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Advanced Machine Learning – Assignment 3

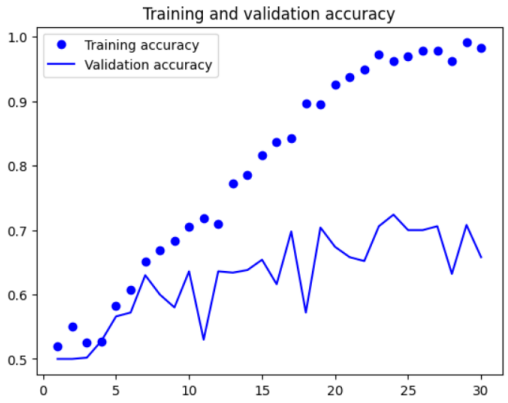
MODEL FROM SCRATCH

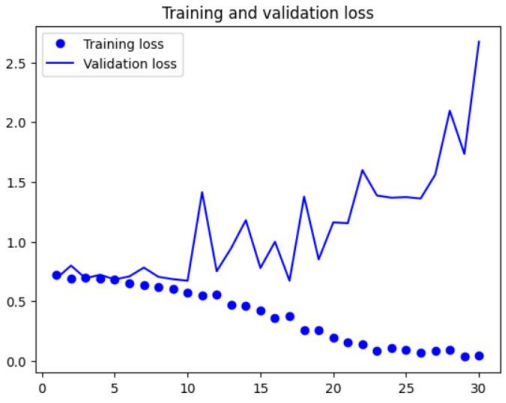
Task 1

I downloaded data from Kaggle. The archive contains 25,000 images of dogs and cats. I limited data to 1000 of training sample, 500 of validation and 500 of test samples.

```
Found 1000 files belonging to 2 classes.
Found 500 files belonging to 2 classes.
Found 500 files belonging to 2 classes.
```

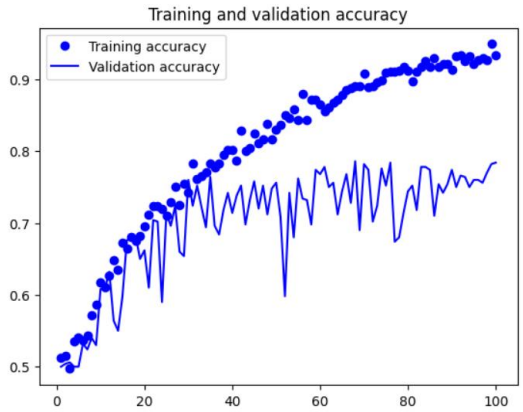
Firstly I trained model without improving performance, no reduce overfitting. The accuracy is 0.610.

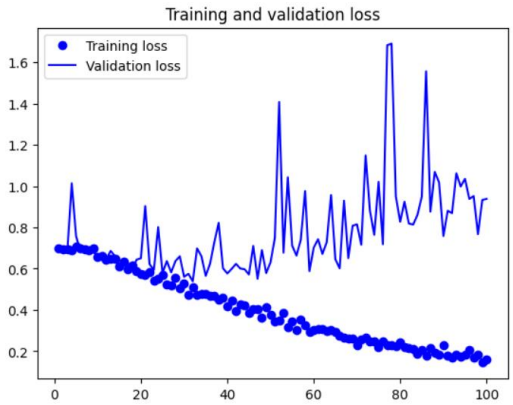





```
16/16 ━━━━━━━━━━━━━━━━━━━━ 2s 71ms/step - accuracy: 0.6095 - loss: 0.6996
Test accuracy: 0.610
```

Then, I trained model again with data augmentation to prevent overfitting. The accuracy improved to 0.730.





