

Convolution

Assignment 2-Report

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Introduction:

In this report, we evaluate the performance of a convolutional neural network using a cat and dog scenario. Changing and determining which sample size and approach is more useful in the model building phase.

Approach:

We have created 3 pre-trained models and 6 scratch models utilizing a variety of scenarios. These configurations vary depending on of the number of layers, nodes, optimizers, dropout rates, and other factors.

Validation Accuracy: , Test Accuracy: , and Test loss: (Scratch Models)

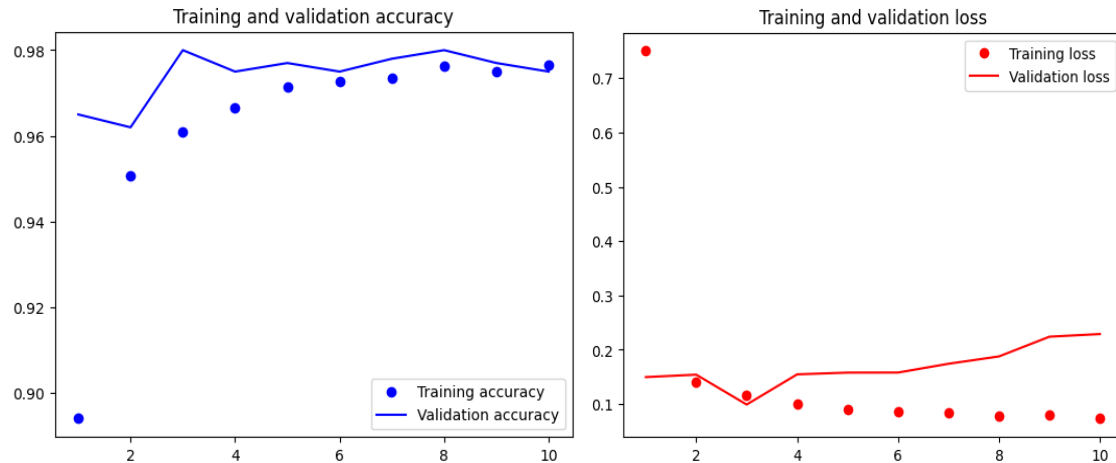
Model number:	Training size:	Validation,Test size:	Validation Accuracy:	Test Accuracy:	Test Loss :
Model Number 1	1000	500,500	0.739	0.739	0.539
Model Number 2	1000	500,500	0.789	0.789	0.460
Model Number 3	1000	500,500	0.762	0.762	0.506
Model Number 4	1000	500,500	0.798	0.798	0.423
Model Number 5	5000	500,500	0.889	0.889	0.515
Model Number 6	10000	500,500	0.902	0.902	0.303

Validation Accuracy: , Test Accuracy: , and Test Loss: (Pre-Trained Models)

Model number:	Training Size:	Validation, Test size:	Validation Accuracy:	Test Accuracy:	Test Loss:
Model Number 7	1000	500,500	0.975	0.975	0.157
Model Number 8	5000	500,500	0.976	0.976	0.106
Model Number 9	10000	500,500	0.983	0.983	0.077

Observations:

- With a training sample size of 1000, a validation sample size of 500, and a test sample size of 500, the accuracy of the irregular cat and dog model example was very poor at 73%. Since the training sample size was small, this suggests overfitting.
- We can improve the model's performance while maintaining the same sample size of 1000 by applying several strategies. I utilized the following three model strategies to do this:
 - a) Dropout Method
 - b) Data Augmentation
 - c) Data Augmentation and dropout method
- It was found that the accuracy of the model that was trained utilizing the data augmentation and dropout gave improved accuracy.
- Train using additional data: More data during training improves accuracy. The accuracy was increased when we tried to increase the training samples to 5000 and 10,000.
- The validation accuracy was 97% when we further raised the training sample size to 5000.
- The validation accuracy increased to 98% when we raised the size of the training sample to 10000. Here, I've added the Maxpooling, Data Augmentation, Dropout Method with a Dropout Rate of 0.5, and Early Stopping techniques.



- The regularized models appeared to offer more accuracy when compared to the unregularized model.
- We can see that the models with pre-trained training sizes of 1000, 5000, and 10,000 had better test and validation accuracy.
- Overall, both scratch and pre-trained models performed most effectively with a training sample size of 10000.

Conclusion:

As a result of addressing the issue of overfitting, we can claim that the size of the training sample plays an important role in increasing the model's accuracy. Additionally, other hyper-tuning factors including max-pooling, data augmentation, and dropout approach aid in enhancing the model's performance. A significant increase in accuracy can be observed when pre-training the models, so we conclude that the pre-training of the model together with the size of the training sample is important.