

[illegible][illegible][illegible]

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190 antiabortion    ...      0      0      0      0      0      0      0
      constitution control ... thursday time trump tuesday voters wade \
0          0      0      0 ...      0      0      0      0      1      0
1          1      0      0 ...      0      0      1      0      0      1
2          0      0      0 ...      0      0      0      0      1      0
3          0      1      ...      0      0      0      0      1      0
4          0      0      ...      0      0      0      0      0      0
... ..
186         0      0      ...      0      0      0      0      0      0
187         0      0      ...      0      0      0      0      0      0
188         0      0      ...      0      0      0      0      0      0
189         0      0      ...      0      0      0      0      0      0
190         0      0      ...      0      0      0      0      0      0

washington woman women world
0          0      0      0      0      0      0      0
1          0      0      0      0      0      0      0
2          0      0      0      0      0      0      0
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4          0      0      0      0      0      0      0
... ..
186         0      0      ...      0      0      0      0      0
187         0      0      ...      0      0      0      0      0
188         0      0      ...      0      0      0      0      0
189         0      0      ...      0      0      0      0      0
190         0      0      ...      0      0      0      0      0

[191 rows x 51 columns]

/usr/folders/ll/yshg9d2k/bwdx463cllx0_2lhb0om0gn/T/pykernel_54087/563212507.py:63: FutureWarning: The error_bad_lines argument has been deprecated and will be removed in a future version. Use on_bad_lines in the future.
BBC_DF = pd.read_csv(filename, error_bad_lines=False)

/Users/xingyuchen/miniconda3/lib/python3.9/site-packages/sklearn/utils/deprecation.py:87: FutureWarning: Function get_feature_names is deprecated; get_feature_names is deprecated in 1.0 and will be removed in 1.2. Please use get_feature_names_out instead.
warnings.warn(msgn, CategoryFutureWarning)

[wordcloud.wordcloud.WordCloud object at 0x7f804a1972b0], <wordcloud.wordcloud.WordCloud object at 0x7f804a197190>

```

In [28]:

```
training_data = My_Orig_DF
train_labels = pd.factorize(labels_DF['LABEL'])[0]
train_labels
WumCols = Final_News_DF_Labels.shape[1]
```

In [29]:

```
# ANN
input_dim = WumCols + 1
input_data = tensorflow.keras.layers.Input(shape=(50))
data = tensorflow.keras.layers.Embedding(input_dim,input_dim, output_dim=18, input_length=50)(input_data)
data = tensorflow.keras.layers.Flatten()(data)
data = tensorflow.keras.layers.Dense(16)(data)
data = tensorflow.keras.layers.Activation('relu')(data)
data = tensorflow.keras.layers.Dropout(0.5)(data)
data = tensorflow.keras.layers.Dense(8)(data)
data = tensorflow.keras.layers.Activation('relu')(data)
data = tensorflow.keras.layers.Dropout(0.5)(data)
data = tensorflow.keras.layers.Dense(4)(data)
data = tensorflow.keras.layers.Activation('sigmoid')(data)
data = tensorflow.keras.layers.Dropout(0.5)(data)
data = tensorflow.keras.layers.Dense(1)(data)
output_data = tensorflow.keras.layers.Activation('sigmoid')(data)

model = tensorflow.keras.models.Model(inputs=input_data, outputs=output_data)
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
model.fit(training_data, train_labels, epochs=10)

Epoch 1/10
6/6 [=====] - 1s 4ms/step - loss: 0.8534 - accuracy: 0.4921
Epoch 2/10
6/6 [=====] - 0s 4ms/step - loss: 0.8125 - accuracy: 0.5079
Epoch 3/10
6/6 [=====] - 0s 5ms/step - loss: 0.7920 - accuracy: 0.5183
Epoch 4/10
6/6 [=====] - 0s 3ms/step - loss: 0.8095 - accuracy: 0.5131
Epoch 5/10
6/6 [=====] - 0s 4ms/step - loss: 0.7701 - accuracy: 0.5131
Epoch 6/10
6/6 [=====] - 0s 3ms/step - loss: 0.7598 - accuracy: 0.5236
Epoch 7/10
6/6 [=====] - 0s 2ms/step - loss: 0.7697 - accuracy: 0.5236
Epoch 8/10
6/6 [=====] - 0s 3ms/step - loss: 0.7589 - accuracy: 0.5079
Epoch 9/10
6/6 [=====] - 0s 2ms/step - loss: 0.7730 - accuracy: 0.5183
Epoch 10/10
6/6 [=====] - 0s 3ms/step - loss: 0.7497 - accuracy: 0.5131
Out[29]: <keras.callbacks.History at 0x7fde946730>
```

In [30]:

```
# RNN
input_data = tensorflow.keras.layers.Input(shape=(50))
data = tensorflow.keras.layers.Embedding(input_dim,input_dim, output_dim=32, input_length=50)(input_data)
data = tensorflow.keras.layers.Bidirectional(tensorflow.keras.layers.SimpleRNN(50))(data)
data = tensorflow.keras.layers.Dense(11)(data)
output_data = tensorflow.keras.layers.Activation('sigmoid')(data)

model = tensorflow.keras.models.Model(inputs=input_data, outputs=output_data)
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
model.fit(training_data, train_labels, epochs=10)

