

Task : Create a two class classifier : Field & Road

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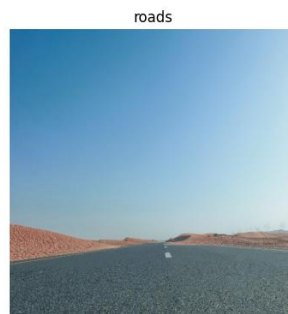
Google Colab Notebook :

<https://colab.research.google.com/drive/1EfQMadED4eihZYldz9wBPQ8rvhm9H92z>

- ▼ Create the below folder structure for classification problem

```
.
├── train_dataset
│   ├── class1
│   │   ├── img1.jpeg
│   │   └── img2.jpeg
│   └── class2
│       ├── img1.jpeg
│       └── img2.jpeg
```

Load and visualize the data



There are 163 images in total

- 123 images – train (36 images in « fields » class and 87« roads» class)
- 30 images – validation
- 10 images - test

The dataset is imbalanced so calculate class weights which can help in improving the metrics for training

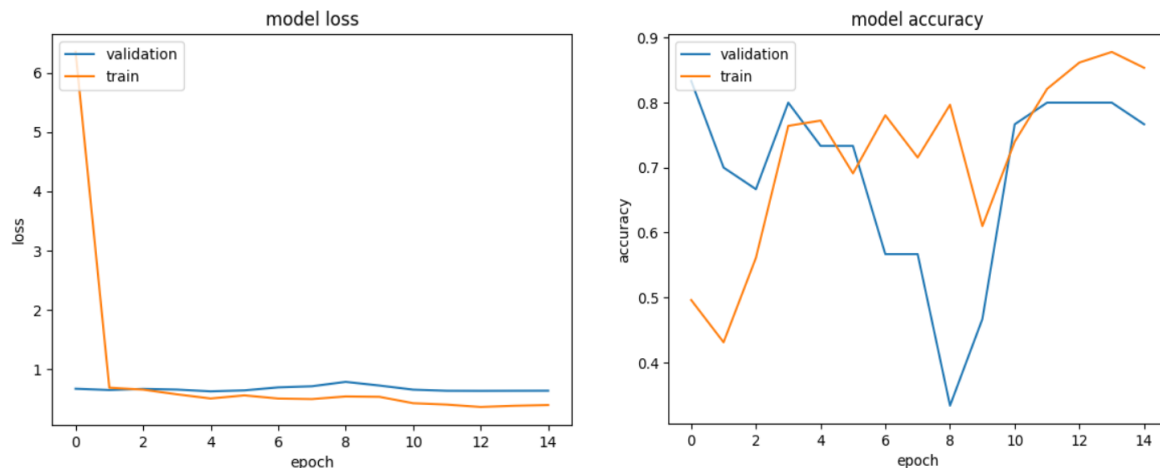
Model 1

CNN Model - 3 convolutional blocks and 2 Fully Connected Layers

- Activation Function : Relu
- Optimizer : Adam
- Loss Function : SparseCategoricalCrossEntropy
- Metrics : Accuracy
- Callbacks : callbacks = [checkPoint_callback, earlyStopping_callback, learningRate_callback, tensorBoard_callback, csvLogger_callback]
- Epochs : 100
- Batch Size : 16

```
Epoch 5: val_loss improved from 0.64555 to 0.62282, saving model to bilberry_classification/20230420-170713/best_weights_CNN.h5
8/8 [=====] - 16s 2s/step - loss: 0.5028 - accuracy: 0.7724 - val_loss: 0.6228 - val_accuracy: 0.7333 - lr: 0.0010

Restoring model weights from the end of the best epoch: 5.
8/8 [=====] - 15s 2s/step - loss: 0.3925 - accuracy: 0.8537 - val_loss: 0.6337 - val_accuracy: 0.7667 - lr: 1.0000e-05
Epoch 15: early stopping
```



