

# AML assignment – 2

## Neural network model for IMBD data set

The general structure of the model:

- Initially, 2 hidden layers have 16 nodes in each layer with ReLU as the activation function and the activation function is changed to **tanh** to observe as different activation function changes the accuracy of the Validation and the test set.
- The process goes on till we get the best accuracy by tuning parameters.eg: layers(2,3), activation function(mse/binary\_crossentropy).. etc.,
- The third layer is the output layer which uses a sigmoid function.

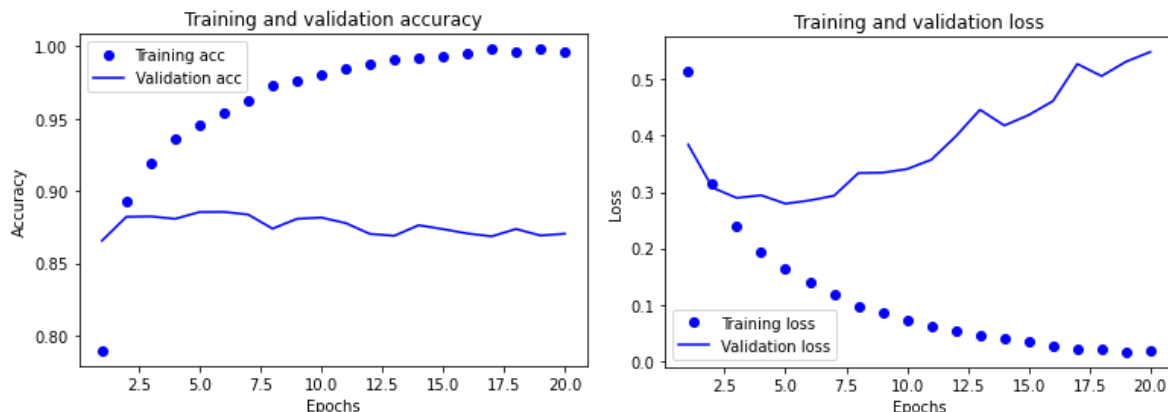
The following functions were adopted in the overall process:

- Rmsprop optimizer is used and Adam optimizer(best)
- Binary\_crossentropy as loss function as it is a binary classification problem. And changed the loss function to MSE to check the accuracy.
- The measure of performance is Accuracy.

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### Model runtime values:

The validation set is used for tuning the hyperparameters while finding the optimal value. We usually adjust the value of the hyperparameter in the training set and check the model's performance on the validation set. This adjusting of the hyperparameter is in the process until the maximum accuracy is attained.



From the above graphs, we can observe that the minimum validation loss and maximum accuracy are obtained nearly at 2 epochs which is less than 2.5 epochs. After 2.5 epochs, the accuracy of the training data is increasing but the accuracy of validation

starts decreasing. This means that after 2.5 epochs, the model is overfitted. Hence, the optimal epochs are chosen as 2 which will decrease the model from overfitting

Hence, the optimal epochs are chosen as 2 which will decrease the model from overfitting. Here, we got accuracy at epoch 2 as 87.55 and the test accuracy is 87.94 from the results of the code.

### **Tuning Hyperparameters:**

Then, we tried tuning parameters such as layers, neurons and, activation function, loss function to check the accuracy of validation and test data.

Layers	Activation function	nodes	Loss function	Accuracy validation	Accuracy test
2	Relu,Relu(rmsprop)	16	Binary_crossentropy	87.55	87.94
3	Tanh,tanh,tanh(rmsprop)	16	mse	86.43	87.14
3	Tanh,tanh,tanh	32	mse	87.98	88.53
3	Tanh,tanh,tanh	64	mse	81.88	88.52

From the above table, we can say that accuracy changes when tuning the hyperparameters.

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### **Dropout technique:**

Generally, this technique is used to increase the model's accuracy on test and validation data

I used both ReLU activation functions for better performance of the model.

After using the Dropout technique, there is a significant improvement in the validation and test accuracy which is 89.01 and 88.81. This shows an approximate improvement of 2% after using the Dropout technique.

Layers	Activation function	nodes	Loss function	Accuracy validation	Accuracy test
2	Relu, relu(Adam)	16	Binary_crossentropy	89.01	88.81