Epoch 1/10
6/6 [=====] - 2s 16ms/step - loss: 0.6979 - accuracy: 0.5236
Epoch 2/10
6/6 [=====] - 0s 17ms/step - loss: 0.6840 - accuracy: 0.5393
Epoch 3/10
6/6 [=====] - 0s 18ms/step - loss: 0.6694 - accuracy: 0.5445
Epoch 4/10
```

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6/6 [=====] - 0s 16ms/step - loss: 0.6441 - accuracy: 0.6545
Epoch 5/10
6/6 [=====] - 0s 18ms/step - loss: 0.6265 - accuracy: 0.6440
Epoch 6/10
6/6 [=====] - 0s 16ms/step - loss: 0.6190 - accuracy: 0.6911
Epoch 7/10
6/6 [=====] - 0s 21ms/step - loss: 0.6132 - accuracy: 0.6649
Epoch 8/10
6/6 [=====] - 0s 17ms/step - loss: 0.6034 - accuracy: 0.7068
Epoch 9/10
6/6 [=====] - 0s 18ms/step - loss: 0.5978 - accuracy: 0.7120
Epoch 10/10
6/6 [=====] - 0s 21ms/step - loss: 0.5714 - accuracy: 0.7487
Keras.callbacks.History at 0x7feda6f7be20

Out [30]:

In [31]: # LSTM
data = tensorflow.keras.layers.Input(shape=(50))
data = tensorflow.keras.layers.Embedding(input_dim=input_dim, input_length=50)(input_data)
data = tensorflow.keras.layers.Bidirectional(tenforflow.keras.layers.LSTM(50))(data)
data = tensorflow.keras.layers.Dense(1)(data)
output_data = tensorflow.keras.layers.Activation('sigmoid')(data)

model = tensorflow.keras.models.Model(input_data, output=output_data)
model.compile(loss='binary_crossentropy', optimizer='adam', metrics='accuracy')
model.fit(training_data, train_labels, epochs=10)
```

```
Epoch 1/10
6/6 [=====] - 3s 27ma/step - loss: 0.6945 - accuracy: 0.4293
Epoch 2/10
6/6 [=====] - 0s 22ms/step - loss: 0.6925 - accuracy: 0.5236
6/6 [=====] - 0s 23ma/step - loss: 0.6922 - accuracy: 0.5236
Epoch 4/10
6/6 [=====] - 0s 24ma/step - loss: 0.6921 - accuracy: 0.5236
Epoch 5/10
6/6 [=====] - 0s 25ma/step - loss: 0.6914 - accuracy: 0.5236
6/6 [=====] - 0s 23ma/step - loss: 0.6910 - accuracy: 0.5236
Epoch 7/10
6/6 [=====] - 0s 23ma/step - loss: 0.6904 - accuracy: 0.5236
Epoch 8/10
6/6 [=====] - 0s 23ma/step - loss: 0.6904 - accuracy: 0.5236
6/6 [=====] - 0s 22ma/step - loss: 0.6892 - accuracy: 0.5236
Epoch 10/10
6/6 [=====] - 0s 23ma/step - loss: 0.6873 - accuracy: 0.5654
Out[31]: keras.callbacks.History at 0x77f7fe739070

In [32]: # CNN
         input_data = tensorflow.keras.layers.Input(shape=(50))
         data = tensorflow.keras.layers.Embedding(input_dim=input_data_dim, output_dim=32, input_length=50)(input_data)
         data = tensorflow.keras.layers.Conv2D(50, kernel_size=3, activation='relu')(data)
```

```
data = tensorflow.keras.layers.Conv2D(40, kernel_size=3, activation='relu')(data)
data = tensorflow.keras.layers.MaxPool2D(pool_size=2)(data)
data = tensorflow.keras.layers.Conv2D(30, kernel_size=3, activation='relu')(data)
data = tensorflow.keras.layers.MaxPool2D(pool_size=2)(data)
data = tensorflow.keras.layers.Conv2D(30, kernel_size=3, activation='relu')(data)
data = tensorflow.keras.layers.MaxPool2D(pool_size=2)(data)
data = tensorflow.keras.layers.Flatten()(data)
data = tensorflow.keras.layers.Dense(20)(data)
data = tensorflow.keras.layers.Dropout(0.5)(data)
data = tensorflow.keras.layers.Dense(1)(data)
output_data = tensorflow.keras.layers.Activation('sigmoid')(data)

model = tensorflow.keras.models.Model(inputs=input_data, outputs=output_data)
model.compile(loss='binary_crossentropy', optimizer='adam', metrics=['accuracy'])
model.fit(training_data, train_labels, epochs=10)

Epoch 1/10
6/6 [=====] - 1s 7ms/step - loss: 0.6930 - accuracy: 0.4869
Epoch 2/10
6/6 [=====] - 0s 8ms/step - loss: 0.6918 - accuracy: 0.5236
Epoch 3/10
6/6 [=====] - 0s 7ms/step - loss: 0.6908 - accuracy: 0.5340
Epoch 4/10
6/6 [=====] - 0s 7ms/step - loss: 0.6903 - accuracy: 0.5340
Epoch 5/10
6/6 [=====] - 0s 8ms/step - loss: 0.6875 - accuracy: 0.5288
Epoch 6/10
```

```
6/6 [=====] - 0s 9ms/step - loss: 0.6868 - accuracy: 0.5340
Epoch 7/10
6/6 [=====] - 0s 8ms/step - loss: 0.6814 - accuracy: 0.5497
Epoch 8/10
6/6 [=====] - 0s 7ms/step - loss: 0.6803 - accuracy: 0.5707
Epoch 9/10
6/6 [=====] - 0s 7ms/step - loss: 0.6790 - accuracy: 0.5759
Epoch 10/10
6/6 [=====] - 0s 9ms/step - loss: 0.6715 - accuracy: 0.6073
Out[32]: <keras.callbacks.History at 0x7f7f67e894d0>
```