Report on Performance of Resnet on EuroSAT Dataset(RGB)

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1 Model Hyperparameters:

- Batch Size - 100

- Learning Rate (Initial) - 0.001

- Total Epoch - 100

- Patience - 15

2 Model Performance:

Resnet18 (pretrained = True)	Resnet18 (pretrained = False)
Training Accuracy - 99.9894%	Training Accuracy - 99.8723 %
Validation Accuracy - 96.723647 %	Validation Accuracy - 92.913105 %
Test Accuracy - 96.981481 %	Test Accuracy - 93.333333 %
Total Epochs - 100	Total Epochs- 100
Early Stopping at epoch - 44	Early Stopping at epoch- 39

NOTE: These values corresponds to the best performing model. The values may differ slightly from the values in the submitted python notebook.

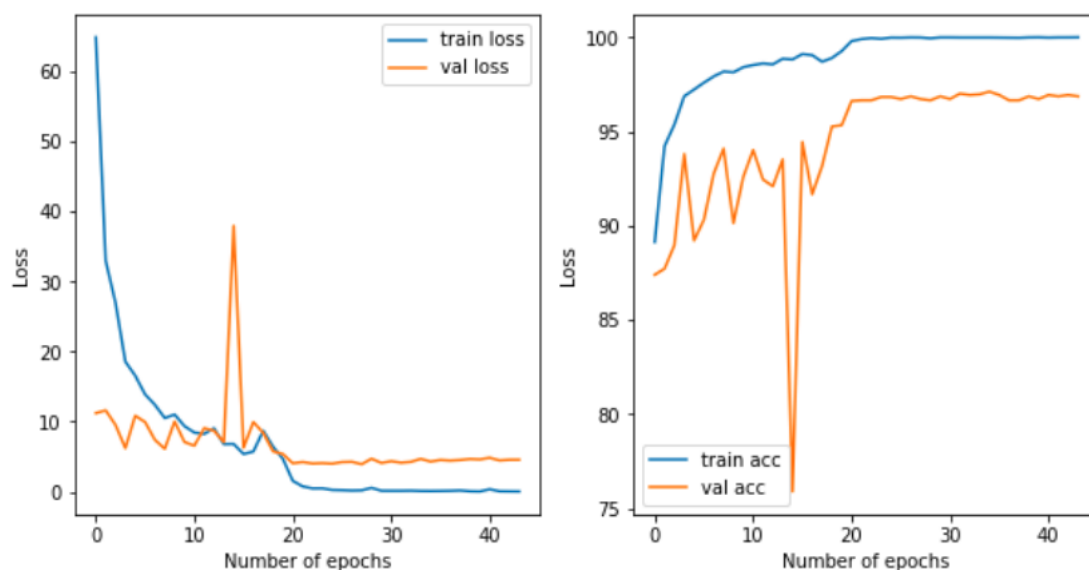### 2.1 Plots of Loss and Accuracy on Training and Validation Sets

Figure 1: Plots of loss and accuracy for pretrained Resnet18 Model

2.2 Recall for each class

Class	Recall
AnnualCrop	0.955
Forest	0.995
HerbaceousVegetation	0.9517
Highway	0.97
Industrial	0.99
Pasture	0.9575
PermanentCrop	0.932
Residential	0.9767
River	0.968
SeaLake	0.995

3 Pretrained Resnet18 Performance Analysis:

3.1 Inferences Based on Model Hyperparameters:

- In cases of low patience value (e.g. 5 or 7) with low learning rate (e.g. 0.0001), the pretrained model was easily hitting the patience value and hence was stopping early (around 10-13 epochs). As we are using already a trained model, the validation loss was consolidating very early for low learning rates.

- The Model performs better for a bigger batch size within less total epochs as compared to the model in task 1. I think this is due to Resnet18 having more number of parameters.

3.2 Inferences Based on Model Performance:

- The Model showed good accuracy form epoch 1. After 25 epochs, the model validation loss consolidates and hit the early stopping criteria. The model stops around 35-45 epochs in most of the cases as compared to 75-85 epochs from the CNN model in task1.

- From plots in Fig.1, we observe that in the initial epochs, model's performance on the validation set changes significantly. The loss and accuracy changes drastically initially (in 5-20 epochs) and settles afterwards.

- The Model is also slightly overfitted but less than the CNN Model in task 1. It also performs better on the all sets form task 1 CNN Model.

