# *TensorBoard Observations*

*In all the 3 models, we use VGG-16 pretrained network without Fully Connected layers and initialize all the weights with 'imagenet' trained weights.*

## *Model-1*

***INPUT --> VGG-16 without Top layers(FC) --> Conv Layer --> Maxpool Layer --> 2 FC layers --> Output Layer***

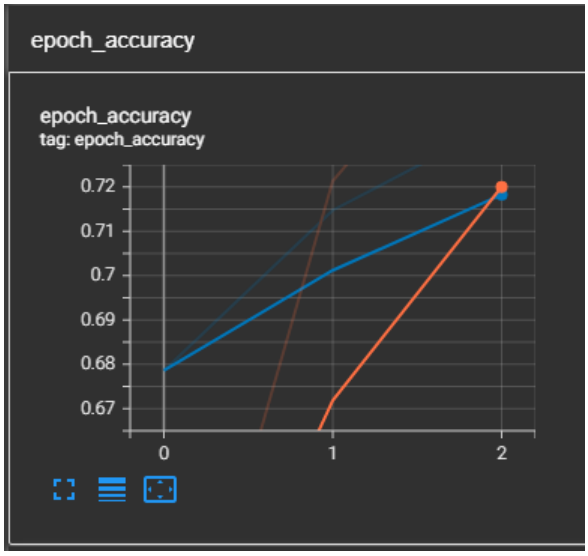
After VGG-16 network without FC layers, I added a new Conv block (1 Conv layer and 1 Maxpooling), 2 FC layers and an output layer to classify 16 classes.

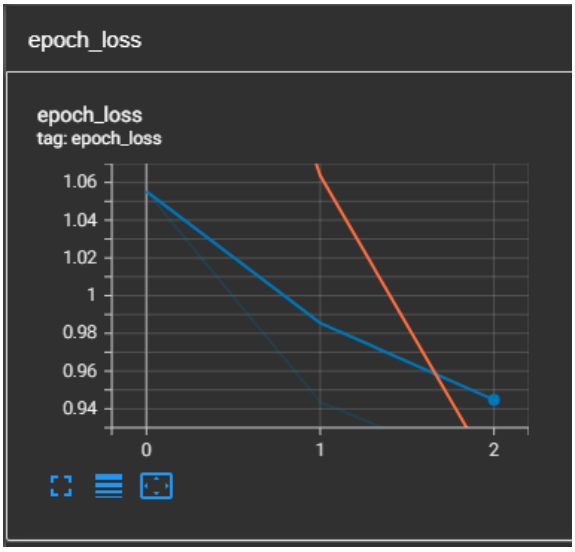
My model is set to train for 3 epochs.

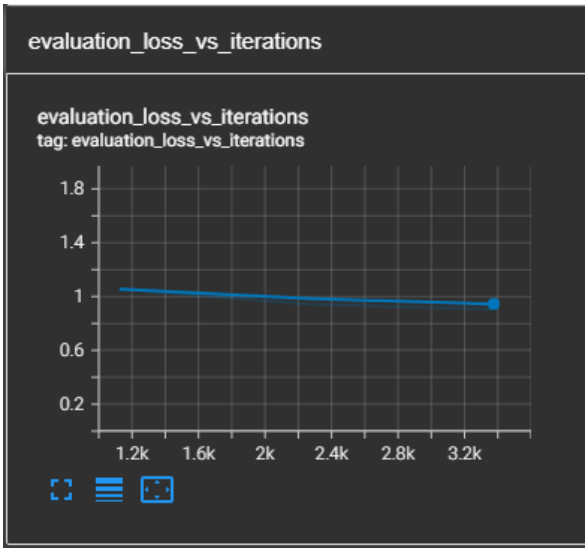
When we evaluate the model on the validation data, the accuracy is 76.6%. If we increase the number of epochs, the accuracy of the model will increase and reduce the loss.

***Note***: Red is the train curve and blue is the validation curve.

1. The train epoch accuracy is 0.7663 and the validation epoch accuracy is 0.7347. The accuracy is increasing and the accuracy across train and validation is converging at the end of 3 epochs.
2. The loss is decreasing to 0.7527 after training for 3 epochs.
3. The validation loss is decreasing over iterations which is 0.9056.






## *Model-2*

***INPUT --> VGG-16 without Top layers(FC) --> 2 Conv Layers identical to FC -->Output Layer***

After VGG-16 network without FC layers, I added 2 Conv layers and an output layer to classify 16 classes.

