Saumya Sinha
SID: 016040674

1) Summarise your experiment results:

The following mini-vgg network and the other variants are implemented in google colab on the runtime **GPU** with class as **"standard"**.

All of the models were executed for **20 epochs** with **batch-size of 64** and **verbose=1**. The optimiser used is **SGD** with **learning_rate= 0.001**.

Loss function used is **loss=CategoricalCrossentropy(from_logits=True)**
 - From_logits=True means that the input to the function is not normalised probabilities rather it is unnormalized logits.

Test accuracy results for different models:
1. **Mini -VGG**:Test Accuracy: 42.80
2. **Variant1:** Test Accuracy: 60.18
3. **Variant 2:** Test Accuracy: 44.86
4. **Variant 3:** Two test were performed based on 2 ways to implement dropouts:
   a. Standard dropout%: Test Accuracy: 37.44
   b. Dropout with different % : Test_accuracy_model2: 37.38
5. **Variant 4:** Test Accuracy: 9.58

2) Discuss the classification performance of the models

The **Variant-1** _performed the best_ with the defined set of parameters with **60.18 accuracy** compared with the base model. **Variant-2** accuracy increased by 2% compared to the base model. Whereas for **Variant-3**, two models are built based on two ways to implement dropouts. In **Model1**, **dropout (0.3)** is used and this model outperformed with **_37.44 test accuracy_** than the other dropout model (Model2) with greater dropout rate whose **_test accuracy was 37.38_**. The last variant, Variant-4 performed with an accuracy of **9.58** which was _the least compared to all the models_

3) Size (# of parameters):
- Mini-VGG base model: Total params: 3,248,202
- Variant 1: Total params: 3,248,202
- Variant 2: Total params: 4,022,794
- Variant 3: Total params: 3,248,202
- Variant 4: Total params: 1,179,594

4) Computation time to train each of these models are:
- Mini-VGG: Total Train Time: 265084
- Variant 1: Total Train Time: 263972
- Variant2: Total Train Time: 384172
- Variant 3: Total Train Time for model1: 324488 and Total Train Time for model2 : 324016
- Variant 4: Total Train Time: 264010