Multi-object recogniser:

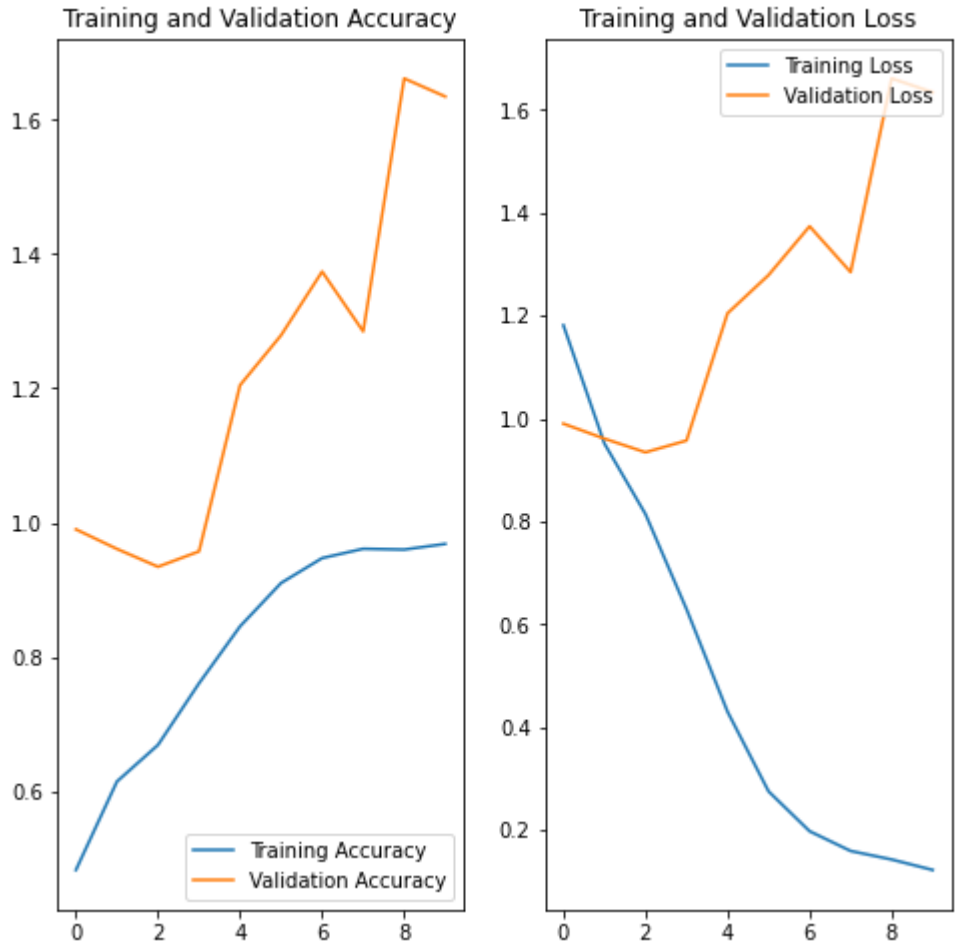
CNN adaptation from the lab session to recognise the 4 object types in the dataset.

Using 3 convulation layers, 3 max pooling layers, and Dense layer. Using Categorical concentropical as loss function.

Epoch10/10

loss	Accuracy	Validation loss	Validation Accuracy
0.12	0.97	1.64	0.60

Accuracy of 97%, Validation Accuracy of 60% after 10 Epochs was recorded.



Using Augmentation

Using 3 convulation layers, 3 max pooling layers, and Dense layer. Using Categorical concentropical as loss function

Epoch 10/10

loss	Accuracy	Validation loss	Validation Accuracy
0.07	0.97	1.63	0.61

Accuracy of 97%, Validation Accuracy of 61% were recorded after 10 Epochs following augmentation.

1. Accuracy of 0.95(95%) was achieved following 7/10 Epoch, 633s(10.55minutes) of the Neural Network Training

Accuracy of 0.97 (97%) was achieved following 10/10 Epoch, 905s(15.083minutes) of the Network Training

2. Checking differences in a Deeper network (More layers)

Loss function as CategoricalCrossentropy

Using 1 convulation layer, 1 max pooling layer, Dense layer

Accuracy	Time(s)
0.96	550

Reducing the layer number shows an accuracy of 0.96(96%) was achieved after 10 Epochs, 550s (9.16667 minutes), hence many layers (deeper network) increasing learning time of the model and reducing number of layers attain accuracy faster in lesser time.

