ML Challenge WS 2022/23

Task:

Your Task is to train a clickbait filter to classify clickbait articles by their headline. You freely decide how to prepare the data and which ML model to use for classification.

The challenge is considered passed if your model performs better than our baseline (a simple classifier; F1 ~0.89). Report at least the F1 score of your classifier. Your model will be evaluated using a hold out dataset. Please prepare a script so your trained model can be evaluated with this dataset.

Dataset:

The data consists of two files, a text file with clickbait headlines and one with headlines from news sources. The hold out dataset is organized the same way.

IMPORTING PACKAGES

+ Code + Text

```
!pip install wordcloud
```

```
    Requirement already satisfied: wordcloud in c:\users\we\anaconda3\lib\site-packages (1.8.2.2)
    Requirement already satisfied: pillow in c:\users\we\anaconda3\lib\site-packages (from wordcloud) (9.0.1)
    Requirement already satisfied: matplotlib in c:\users\we\anaconda3\lib\site-packages (from wordcloud) (3.6.3)
    Requirement already satisfied: numpy>=1.6.1 in c:\users\we\anaconda3\lib\site-packages (from wordcloud) (1.22.0)
    Requirement already satisfied: packaging>=20.0 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (21.3)
    Requirement already satisfied: cycler>=0.10 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (0.11.0)
    Requirement already satisfied: fonttools>=4.22.0 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (4.25.0)
    Requirement already satisfied: pyparsing>=2.2.1 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (3.0.4)
    Requirement already satisfied: python-dateutil>=2.7 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (2.8.2)
    Requirement already satisfied: contourpy>=1.0.1 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (1.0.6)
    Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\we\anaconda3\lib\site-packages (from matplotlib->wordcloud) (1.3.2)
    Requirement already satisfied: six>=1.5 in c:\users\we\anaconda3\lib\site-packages (from python-dateutil>=2.7->matplotlib->wordclou
```

```
import re
import warnings
import pandas as pd
warnings.filterwarnings("ignore")
import spacy
from spacy.lang.en.stop_words import STOP_WORDS
from wordcloud import WordCloud
import seaborn as sns
import nltk
from nltk.corpus import stopwords
import matplotlib.pyplot as plt
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score,confusion_matrix,precision_score,classification_report,f1_score
```

LOADING AND EDA

```
# read the txt file and store each line as a list element
with open('clickbait_no.txt', 'r' ,encoding='utf-8-sig') as file:
    lines = file.readlines()

# convert the list into a dataframe
clickbait_no = pd.DataFrame(lines, columns=['text'])

# print the dataframe
clickbait_no.head()

clickbait_no['Label']  = 0
clickbait_no.head()
```

	text	Label

```
# read the txt file and store each line as a list element
with open('clickbait_yes.txt', 'r' ,encoding='utf-8-sig') as file:
    lines = file.readlines()

# convert the list into a dataframe
clickbait_yes = pd.DataFrame(lines, columns=['text'])

# print the dataframe
clickbait_yes.head()

clickbait_yes['Label']  = 1
clickbait_yes.head()
```

	text	Label
0	Guys Try Tinder\n	1
1	Michael B. Jordan Got Laid The Fuck Out While ...	1
2	What's The Most Fucked Up Thing You've Done On...	1
3	How Far Would You Make It In The Hunger Games\n	1
4	If Matthew Gray Gubler's Tweets Were Motivatio...	1

```
frames = [clickbait_yes, clickbait_no]
df = pd.concat(frames)
df.head()
```

	text	Label
0	Guys Try Tinder\n	1
1	Michael B. Jordan Got Laid The Fuck Out While ...	1
2	What's The Most Fucked Up Thing You've Done On...	1
3	How Far Would You Make It In The Hunger Games\n	1
4	If Matthew Gray Gubler's Tweets Were Motivatio...	1

```
df['Label'].value_counts()
```