4 Examples where the model got wrong but was most confident about
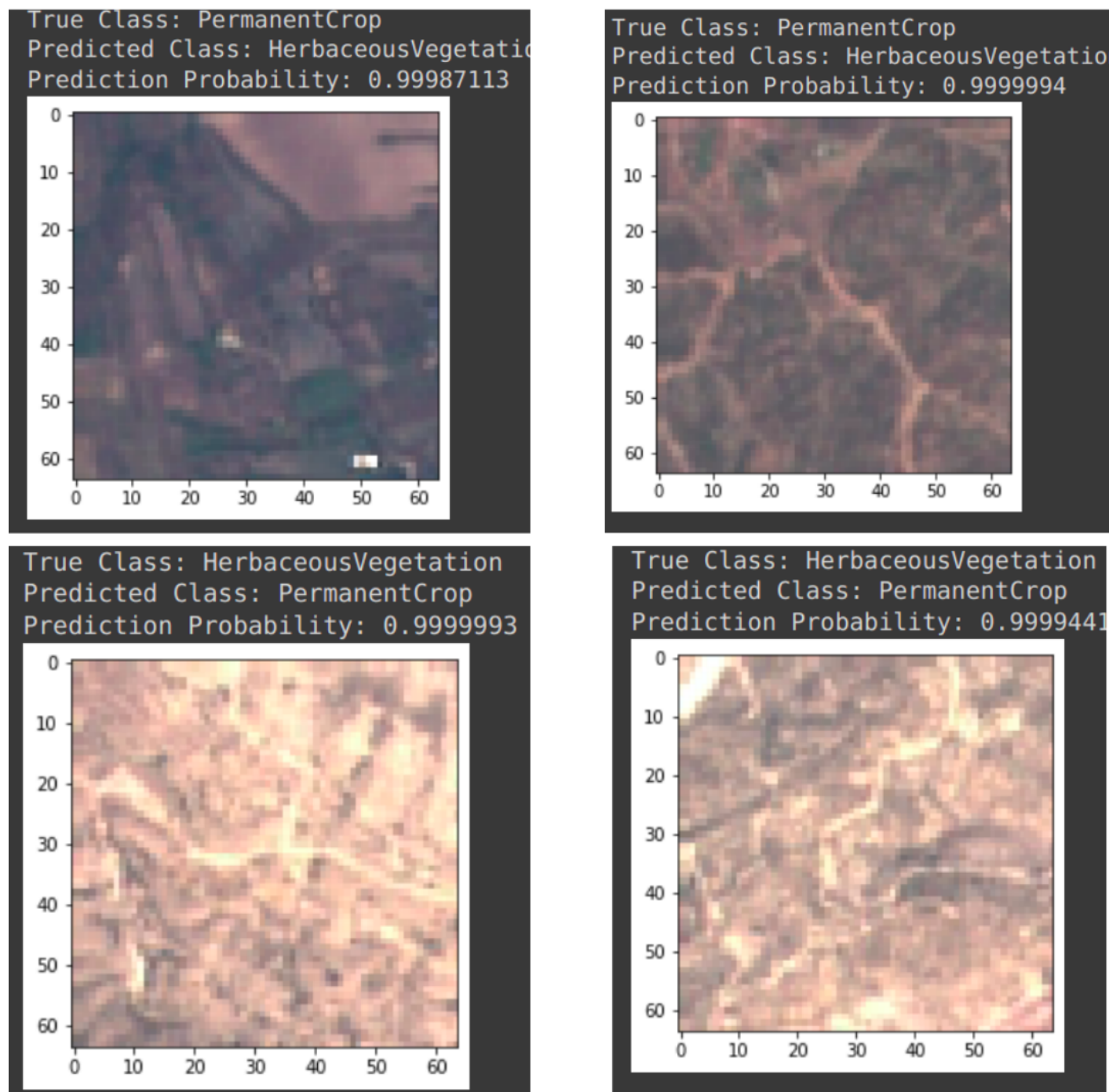

Figure 2: Examples where the model got wrong but was most confident about

5 Differences Between Pretrained and Not Pretrained Resnet18 Models Performances:
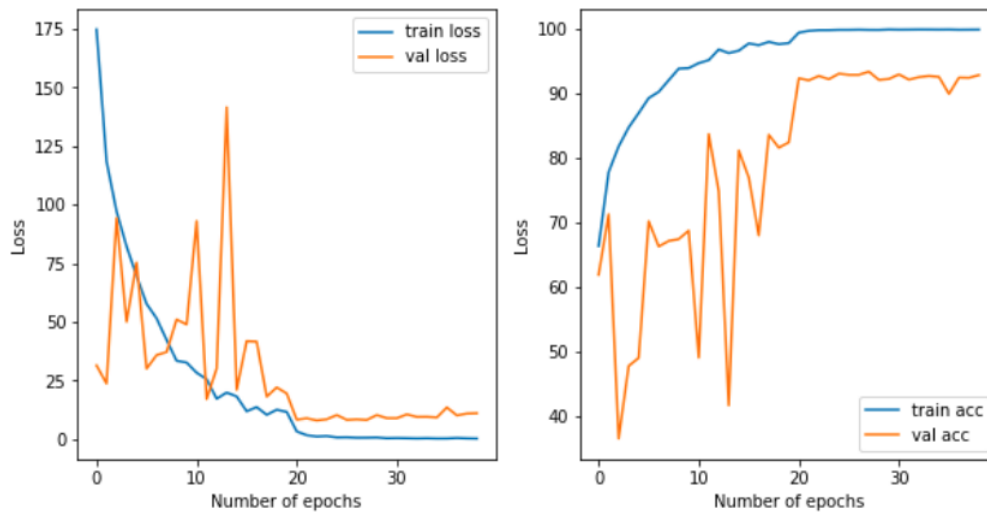

Figure 3: Plot of loss and accuracy of non-pretrained Resnet18 model on EuroSAT dataset

- The Pretrained Model performs better on all data sets than the non-pretrained Model.

- Initial accuracies of non-pretrained model were very low and the losses were very high. But due to learning rate of 0.01 the non-pretrained model learns quickly after some epochs, thereby stopping at around the same number of epochs as the pretrained model.

- The non-pretrained model overfits more than the pretrained model.