naive-bayes-and-text-mining

November 25, 2024

[1]:
```
import pandas as pd

df = pd.read_csv('/content/blogs.csv')
```

[2]:
```
print(df.head())
print(df.info())
print(df.describe())
```

```
                                                Data       Labels
0  Path: cantaloupe.srv.cs.cmu.edu!magnesium.club…  alt.atheism
1  Newsgroups: alt.atheism\nPath: cantaloupe.srv…  alt.atheism
2  Path: cantaloupe.srv.cs.cmu.edu!das-news.harva…  alt.atheism
3  Path: cantaloupe.srv.cs.cmu.edu!magnesium.club…  alt.atheism
4  Xref: cantaloupe.srv.cs.cmu.edu alt.atheism:53…  alt.atheism
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2000 entries, 0 to 1999
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Data    2000 non-null   object
 1   Labels  2000 non-null   object
dtypes: object(2)
memory usage: 31.4+ KB
None
                                                   Data       Labels
count                                              2000         2000
unique                                             2000           20
top     Path: cantaloupe.srv.cs.cmu.edu!magnesium.club…  alt.atheism
freq                                                  1          100
```

[4]:
```
import string
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from sklearn.feature_extraction.text import TfidfVectorizer
from nltk.stem import WordNetLemmatizer
import nltk
nltk.download('punkt')
nltk.download('stopwords')
```

```
nltk.download('wordnet')
# Download the 'punkt_tab' resource
nltk.download('punkt_tab') # This line was added to download the missing␣
 ↪resource

stop_words = set(stopwords.words('english'))
lemmatizer = WordNetLemmatizer()

def preprocess_text(text):
    # Convert to lowercase
    text = text.lower()
    # Remove punctuation
    text = text.translate(str.maketrans('', '', string.punctuation))
    # Tokenize text
    tokens = word_tokenize(text)
    # Remove stopwords and lemmatize
    tokens = [lemmatizer.lemmatize(word) for word in tokens if word not in␣
 ↪stop_words]
    return ' '.join(tokens)

df['Data'] = df['Data'].apply(preprocess_text)
```

```
[nltk_data] Downloading package punkt to /root/nltk_data…
[nltk_data]   Package punkt is already up-to-date!
[nltk_data] Downloading package stopwords to /root/nltk_data…
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package wordnet to /root/nltk_data…
[nltk_data]   Package wordnet is already up-to-date!
[nltk_data] Downloading package punkt_tab to /root/nltk_data…
[nltk_data]   Unzipping tokenizers/punkt_tab.zip.
```

[5]:
```
vectorizer = TfidfVectorizer()
X = vectorizer.fit_transform(df['Data'])
y = df['Labels']
```

[6]:
```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
 ↪random_state=42)
```

[7]:
```
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, precision_score, recall_score,␣
 ↪f1_score, classification_report

model = MultinomialNB()
model.fit(X_train, y_train)
y_pred = model.predict(X_test)
```

[8]:
```
print(classification_report(y_test, y_pred))
```

```
                          precision    recall  f1-score   support

             alt.atheism       0.53      0.94      0.68        18
           comp.graphics       0.71      0.83      0.77        18
 comp.os.ms-windows.misc       0.86      0.82      0.84        22
comp.sys.ibm.pc.hardware       0.79      0.76      0.78        25
   comp.sys.mac.hardware       0.86      0.86      0.86        21
          comp.windows.x       1.00      0.80      0.89        25
            misc.forsale       0.83      0.56      0.67        18
               rec.autos       0.89      0.89      0.89        18
         rec.motorcycles       0.83      0.94      0.88        16
      rec.sport.baseball       0.71      0.94      0.81        18
        rec.sport.hockey       0.88      1.00      0.94        15
               sci.crypt       0.86      0.95      0.90        19
         sci.electronics       0.67      0.75      0.71        16
                 sci.med       0.88      0.88      0.88        17
               sci.space       1.00      0.81      0.89        21
  soc.religion.christian       0.85      0.96      0.90        23
      talk.politics.guns       0.95      0.68      0.79        28
   talk.politics.mideast       0.95      0.95      0.95        20
      talk.politics.misc       0.59      0.89      0.71        18
      talk.religion.misc       0.83      0.21      0.33        24

                accuracy                           0.81       400
               macro avg       0.82      0.82      0.80       400
            weighted avg       0.83      0.81      0.80       400
```

[9]:
```
from textblob import TextBlob
```

[10]:
```
def get_sentiment(text):
    analysis = TextBlob(text)
    if analysis.sentiment.polarity > 0:
        return 'positive'
    elif analysis.sentiment.polarity == 0:
        return 'neutral'
    else:
        return 'negative'

df['Sentiment'] = df['Data'].apply(get_sentiment)
```

[11]:
```
sentiment_distribution = df.groupby(['Labels', 'Sentiment']).size().unstack().
↪fillna(0)
print(sentiment_distribution)
```