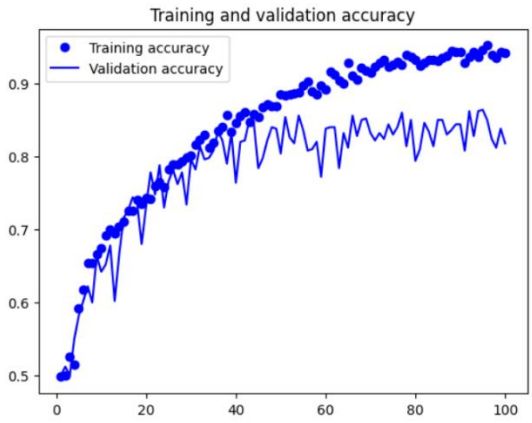
```
16/16 ━━━━━━━━━━━━━━━━━━━━ 1s 58ms/step - accuracy: 0.7061 - loss: 0.5825
Test accuracy: 0.730
```

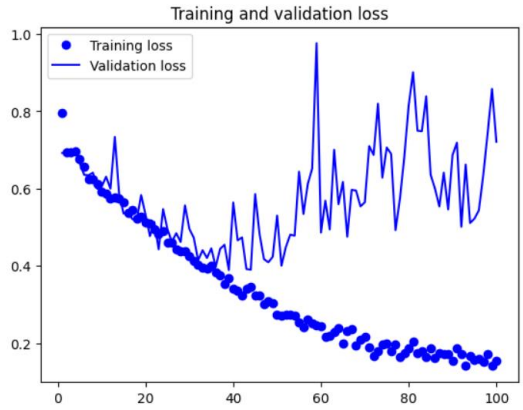
Task 2

I increased the training sample size to 2000. The validation and testing sample sizes are the same.

```
Found 2000 files belonging to 2 classes.
Found 500 files belonging to 2 classes.
Found 500 files belonging to 2 classes.
```

I trained model with data augmentation. The accuracy improved to 0.788.





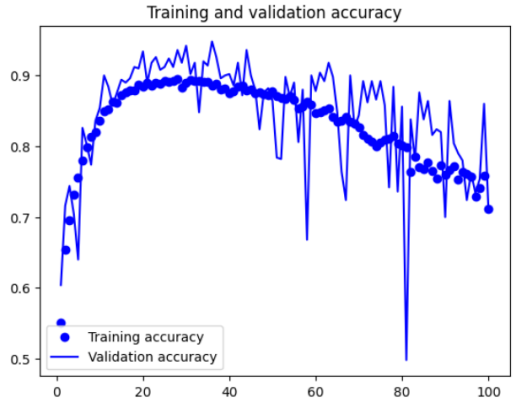

```
16/16 ━━━━━━━━━━━━━━━━━━━━ 1s 47ms/step - accuracy: 0.7852 - loss: 0.4523
Test accuracy: 0.788
```

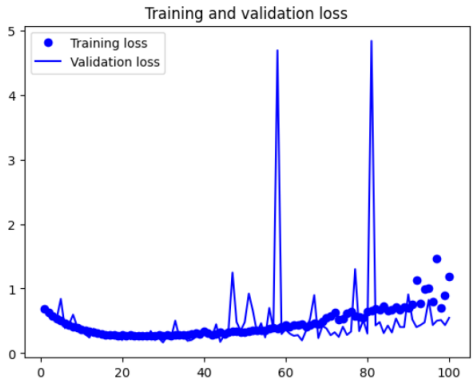
Task 3

Again, I increased the training samples size to 10 000. The validation and testing sample sizes are the same.

```
Found 10000 files belonging to 2 classes.
Found 500 files belonging to 2 classes.
Found 500 files belonging to 2 classes.
```

I trained model with data augmentation. The accuracy improved to 0.908.






```
16/16 ━━━━━━━━━━━━━━━━━━━━ 1s 31ms/step - accuracy: 0.9081 - loss: 0.2340
Test accuracy: 0.908
```

A PRETRAINED CONVNET

I got limited the GPU in Google Colab so I needed to switch to my local machine. I created the new environment where I installed tensorflow library and connected with my GPU. I changed the code in the script to download the same data from Kaggle and created the same sample sizes for each task.

