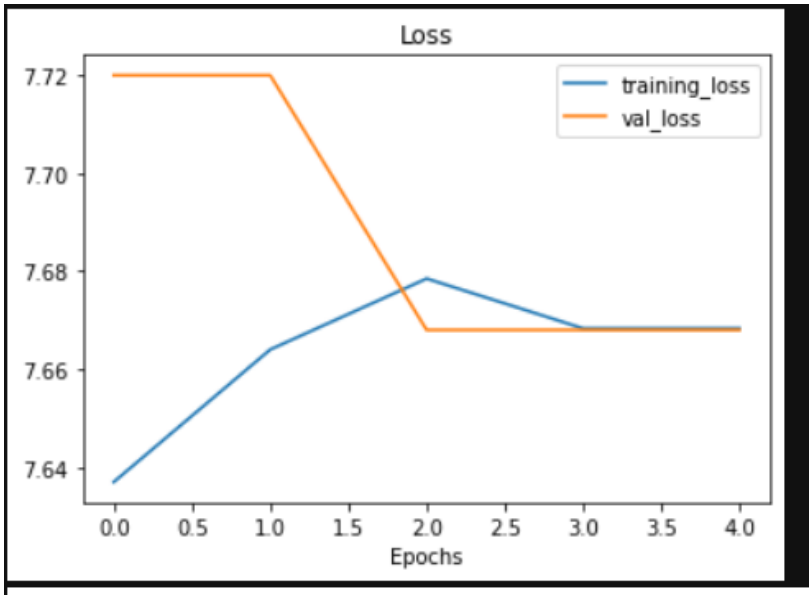


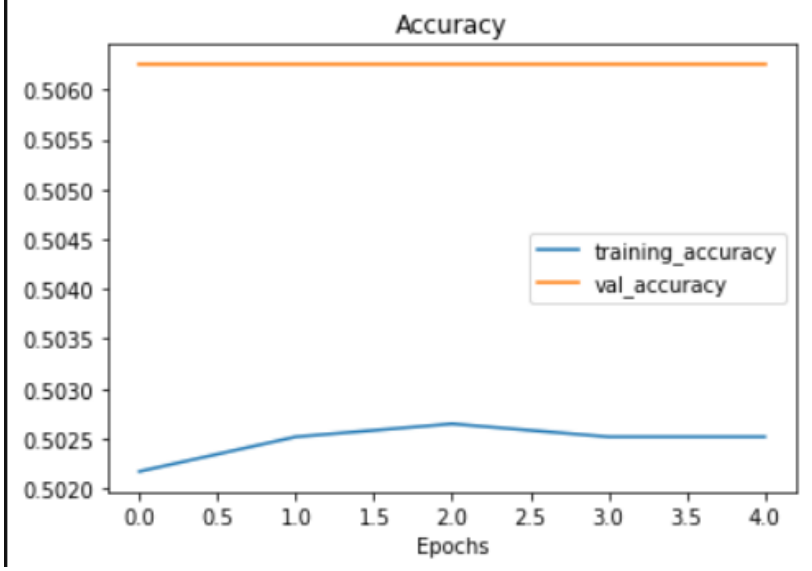


Using Vision Transformers to classify electrons and photons.

The model works by dividing the image into patches and then uses self-attention mechanisms to process images.

The model I trained was unsuccessful and was guessing the data rather than predicting because it was not learning anything. The accuracy was 50%.


Loss
training_loss
val_loss
7.72
7.70
7.68
7.66
7.64
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Epochs


Accuracy
training_accuracy
val_accuracy
0.5060
0.5055
0.5050
0.5045
0.5040
0.5035
0.5030
0.5025
0.5020
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Epochs