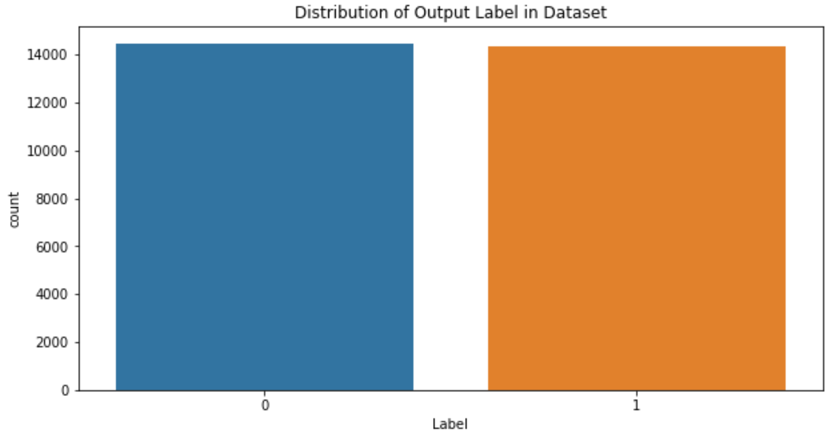
```
0    14465
1    14335
Name: Label, dtype: int64
```

```
df.isnull().sum()
```

```
text     0
Label    0
dtype: int64
```

```
plt.figure(figsize=(10,5))
sns.countplot(x= 'Label', data=df)
plt.title('Distribution of Output Label in Dataset')
plt.show
```

```
<function matplotlib.pyplot.show(close=None, block=None)>
```

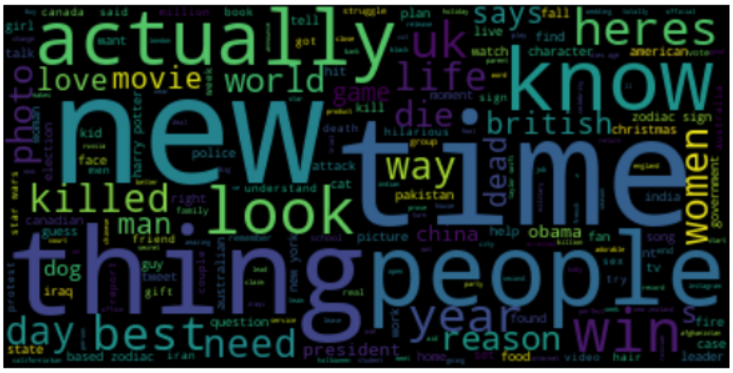


DATA PRECOESSING

```
nlp = spacy.load("en_core_web_sm", disable=['parser', 'tagger', 'ner'])
stops = STOP_WORDS

# For Removing Special Characters
spec_chara = re.compile('[/(){}\[\]\|@,;]')

# For Removing Extra Symbols
ext_sym = re.compile('[^0-9a-z #+_]')


def normalize(comment, lowercase, remove_stopwords):
    if lowercase:
        comment = comment.lower()
        comment = spec_chara.sub(' ', comment)
        comment = ext_sym.sub('', comment)

    comment = nlp(comment)
    lemmatized = list()

# Loop for Lemmatization
    for word in comment:
        token = [token for token in comment]
        lemma = word.lemma_.strip()

        if lemma:
            if not remove_stopwords or (remove_stopwords and lemma not in stops):
                lemmatized.append(lemma)

    return " ".join(lemmatized)


df['Cleaned_Text'] = df['text'].apply(normalize, lowercase=True, remove_stopwords=True)


df.head()
```

	text	Label	Cleaned_Text
0	Guys Try Tinder\n	1	guys try tinder
1	Michael B. Jordan Got Laid The Fuck Out While ...	1	michael b jordan got laid fuck filming creed
2	What's The Most Fucked Up Thing You've Done On...	1	s fucked thing ve rollercoaster tycoon
3	How Far Would You Make It In The Hunger Games\n	1	far hunger games
4	If Matthew Gray Gubler's Tweets Were Motivatio...	1	matthew gray gublers tweets motivational posters

```
plt.figure(figsize=(10,5))

text = ' '.join(df['Cleaned_Text'])

# Create the wordcloud object
wordcloud = WordCloud().generate(text)

# Display the word cloud
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis("off")
plt.show()
```