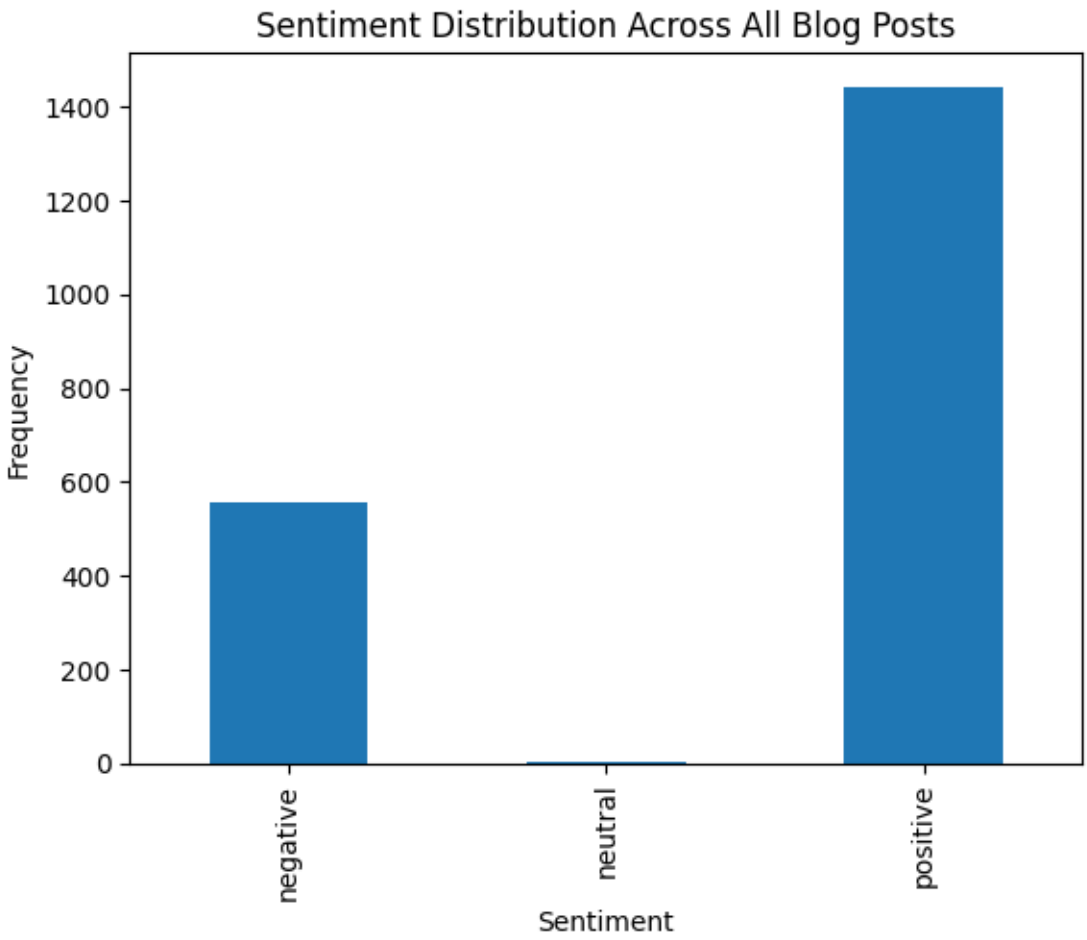
Sentiment	negative	neutral	positive
Labels			
alt.atheism	36.0	0.0	64.0
comp.graphics	28.0	0.0	72.0
comp.os.ms-windows.misc	23.0	0.0	77.0
comp.sys.ibm.pc.hardware	18.0	0.0	82.0
comp.sys.mac.hardware	26.0	0.0	74.0
comp.windows.x	20.0	2.0	78.0
misc.forsale	20.0	0.0	80.0
rec.autos	24.0	0.0	76.0
rec.motorcycles	29.0	0.0	71.0
rec.sport.baseball	38.0	0.0	62.0
rec.sport.hockey	44.0	0.0	56.0
sci.crypt	23.0	0.0	77.0
sci.electronics	24.0	0.0	76.0
sci.med	34.0	0.0	66.0
sci.space	29.0	0.0	71.0
soc.religion.christian	25.0	0.0	75.0
talk.politics.guns	41.0	1.0	58.0
talk.politics.mideast	27.0	0.0	73.0
talk.politics.misc	25.0	0.0	75.0
talk.religion.misc	21.0	0.0	79.0

[12]:
```
print(f"Accuracy: {accuracy_score(y_test, y_pred)}")
print(f"Precision: {precision_score(y_test, y_pred, average='weighted')}")
print(f"Recall: {recall_score(y_test, y_pred, average='weighted')}")
print(f"F1-Score: {f1_score(y_test, y_pred, average='weighted')}")
```

```
Accuracy: 0.8075
Precision: 0.8326691647812972
Recall: 0.8075
F1-Score: 0.7991740766856441
```

[14]:
```
import matplotlib.pyplot as plt # Import the matplotlib.pyplot module with the␣
 ↪alias 'plt'

df.groupby('Sentiment').size().plot(kind='bar')
plt.title('Sentiment Distribution Across All Blog Posts')
plt.xlabel('Sentiment')
plt.ylabel('Frequency')
plt.show()
```


Sentiment Distribution Across All Blog Posts
Frequency
0
200
400
600
800
1000
1200
1400
negative
neutral
positive
Sentiment

[ ]: