

# Advanced Machine Learning Neural Network Assignment

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## **IMDB DATASET:**

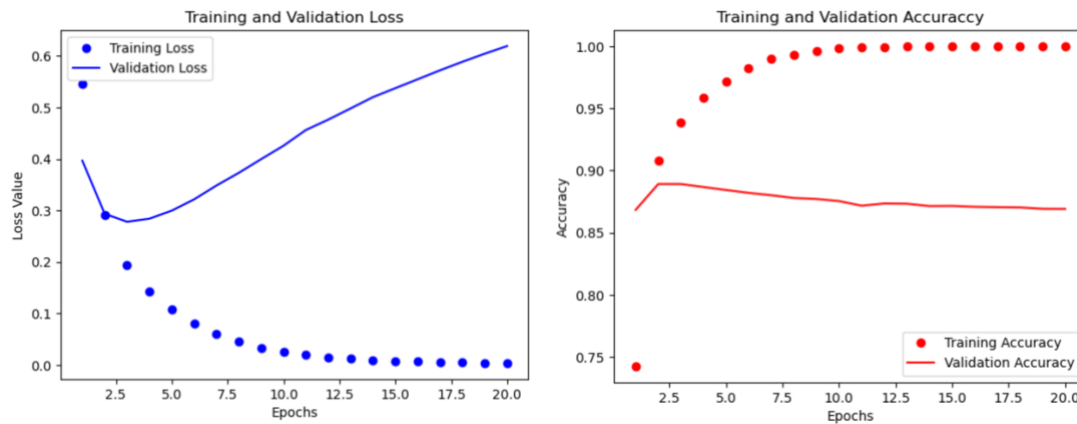
This "IMDB dataset" is a set of 50,000 extremely critical comments on the Online Movie Database. There is an equal proportion of both positive and negative ratings in the 25,000 reviews allocated for testing and 25,000 reviews for training. This dataset is preprocessed by the Keras; the reviews have already been turned into a series of integers that correspond to dictionary words. I have employed 16, 32, 64, and 128 neurons in 3 hidden layers. By comparing the test and validation graphs and using the highest validation accuracy (binary accuracy), the ideal epoch was identified.

According to the preliminary findings, accuracy increased until epoch 4, at which point it began to decline, suggesting overfitting. With a test accuracy of 0.8840%, epoch 4 saw the highest validation accuracy.

The TanH activation function, ADAM optimizer, and MSE Loss function were employed by the model. There was minimal effect on the test and validation accuracy when the activation function, optimizer, and loss function were changed. For varying numbers of neurons, there was no discernible trend or variance in accuracy whether using 1, 2, or 3 hidden layers.

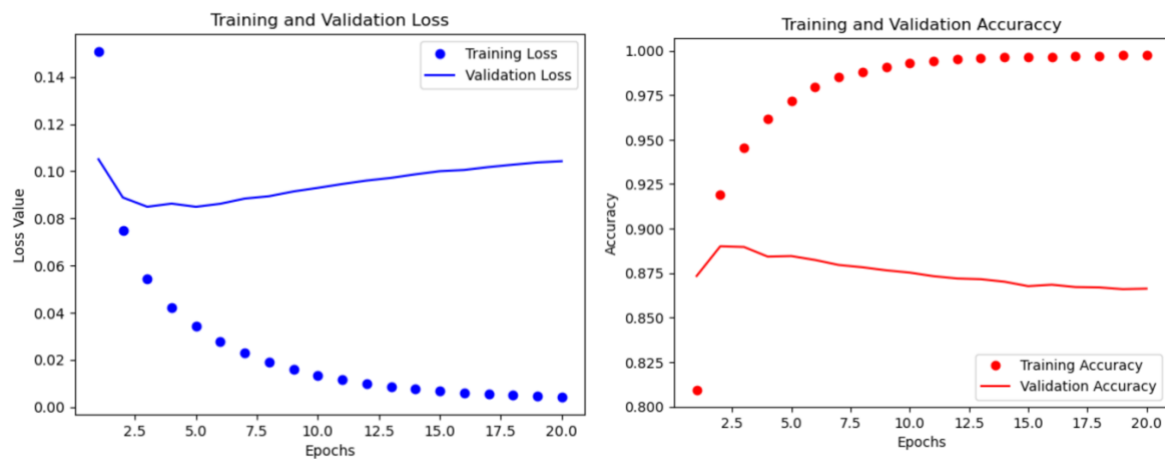
The validation and test accuracy did not, however, significantly improve with an increase in the number of layers and neurons. The validation and test accuracy did not considerably increase when the normalization model using dropout method was applied.

Here we have used different approaches that we used for validation of loss and Accuracy.



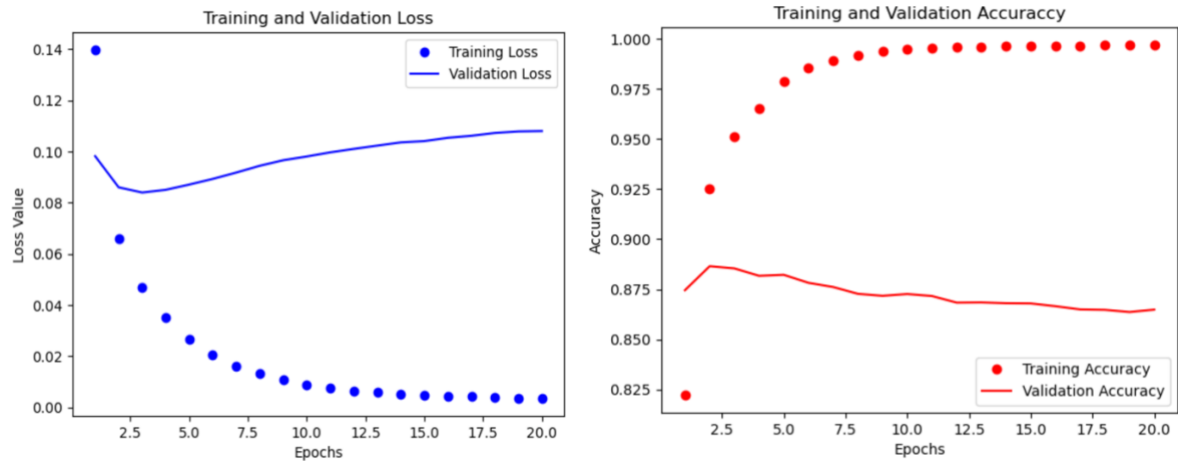
By Using a trained model to generate predictions on new data and implemented with 1 hidden layer with 16 neurons and binary cross entropy loss function with accuracy of 0.8866

Implemented one hidden layer with 32 neurons and MSE loss function.



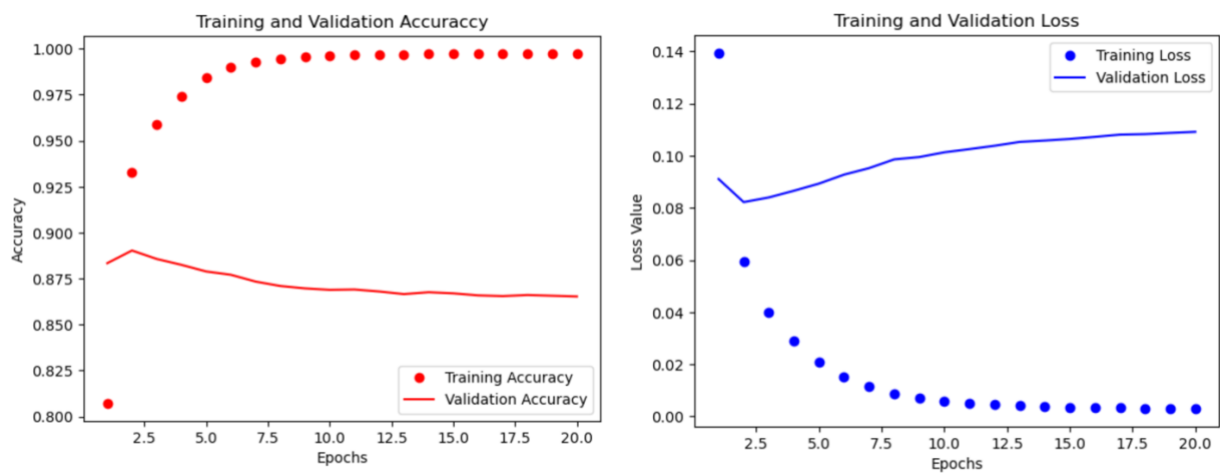
Accuracy 0.880

Implemented one hidden layer with 64 neurons and MSE loss function.