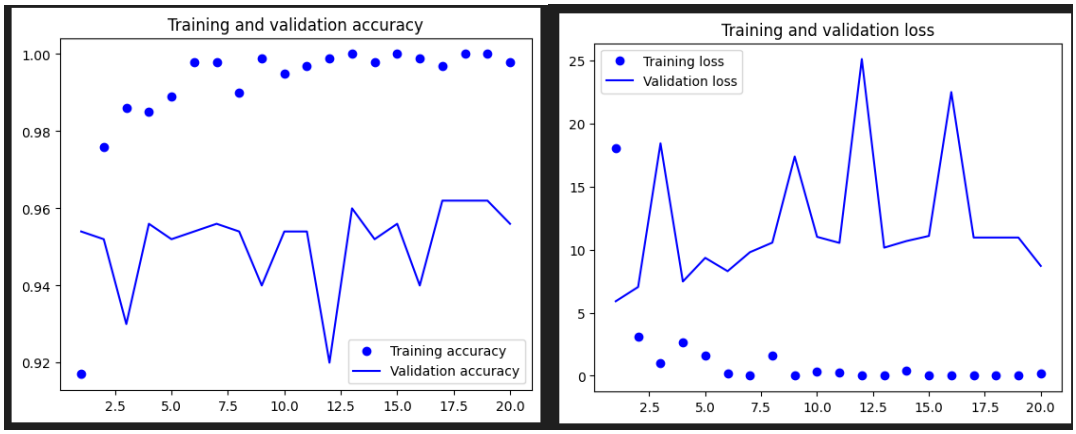
I used a pretrained model on the ImageNet dataset with VGG16 architecture.

Task 4-1

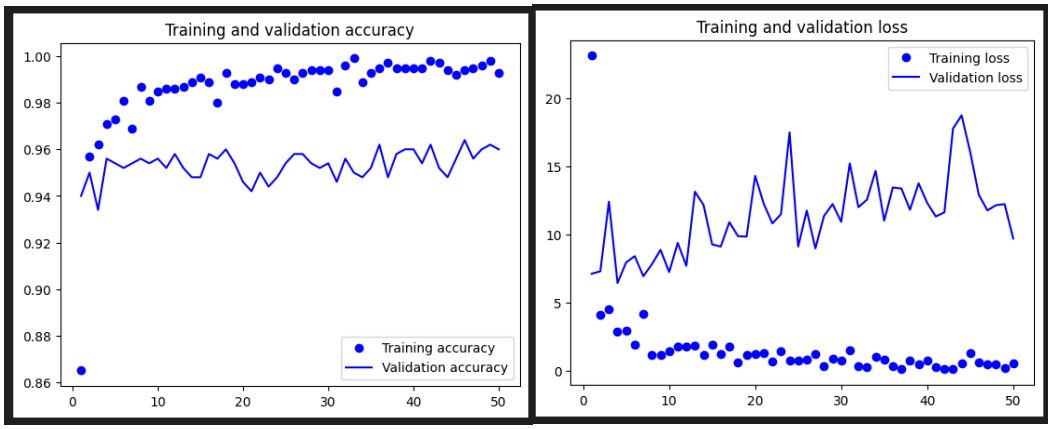
I limited data to 1000 of training sample, 500 of validation and 500 of test samples.

I used a pretrained model on the ImageNet dataset with VGG16 architecture.

Firstly I did without data augmentation:



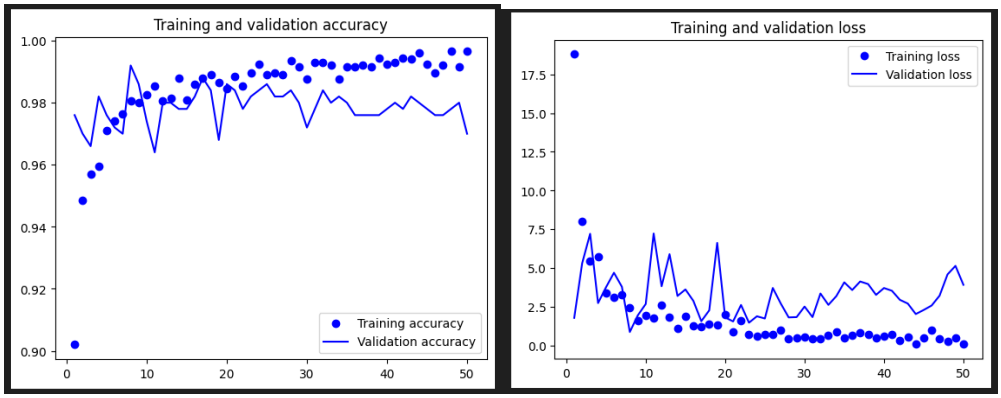
Then, with data augmentation. The accuracy is 0.980.




```
16/16 [==============================] - 1s 59ms/step - loss: 1.9612 - accuracy: 0.9800
Test accuracy: 0.980
```

Task 4-2

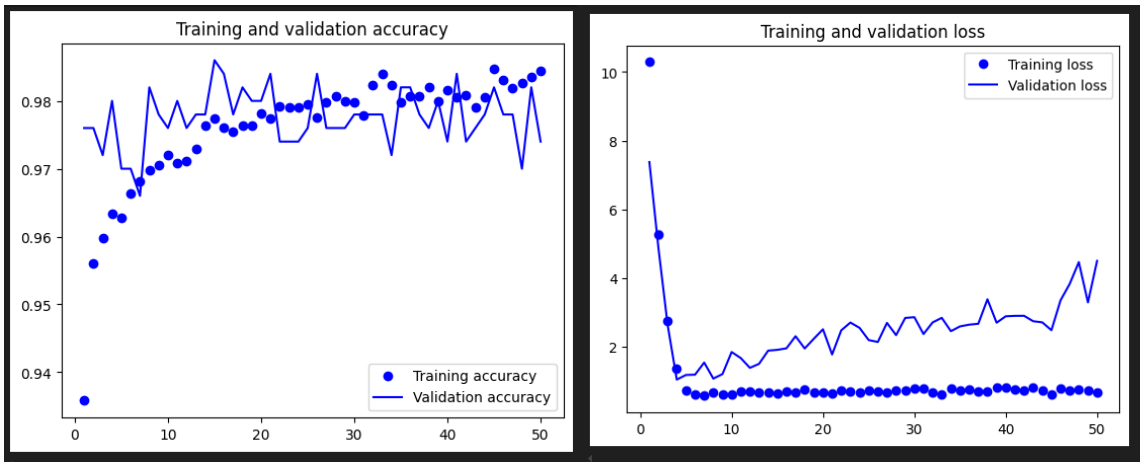
I increased the training sample size to 2000. The validation and testing sample sizes are the same. I did with data augmentation. The accuracy is 0.978.




```
16/16 [==============================] - 2s 63ms/step - loss: 3.7699 - accuracy: 0.9780
Test accuracy: 0.978
```

Task 4-3

I increased the training sample size to 10 000. The validation and testing sample sizes are the same. I did with data augmentation. The accuracy is 0.968.




```
16/16 [==============================] - 3s 125ms/step - loss: 1.0341 - accuracy: 0.9680
Test accuracy: 0.968
```

COMPARISION TABLE

MODEL FROM SCRATCH			PRETRAINED CONVNET		
SAMPLE	ACCURACY	DATA AUGMENTATION	SAMPLE	ACCURACY	DATA AUGMENTATION
1000	0.610	NO	1000	-	NO
1000	0.730	YES	1000	0.980	YES
2000	0.788	YES	2000	0.978	YES
10000	0.908	YES	10000	0.968	YES

The pretrained model does not need a big sample of training data compared to model from scratch. The good pretrained model helps to achieve high accuracy. If we want to achieve a good performance in model from scratch, we need to prepare a big amount of training data.