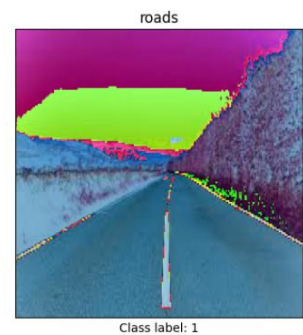
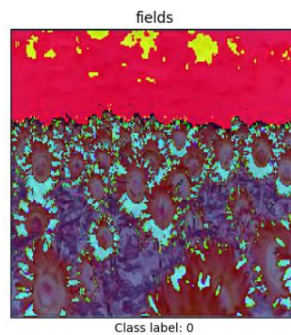
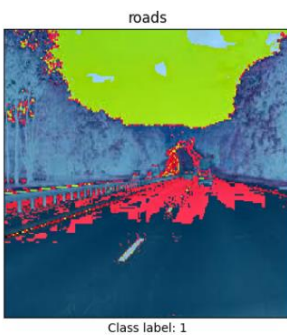
model weights –

<https://drive.google.com/file/d/1FRCcOjNAqHe0CX20nIPcnYZGh9F43ngM>

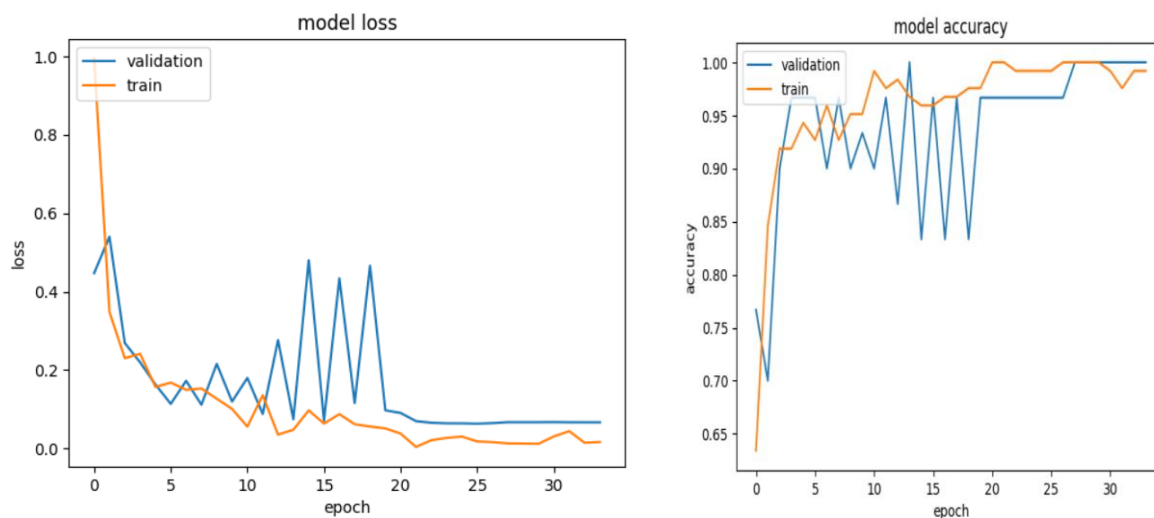
Transfer Learning using VGG19 + 3 Fully connected Layers

- Transfer Learning : VGG19
- Activation Function : Relu
- Optimizer : Adam
- Loss Function : SparseCategoricalCrossEntropy
- Metrics : Accuracy
- Callbacks : callbacks = [checkPoint_callback, earlyStopping_callback, learningRate_callback, tensorBoard_callback, csvLogger_callback]
- Epochs : 100 (early stopping , patience : 10)
- Batch Size : 16

Data preprocessing



```
Epoch 24: val_loss improved from 0.06571 to 0.06432, saving model to bilberry_classification/20230420-171220/best_weights_TL_VGG19.h5
8/8 [=====] - 16s 2s/step - loss: 0.0272 - accuracy: 0.9919 - val_loss: 0.0643 - val_accuracy: 0.9667 - lr: 1.0000e-04
Restoring model weights from the end of the best epoch: 24.
8/8 [=====] - 16s 2s/step - loss: 0.0167 - accuracy: 0.9919 - val_loss: 0.0668 - val_accuracy: 1.0000 - lr: 1.0000e-06
Epoch 34: early stopping
```



model weights –

https://drive.google.com/file/d/1DAb6hT_ZHo5n_IJfZAKelJREydtf-sr/

Inference on test samples using Transfer Learning VGG19 weights

Predicted Class: fields



Predicted Class: roads



Predicted Class: roads



Predicted Class: roads



Predicted Class: roads



Predicted Class: roads



Predicted Class: roads



Predicted Class: fields