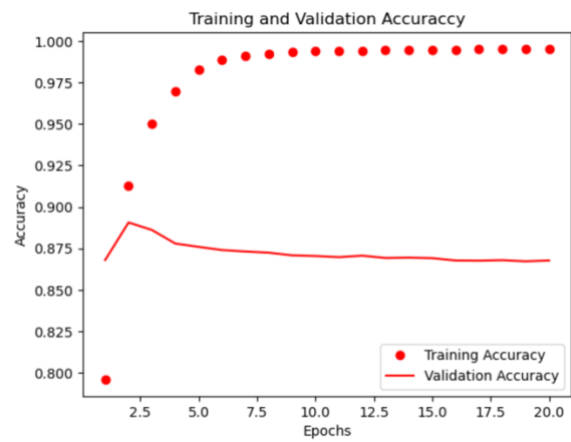
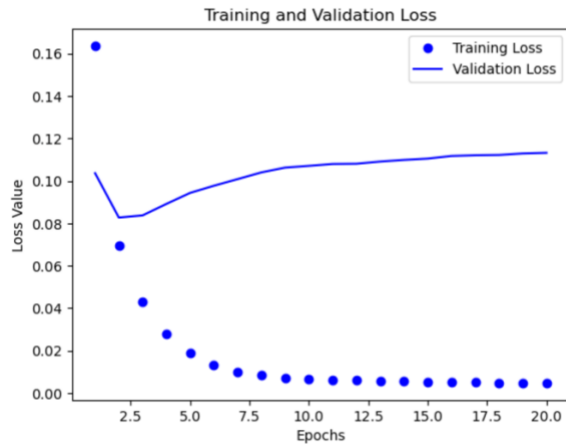
Accuracy:0.885

Implemented one hidden layer with 128 neurons and MSE loss function.



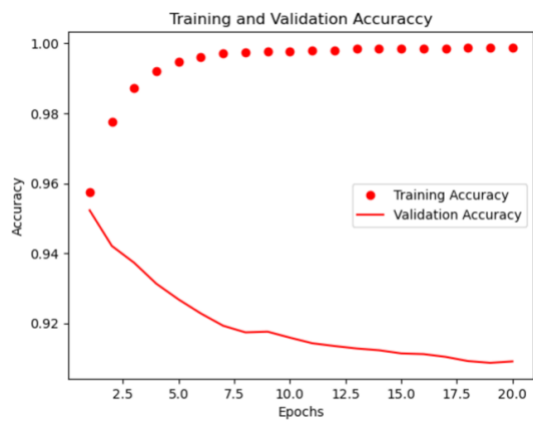
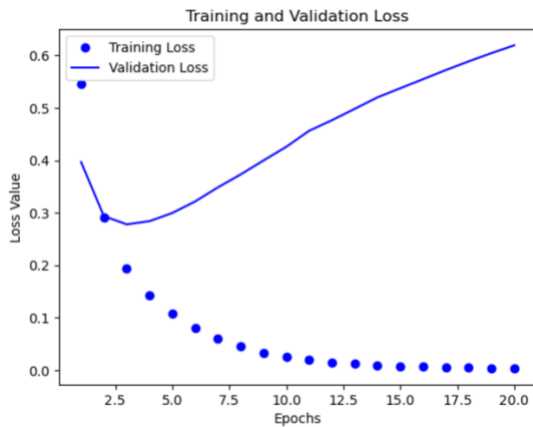
Accuracy 0.876

Implemented three hidden layers with 16 neurons and MSE loss function.