PREPROCESSING FOR ML MODEL

```
x = df['Cleaned_Text']
y = df['Label']
```

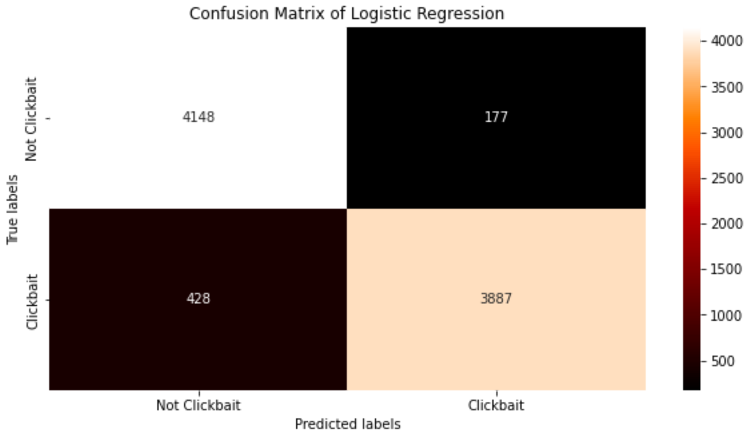
```
Tfid = TfidfVectorizer(max_features=3000)
```

```
x = Tfid.fit_transform(x)

X_train,X_test,y_train,y_test = train_test_split(x,y,test_size=0.3,random_state=2)
```

MACHINE LEARNING MODEL

```
log = LogisticRegression(solver='liblinear', penalty='l1')

model = log.fit(X_train,y_train)

y_pred = log.predict(X_test)

acc = accuracy_score(y_test,y_pred)
print(f"Test Accuracy of Model: {acc}")

f1 = f1_score(y_test,y_pred)
print(f"Test F1_score of Model: {acc}")

     Test Accuracy of Model: 0.9299768518518519
     Test F1_score of Model: 0.9299768518518519
```

```
plt.figure(figsize=(10,5))
ax= plt.subplot()
cm = confusion_matrix(y_test,y_pred ) #confusion matrix on test data
sns.heatmap(cm, annot=True, fmt='g', cmap="gist_heat", ax=ax)

# labels, title and ticks
ax.set_xlabel('Predicted labels');ax.set_ylabel('True labels');
ax.set_title('Confusion Matrix of Logistic Regression');
ax.xaxis.set_ticklabels(['Not Clickbait','Clickbait']); ax.yaxis.set_ticklabels(['Not Clickbait','Clickbait']);

plt.show()
```



```
print(classification_report(y_pred, y_test,target_names= ['Not Clickbait','Clickbait']))

                   precision    recall  f1-score   support

     Not Clickbait       0.96      0.91      0.93      4576
         Clickbait       0.90      0.96      0.93      4064

          accuracy                           0.93      8640
         macro avg       0.93      0.93      0.93      8640
      weighted avg       0.93      0.93      0.93      8640
```

Prediction

```
test = pd.read_csv('clickbait_hold_X.csv')
test.head()
```

	Text
0	How To Make The Ultimate Spaghetti With Red Sauce
1	Soviet human rights activist Yelena Bonner die...
2	Someone Calculated How Much Money Jim Spent Pr...
3	Demonstrators clash with police in Algeria aft...
4	This Color Quiz Will Tell You Which Husky Shou...

```
test.shape
```

```
(3200, 1)
```

```
test['Cleaned_Text'] = test['Text'].apply(normalize, lowercase=True, remove_stopwords=True)
```

```
feature = test['Cleaned_Text']
```

```
feature_transform = Tfid.fit_transform(feature)
```

```
prediction = log.predict(feature_transform)
prediction = pd.DataFrame({'Prediction': prediction})
```

```
predict_data = pd.concat([test, prediction],  axis=1)
predict_data
```

	Text	Cleaned_Text	Prediction
0	How To Make The Ultimate Spaghetti With Red Sauce	ultimate spaghetti red sauce	0
1	Soviet human rights activist Yelena Bonner die...	soviet human rights activist yelena bonner die...	0
2	Someone Calculated How Much Money Jim Spent Pr...	calculated money jim spent pranking dwight off...	0
3	Demonstrators clash with police in Algeria aft...	demonstrators clash police algeria slum protest	0
4	This Color Quiz Will Tell You Which Husky Shou...	color quiz tell husky bff	0
...	...	...	...
3195	WHO: H1N1 influenza virus still a pandemic	h1n1 influenza virus pandemic	0
3196	No More Surprises as Marist Women Assume Highe...	surprises marist women assume higher profile	0

Questions?

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