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CSC 44800
12/11/23

Recurrent Neural Network (RNN) Deep Learning TensorFlow Neural Network

The TensorFlow neural network that I designed is an unsupervised learning model. As a result of this, this model took the most training and data breakdown out of all the models used. I had to first clean up the data. What I mean by this is that I removed stopping words, punctuation marks, duplicate words in the text being analyzed, email addresses, URL links, and numbers. After doing that, I further broke down the data using tokenization, stemming, and lemmatization to make it even easier for the TensorFlow neural network to classify the data. Then, I began to split the dataset as I did for the other models, allocating 80% of the data for training and 20% of it for testing. The neural network consists of an input layer that receives the dataset, seven hidden layers to understand the data, and an output layer to output the results. Once all this was done, the time came to test the dataset. I used multiple iterations of the neural network, where each iteration builds off the previous one to improve the model over time. The final accuracy of this model was 0.745500. Figure 10 below shows all the iterations my neural network worked through. This accuracy was the lowest out of all the models and methods I had used. Some things that I can improve upon are to require more iterations, better training and testing set ratios, or even including more feature extraction methods. These things should increase the

accuracy of RNN and better reflect how it performs in terms of text classification.

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In [46]: model.compile(loss='binary_crossentropy',optimizer=RMSprop(),metrics=['accuracy'])

In [47]: history=model.fit(X_train,Y_train,batch_size=80,epochs=6, validation_split=0.1)

        Epoch 1/6
        WARNING:tensorflow:From C:\Users\chaud\anaconda3\Lib\site-packages\keras\src\utils\tf_utils.py:492: The name tf.ragged.RaggedTe
        nsorValue is deprecated. Please use tf.compat.v1.ragged.RaggedTensorValue instead.

        WARNING:tensorflow:From C:\Users\chaud\anaconda3\Lib\site-packages\keras\src\engine\base_layer_utils.py:384: The name tf.execut
        ing_eagerly_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

        360/360 [==============================] - 114s 312ms/step - loss: 0.5990 - accuracy: 0.6662 - val_loss: 0.5415 - val_accuracy:
        0.7234
        Epoch 2/6
        360/360 [==============================] - 113s 315ms/step - loss: 0.5106 - accuracy: 0.7547 - val_loss: 0.5257 - val_accuracy:
        0.7300
        Epoch 3/6
        360/360 [==============================] - 113s 314ms/step - loss: 0.4933 - accuracy: 0.7634 - val_loss: 0.5248 - val_accuracy:
        0.7344
        Epoch 4/6
        360/360 [==============================] - 112s 312ms/step - loss: 0.5135 - accuracy: 0.7511 - val_loss: 0.5271 - val_accuracy:
        0.7406
        Epoch 5/6
        360/360 [==============================] - 113s 313ms/step - loss: 0.4905 - accuracy: 0.7689 - val_loss: 0.5263 - val_accuracy:
        0.7381
        Epoch 6/6
        360/360 [==============================] - 108s 300ms/step - loss: 0.4663 - accuracy: 0.7801 - val_loss: 0.5394 - val_accuracy:
        0.7387

In [50]: accr1 = model.evaluate(X_test,Y_test)

        250/250 [==============================] - 14s 55ms/step - loss: 0.5289 - accuracy: 0.7455

In [51]: print(accr1[1])

        0.7455000281333923

In [ ]:
```

Figure 10: Testing Iterations of TensorFlow neural network.