3. Using Average pooling Mechanism, Using 3 convulation layers, 3 max pooling layers, and Dense layer. Using Categorical concentropical as loss function

Epoch10/10

loss	Accuracy	Validation loss	Validation Accuracy
0.25	0.92	1.68	0.60

Max pooling is the standard mechanism, use of the Average pooling mechanism shows a lower accuracy of 92% achieved in 874s (14.5667 minutes) compared to the above-reported training model where Max pooling was used

dataset of images containing the four objects' categories was collected as contained in the Vehicles_pictures folder attached to my porfolio

Training Network using my 20 collected image dataset

Using 3 convulation layers, 3 max pooling layers, and Dense layer. Using Categorical concentropical as loss function.

Epoch10/10

Time= 11seconds

loss	Accuracy	Val_loss	Val_accuracy
0.39	0.94	1.25	0.25

94% accuracy after 10/10 Epochs in 11seconds recored.

motorcycle

motorcycle

bus

train

bus

plane

motorcycle

motorcycle

plane

Using augmenation to improve performance

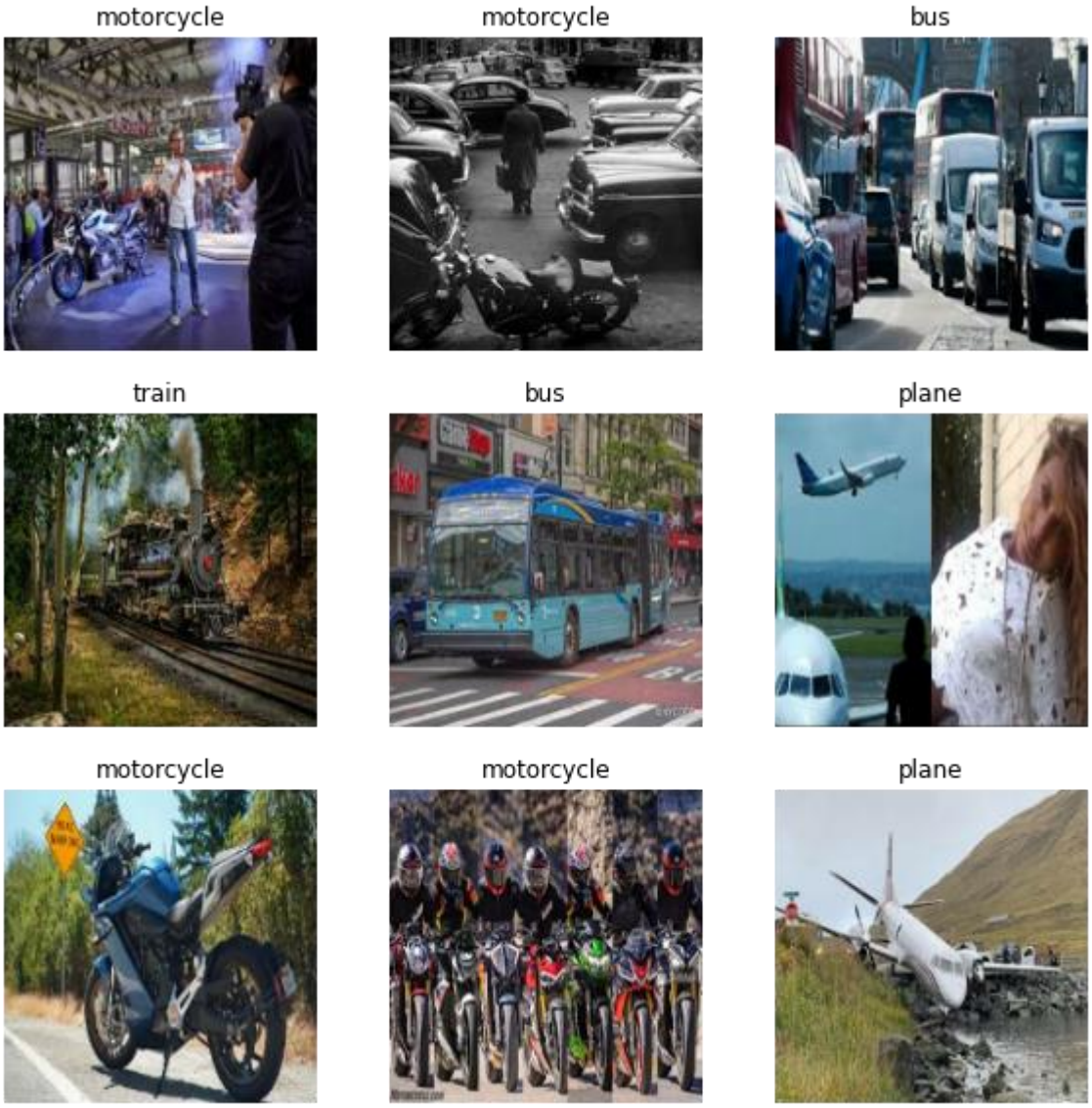
Epoch 10/10

Time=10s

loss	Accuracy	Val_loss	Val_accuracy
0.00	1.0	4.49	0.5

Training after augmentation results in 100% accuracy after 10/10 Epochs in 10seconds.

4. The network classified the images well as following



- The network Found 20 files belonging to 4 classes.
- Using 16 files for training.
- The network Found 20 files belonging to 4 classes.
- Using 4 files for validation.
- ['bus', 'motorcycle', 'plane', 'train']
- Accuracy of 94% to 100% was achieved

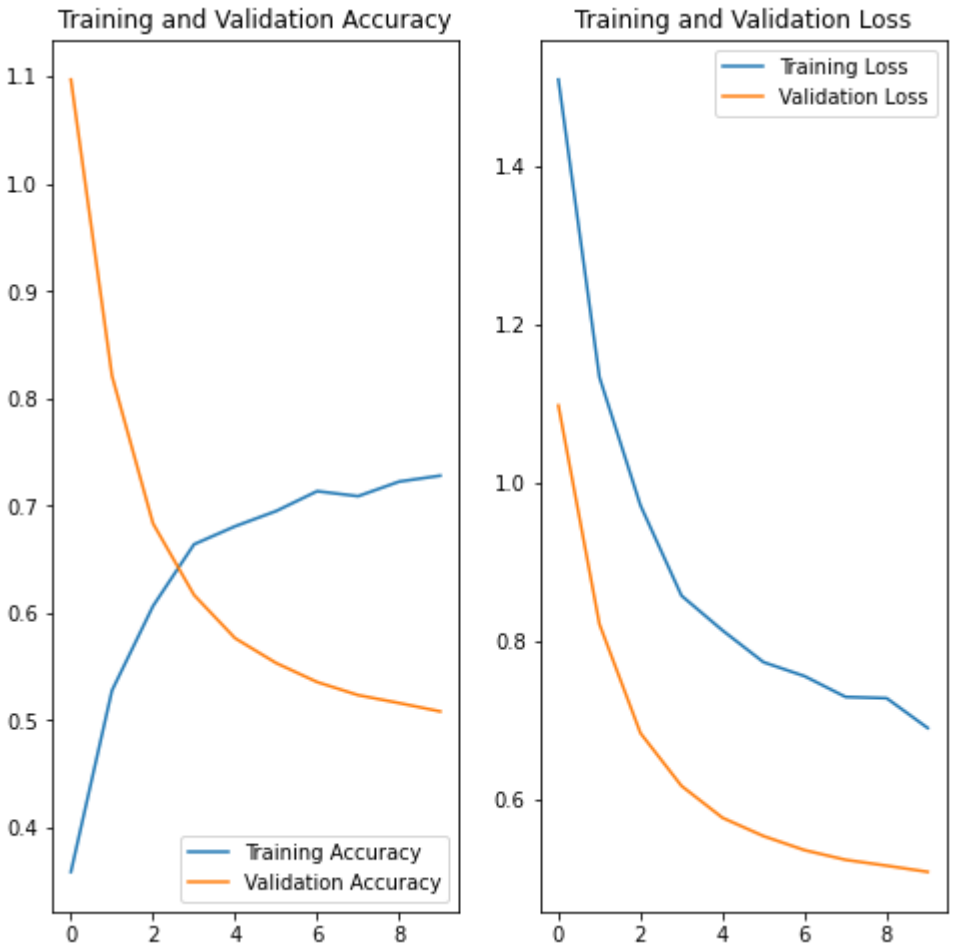
5. Yes, following fine-tuning(augmentation) it does, accuracy of 100% was achieved in 10 seconds.