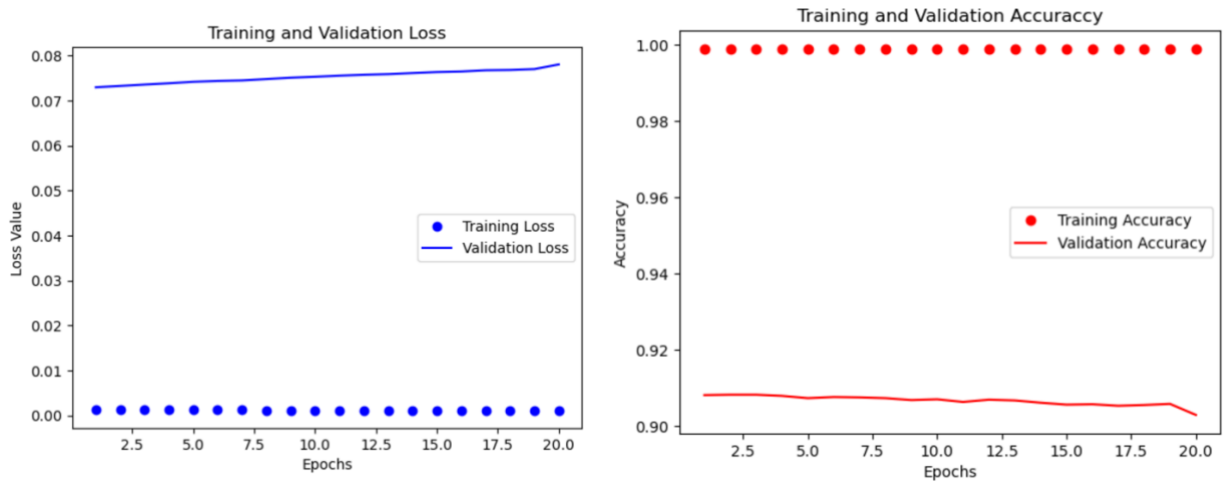
Accuracy 0.877

Implemented three hidden layers with 16 neurons and MSE loss function.



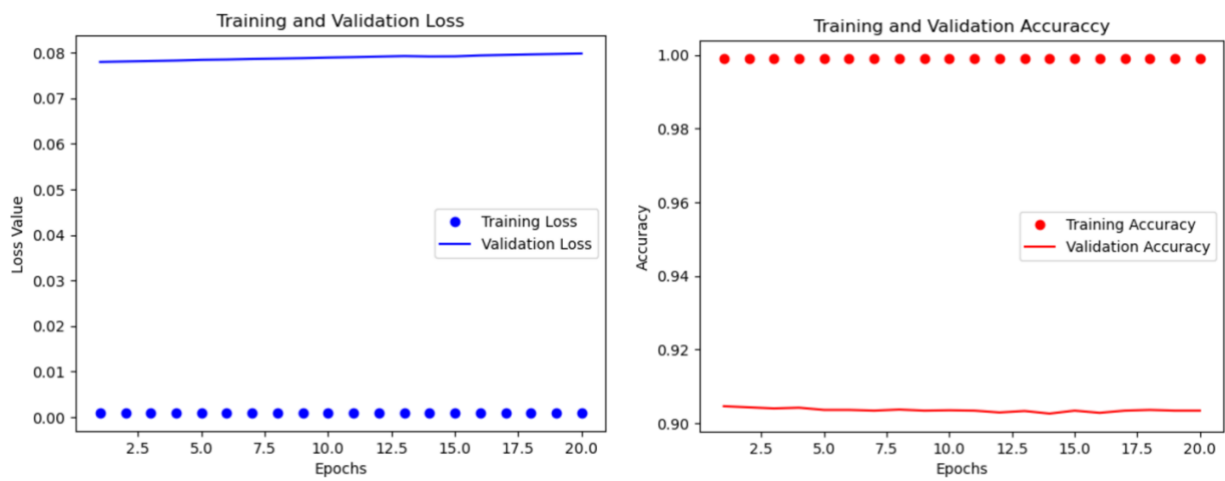
Accuracy 0.875

Implemented three hidden layers with 32 neurons and MSE loss function.



