Ahsanullah University of Science and Technology

Department of Computer Science & Engineering

Course No. : CSE 4238
Course Name : Soft Computing Lab

Assignment No. : 02

Submitted To

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Section : A (A2)

Task Name :

To solve a text classification problem using the model described

Model Architecture:

As per the report instructions, First model is based on Neural Network with two pre-processing steps, i) Stop Word removal and ii)Stemming and a feature selection method called Bag of Words (BoW).
The second model is also a neural network with two pre-processing steps same as the first model and a feature selection method called Term Frequency-Inverse Document Frequency (TF-IDF).

Each of the two neural networks have five dense hidden layers with 512 nodes in each.

Hyperparameters:

Different hyperparameters used in two models are stated in Table 1

Table 1

Hyperparameter	Neural Network (BoW)	Neural Network (TF-IDF)
Epoch	50	100
Learning Rate	0.001	0.001
Optimizer	Adam	Adam
Batch Size	12104 (vocabulary size)	12104 (vocabulary size)
Activation Function	ReLu (hidden layers) Sigmoid(Output)	ReLu (Hidden layers) Sigmoid (Output)
Loss	Binary Cross Entropy Loss with Logits (BCELosswithLogits)	Binary Cross Entropy Loss with Logits (BCELosswithLogits)

Loss Graphs:

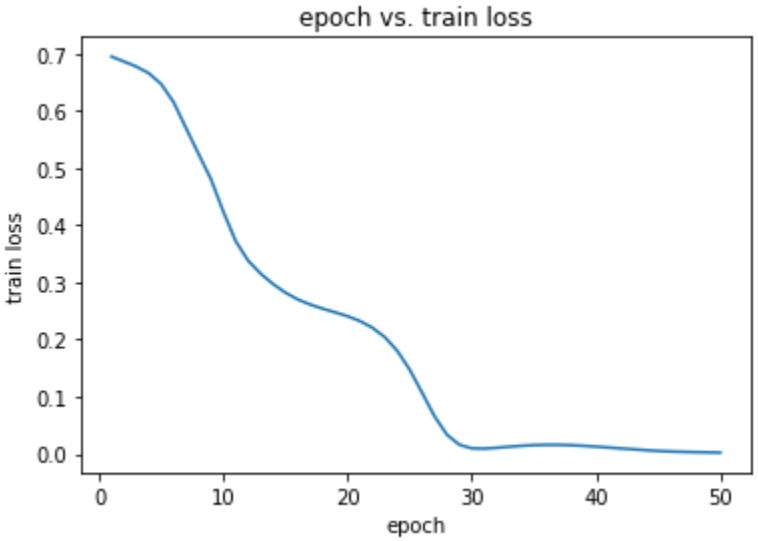

Fig 1. Train Loss of BoW Neural Network Model

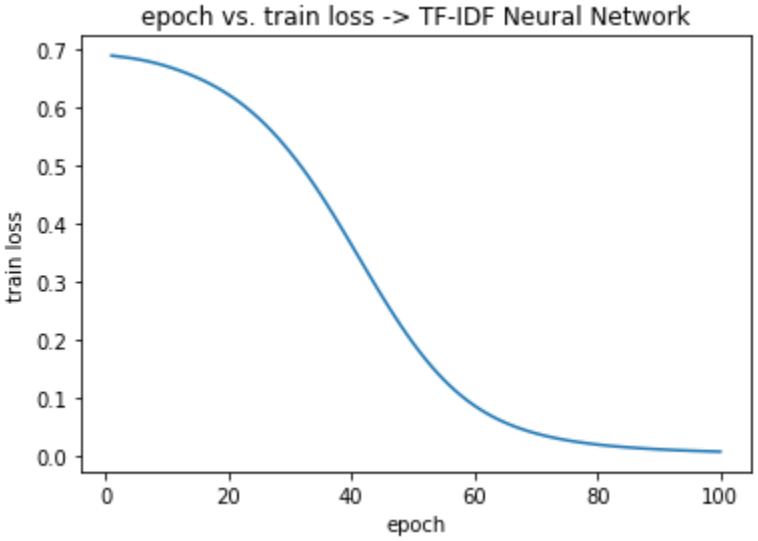

Fig 2. Train Loss of TF-IDF Neural Network Model

Performance Metrics:

Performance metrics differences are stated below in Table 2.

Table 2

	Neural Network (BoW)	Neural Network (TF-IDF)
Accuracy	76.44%	63.67%
Precision	78.93%	63.85%
Recall	82.35%	99.32%
F1 Score	77.73%	77.73%

For the given dataset, I trained the neural network model with given hyperparameters of learning rate = 0.001, epoch = 50 (first model) and 100(second model), number of hidden layers = 5, number of nodes in each hidden layer = 512 and batch size of 12104 (vocabulary size). The dataset has been splitted into 80:20 train and test dataset ratio.

From the performance metric it is seen that the first model is performing average. But interestingly, the recall value in the second model is very high whereas the other performance metrics are average.
Precision is a measure of how often your predictions for the positive class are actually true. High precision relates to a low false positive rate, and high recall relates to a low false negative rate. In our case, low precision and high recall can indicate an unbalanced dataset for a TF-IDF Feature selection method.

Github Link :

https://github.com/ShreyaChakraborty50/Soft_Computing_Lab/blob/main/170204050_Assignment2_CSE4238.ipynb