Assignment 2 Report- AML

Group members –

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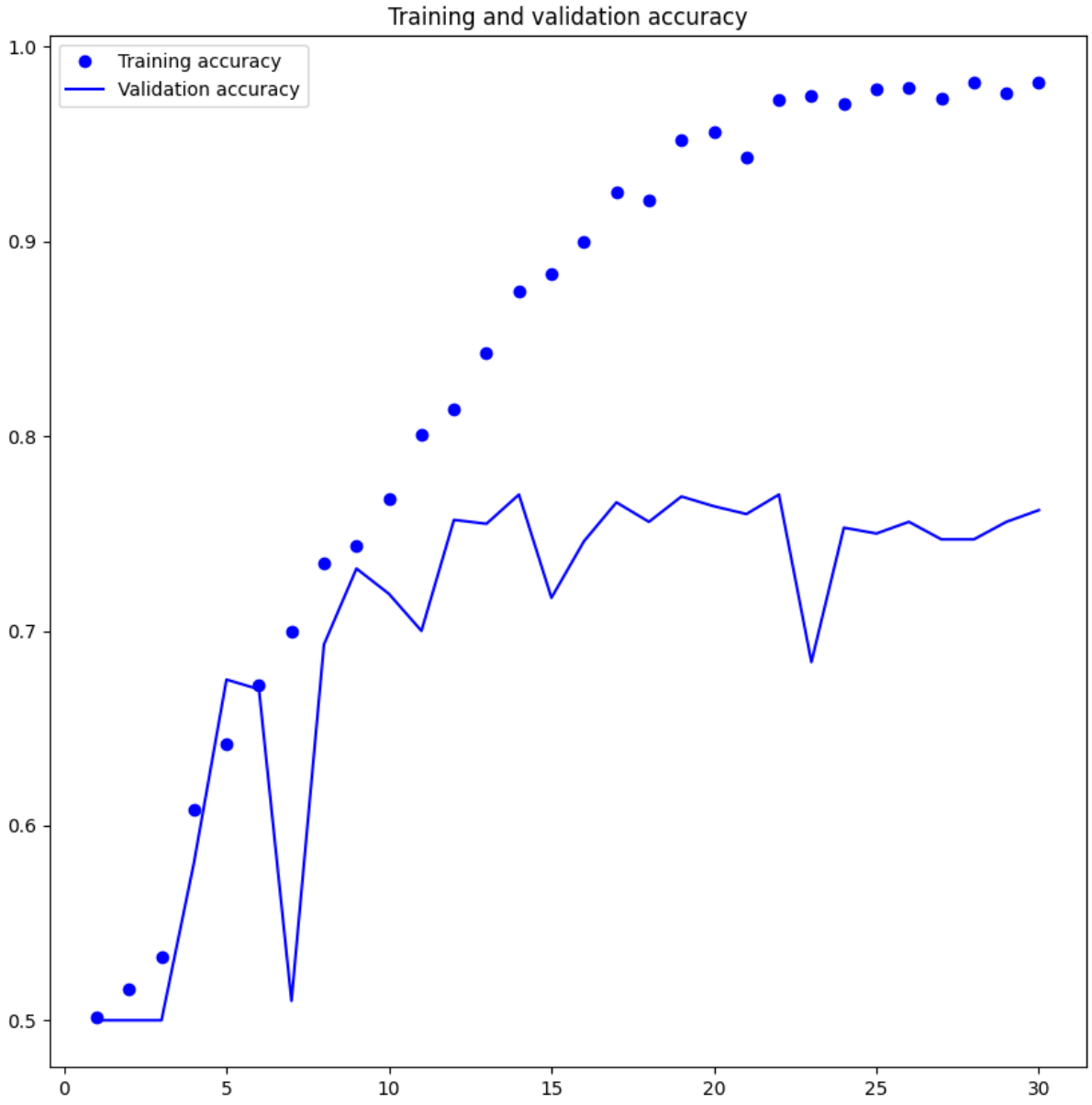
INTRODUCTION:

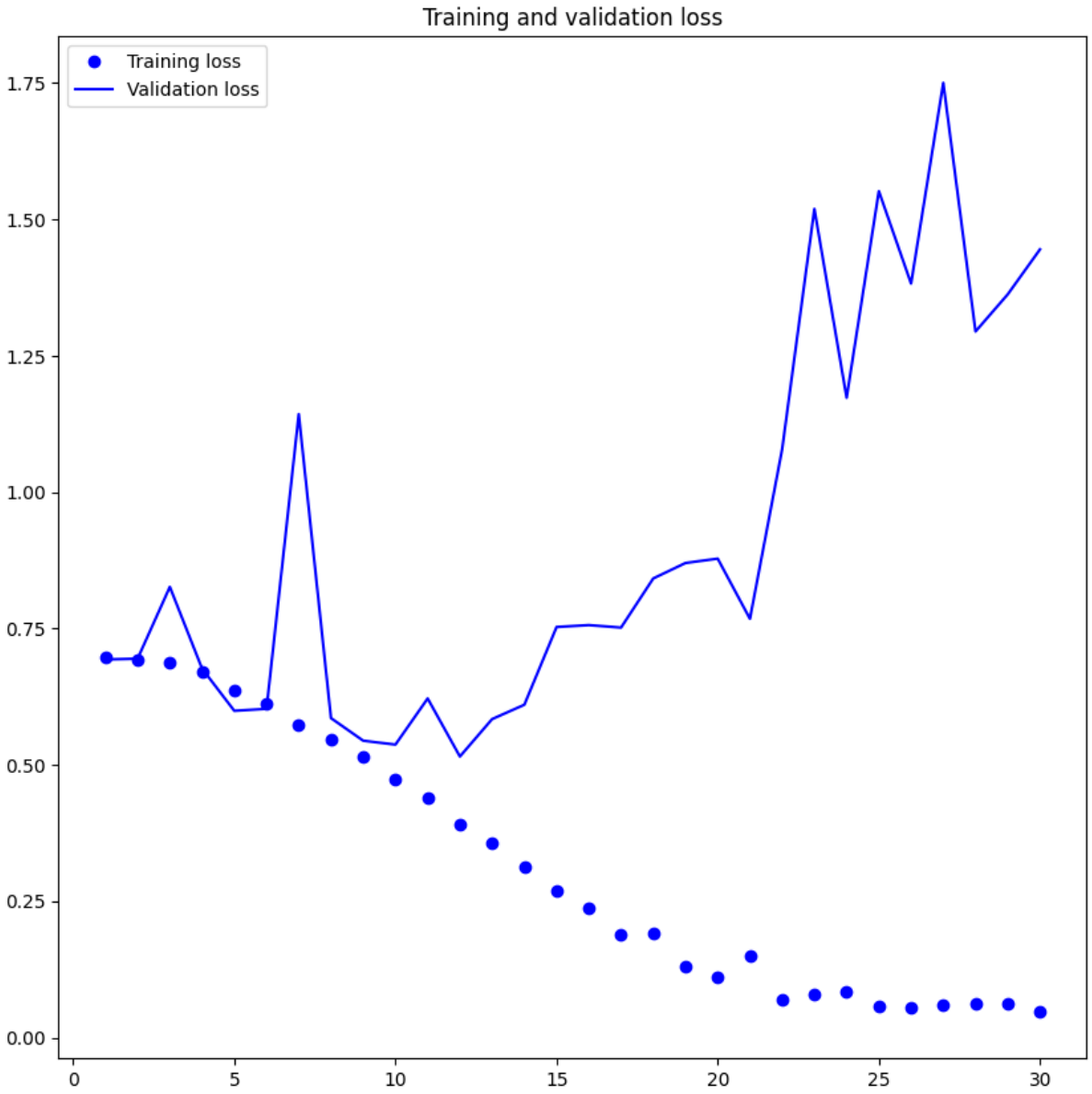
The report thoroughly explains using the example of classifying cats and dogs how the training sample size influences the choice of network architecture. It also discusses methods to tackle overfitting and improve model performance. Furthermore, the report assesses how well the model performs on validation and test sets. Finally, it compares the results obtained by training a network from scratch with those achieved using a pre-trained network.