Extra Challenges

- Using feature extraction from pre-trained models and the provided image dataset vehicles_images

Epoch 10/10

Validation Accuracy	Accuracy
0.82 (82%)	0.73 (73%)

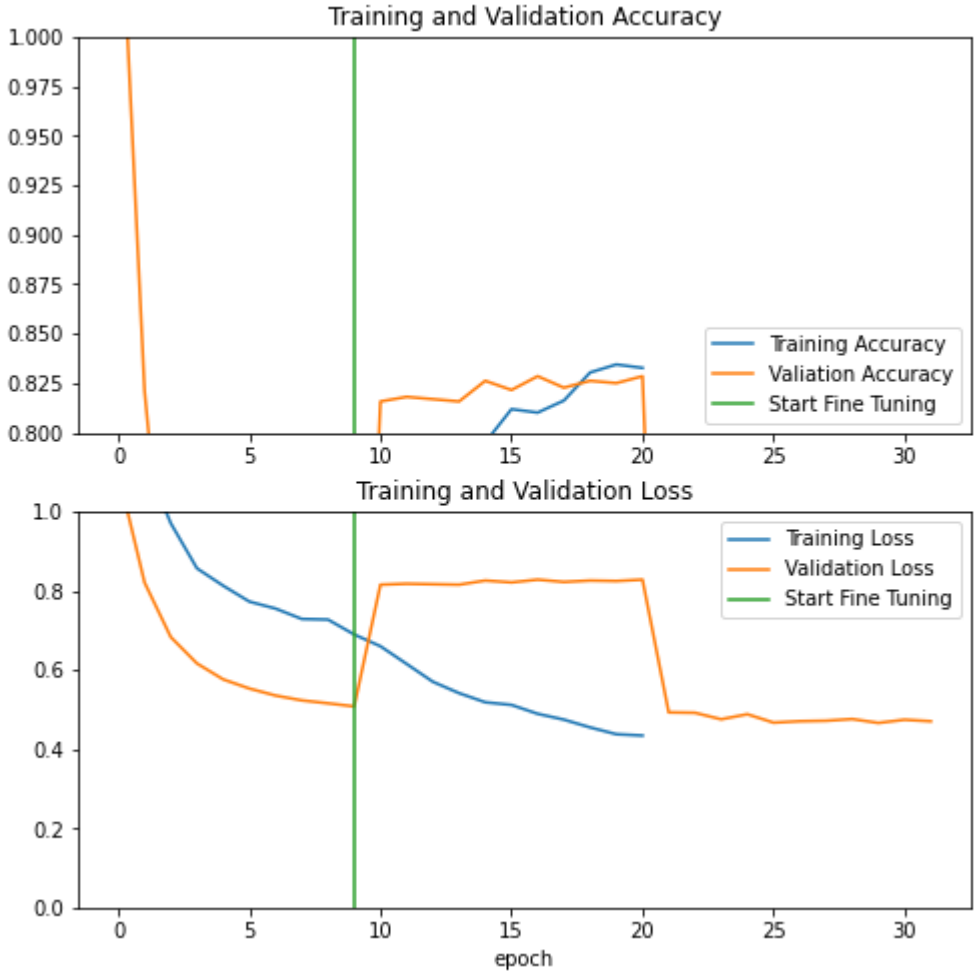


- Fine-tunnig model weights from pre-trained model
- base model unfreeze, instructing learner exactly from which layers to resume training

- Continuing training adding fine-tuning epochs to normal training epochs

Epochs 20/20

Validation Accuracy	Accuracy
0.83 (83%)	0.83 (83%)



Further model Training

Test accuracy	Accuracy
0.88 (88%)	0.88 (83%)