My model is set to train for 3 epochs.

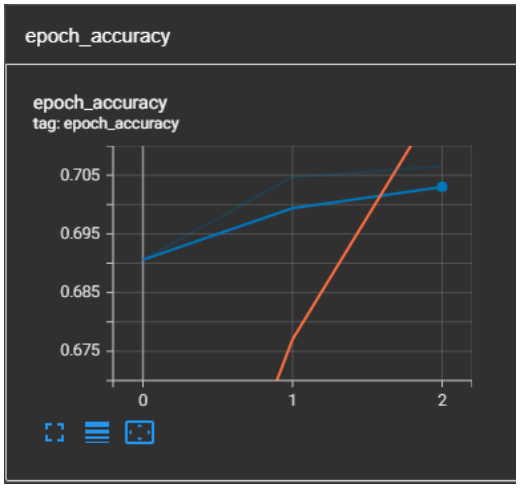
When we evaluate the model on the validation data, the accuracy is 75.8%.

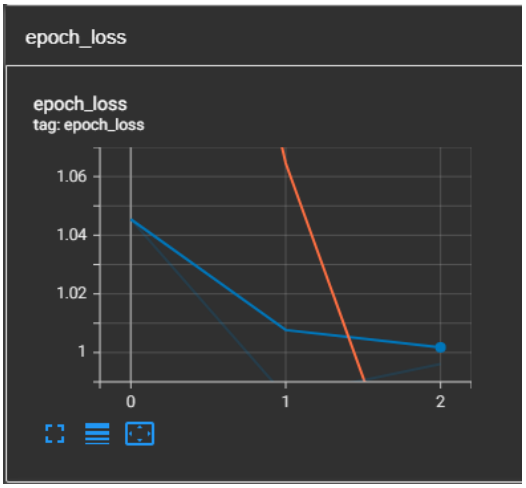
- The number of trainable parameters are large as compared to Model_1 so the time taken for each epoch increases.

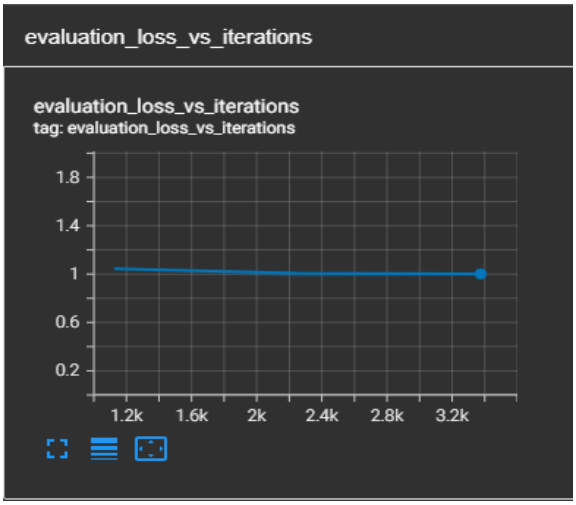
- As the number of trainable parameters increase and we use the same number of epochs as Model_1, we get lesser accuracy and higher loss

***Note***: Red is the train curve and blue is the validation curve.

1. The accuracy is increasing and the accuracy across train and validation is converging at the end of 3 epochs.
2. The loss is decreasing to 0.9961 after training for 3 epochs.
3. The validation loss is decreasing over iterations.




## *Model-3*

***INPUT --> VGG-16 without Top layers(FC) (train only Last 6 Layers)--> 2 Conv Layers identical to FC --> Output Layer***

After training only the last 6 layers of the VGG-16 network without FC layers, I added 2 Conv layers and an output layer to classify 16 classes.

My model is set to train for 3 epochs.

When we evaluate the model on the validation data, the accuracy of the model is just 6.1%.

- Low accuracy is because the model consists of very large number of trainable parameters so that it need more epochs to attain higher accuracy.
- As trainable parameters increase more epochs are needed to get good accuracy loss convergence.
- If we run the model for 25-30 epochs, the model can be expected to get an accuracy above 90%.

***Note***: Red is the train curve and blue is the validation curve.

1. The train epoch accuracy is 0.0612 and the validation epoch accuracy is 0.0584. The accuracy is increasing and the accuracy across train and validation is converging at the end of 3 epochs.
2. The training loss is decreasing after training for 3 epochs.
3. The validation loss is not changing much over iterations.