Training network from scratch.

- We start with the training sample of 1000, validation sample of 500, and a test sample of 500
- And we used a CNN with the three convolutional layers two max pooling layers, and 2 dense layers.
- After that to reduce the overfitting we have applied droup out after second dense layer.
- After that we got the initial accuracy which is 74.8% but this Was happened due to overfitting
- Later there we introduced the data augmentation, early stopping and drop out, which caused the accuracy to drop.
- When these techniques are been introduced the accuracy just was dropped, but this is expected as the model is now going to get better generalized and less prone to over fitting.

Displaying curves of loss and accuracy during training



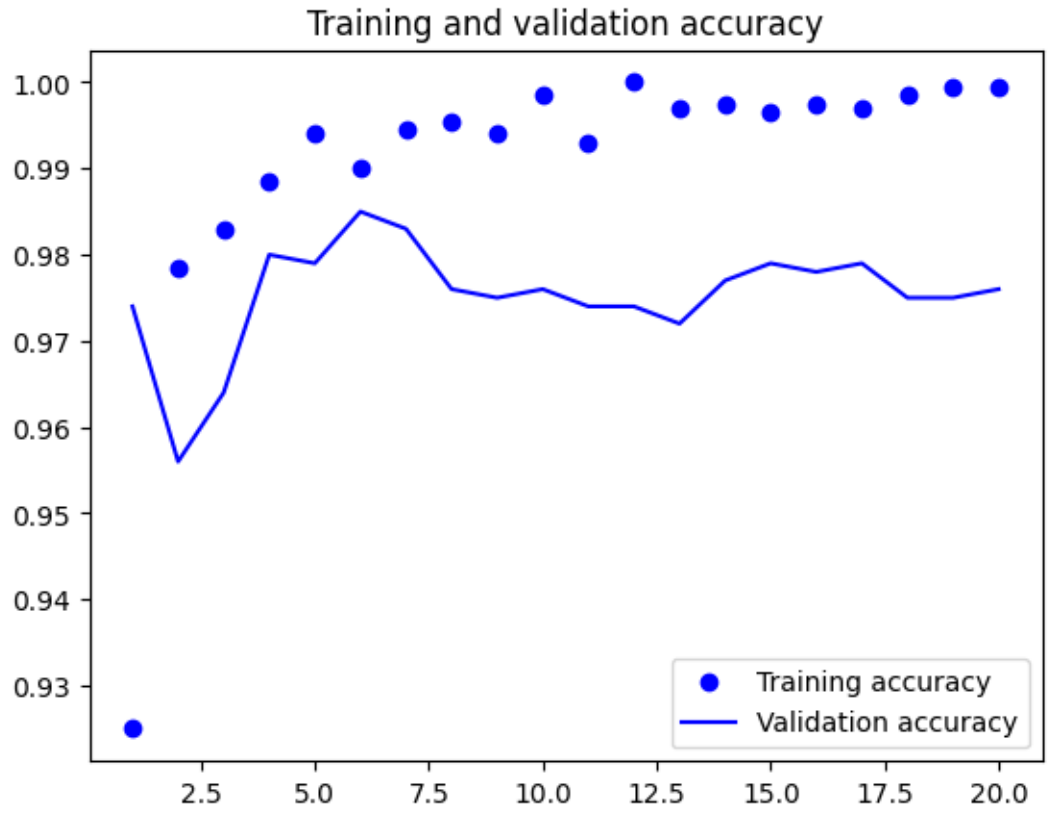


- Using a pretrained network:

In particular, when working with limited data, building a highly accurate deep learning model from scratch can be challenging. Using a pre-trained model that has already learned a lot from a large dataset is one useful trick. Subsequently, you can modify this model to meet your own requirements. Similar to taking out a loan from someone who is an expert in a field, it can frequently provide you an advantage and yield superior outcomes than beginning from scratch.