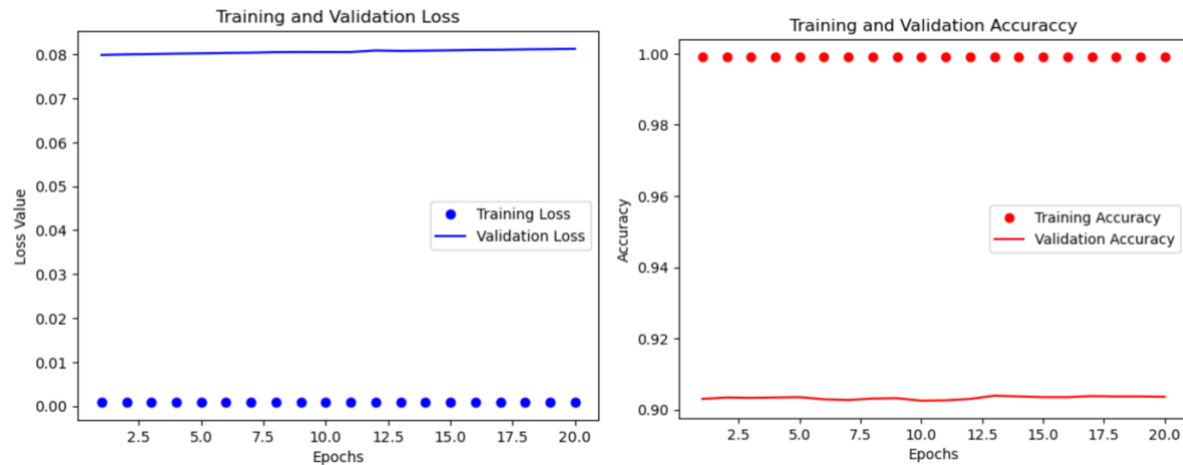
Accuracy 0.856

Implemented three hidden layers with 64 neurons and MSE loss function.



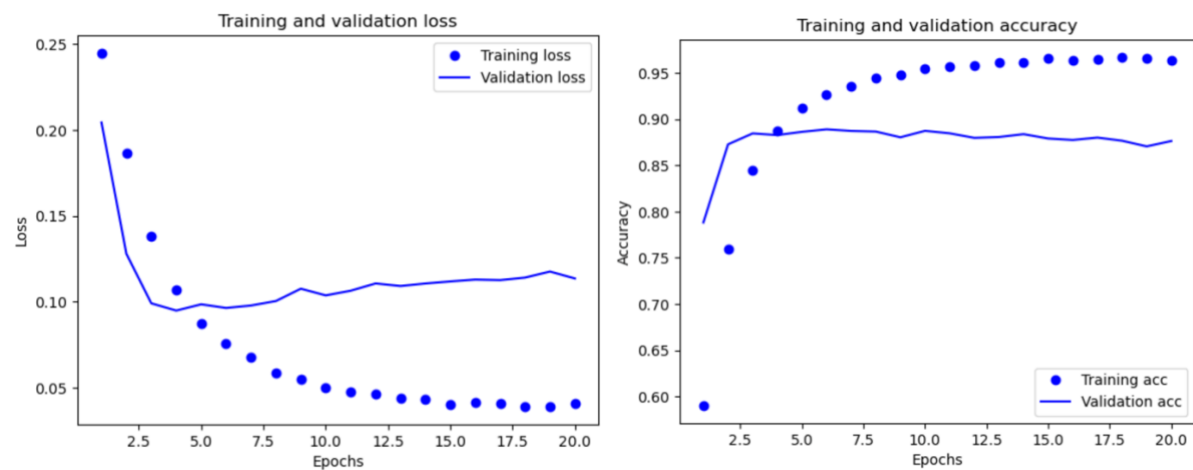
Accuracy 0.856

Implemented three hidden layers with 128 neurons and MSE loss function.



Accuracy 0.856

Training model with hyper tuned parameters



Accuracy 0.876

**Conclusion:** Changing layers of neurons and functions does not significantly improve test accuracy. As per hyper tune parameter has the best accuracy and least validation lost so it is the best model.