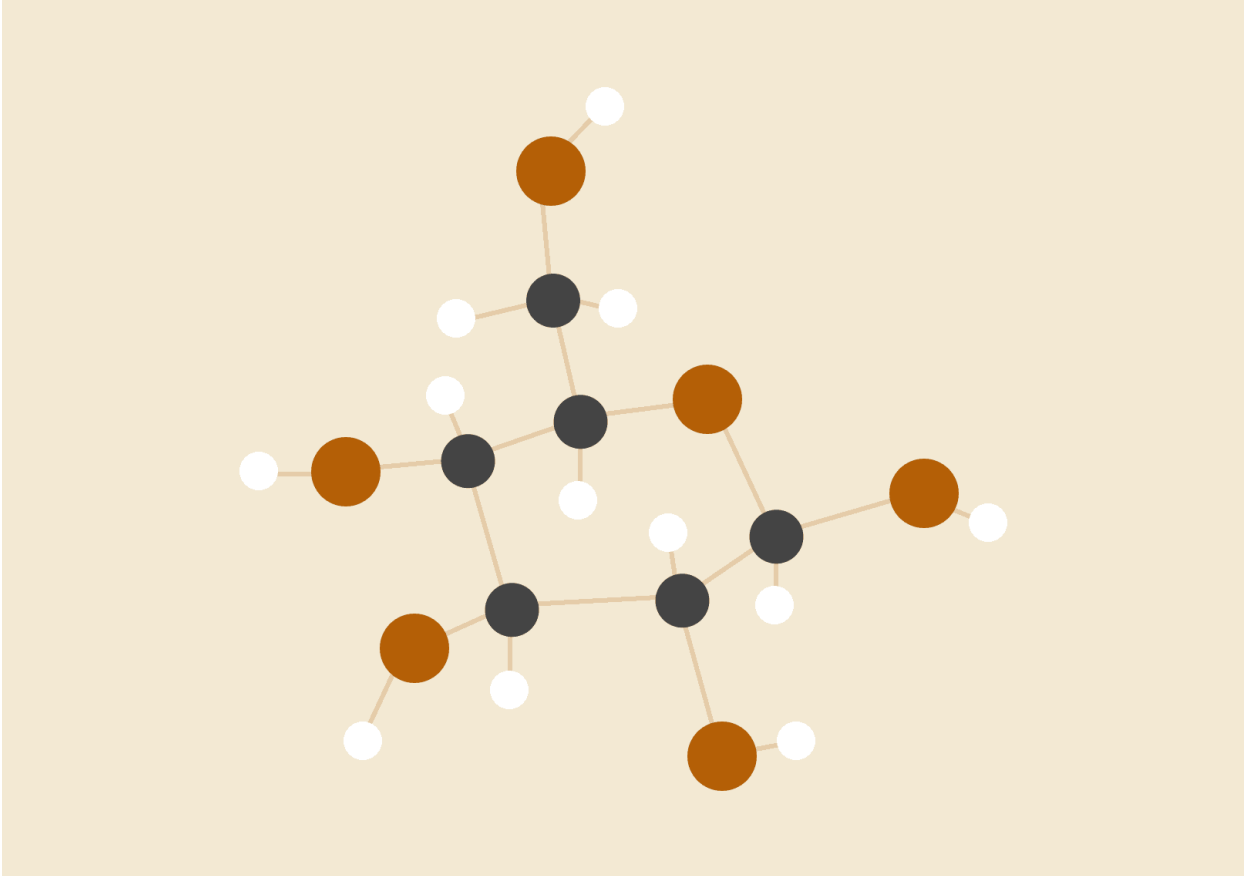
MACHINE LEARNING ASSIGNMENT REPORT



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PART A-

Model

We implemented Naive Bayes model from scratch, and trained it on a dataset which contained details of adults, and whether he was earning more than $50k a year.

The dataset can be found at-
https://archive.ics.uci.edu/ml/datasets/Adult

Parameters

The model was run 10 times, with 67% training data, and 33% testing data. The average of all runs was considered for evaluation

Results

Table A.1 shows the average metrics after 10 runs.

Model	Accuracy	Precision	Recall	F1 Score
Naive Bayes	0.83	0.62	0.75	0.68

Table A.1

Comparison

We implemented KNN, and Log Reg using sklearn, and took average metrics of 10 runs. ***Table A.2*** shows the results of the same.

Model	Accuracy	Precision	Recall	F1 Score
Naive Bayes	0.83	0.62	0.75	0.68
KNN	0.80	0.65	0.61	0.63
LR	0.81	0.68	0.43	0.54

Table A.2

Conclusion

As we can see clearly, the best model is Naive Bayes, as it has the highest F1 score and accuracy.

PART B-

Model

We implemented a basic neural network using tensorflow and keras that can classify images of handwritten digits from the MNIST dataset.

Parameters

-15 different Neural Networks(By changing activation functions and architecture) were trained and tested, accuracy and confusion matrix was calculated for each.
-Optimizer was used while training.
- Activation functions used for hidden layers are : Relu,Tanh and Sigmoid
-Activation function for the output layer was Softmax

Results

Table B.1 shows the metrics of 2 layer networks tested (for confusion matrix see o/p PDF)

Layer1/layer2	Accuracy
Relu/Relu	0.95
Relu/Sigmoid	0.93
Tanh/Sigmoid	0.9
Tanh/Relu	0.9
Relu/Tanh	0.87
Sigmoid/Relu	0.92
Tanh/Tanh	0.88

Table B.1

Table B.2 shows the metrics of 3 layer networks tested (for confusion matrix see o/p PDF)

Layer1/layer2/Layer3	Accuracy
Relu/Relu/Relu	0.95
Relu/Relu/Sigmoid	0.94
Tanh/Tanh/Relu	0.88
Tanh/Tanh/Tanh	0.89
Sigmoid/Sigmoid/Relu	0.9
Sigmoid/Sigmoid/Sigmoid	0.89
Relu/Relu/Tanh	0.9

Table B.2

Conclusion

There are no significant better models. But the Relu activation function with 2 hidden layers gave slightly better accuracy.