In your case, you used a pretrained VGG16 network, a popular deep learning architecture that had previously been trained on a sizable dataset. Prior to fine-tuning the model on your dataset, you added a dense layer with 256 units and froze the convolutional layer weights. Consequently, your validation accuracy was 97.6%, a significant improvement over creating a model from the ground up. This approach highlights the benefits of using pretrained models and adjusting them to meet your specific needs.

Pretrained model with enhancement: In this case, the validation accuracy went up to 97.3%. Test accuracy was 97.8% when a predefined model was used and fine-tuned.



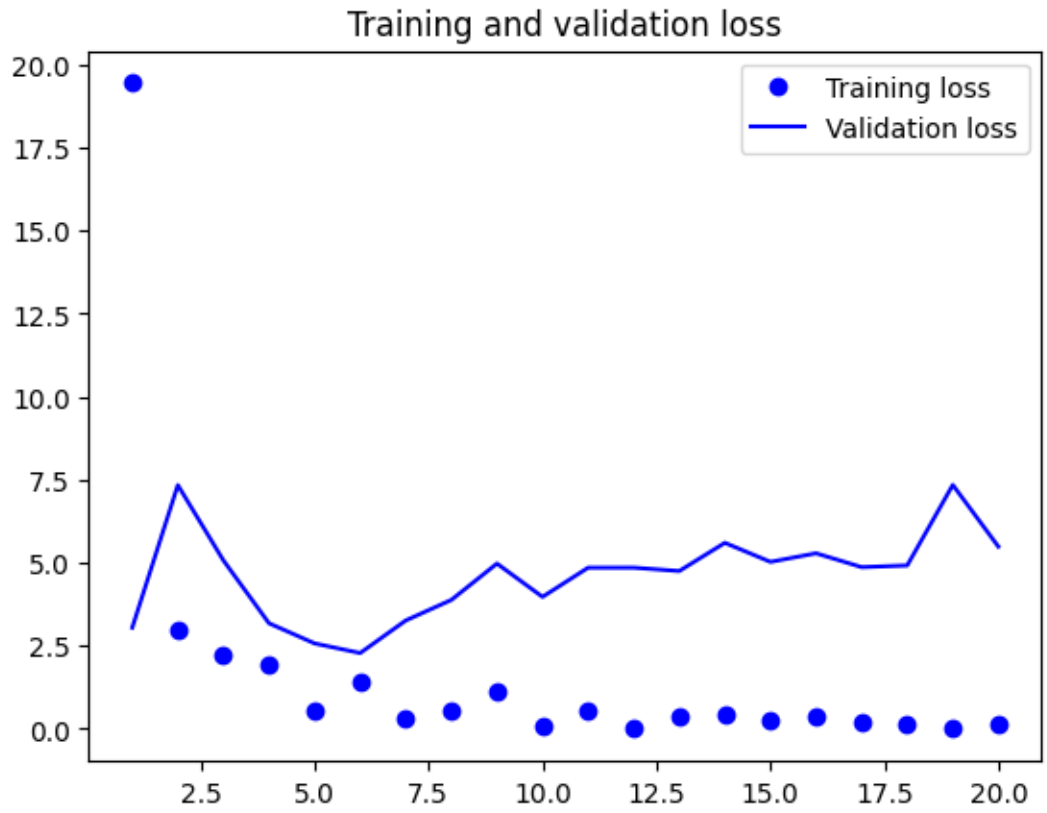


Table:

Table for trained model analysis

Loss values	Accuracy values	Validation loss	Validation accuracy
0.0472	0.9815	1.4452	0.7620

After increasing training sample and pretrained sample

Loss values	Accuracy values	Validation loss	Validation accuracy
0.6299	0.9895	2.1986	0.9810

Conclusion:

Indeed The amount of training data and the network architecture employed, according to our research, significantly impacted how well deep learning models performed. We found that using a pretrained network and increasing the size of the training sample could lead to a significant improvement in performance. Additionally, we noticed that the relationship between network architecture and training sample size. The process of selection is intricate. For smaller datasets, networks with simpler structures might work, but larger datasets might need more complex structures to reveal the underlying patterns in the data.