```
from google.colab import drive
```

```
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
%cd /content/reviewContent+metadata.csv
```

```
[Errno 2] No such file or directory: '/content/reviewContent+metadata.csv'
/content
```

```
import numpy as np
import pandas as pd
import itertools
```

```
dataset=pd.read_csv("/content/reviewContent+metadataBalanced.csv", encoding="ISO-8859-1",on_bad_lines='skip')
dataset=dataset.astype(str)
```

```
dataset.shape
dataset.head(10)
```

	user_id	prod_id	rating	label	date	text_
0	5044	0	1	0	11/16/2014	Drinks were bad, the hot chocolate was watered...
1	5045	0	1	0	9/8/2014	This was the worst experience I've ever had a ...
2	5046	0	3	0	10/6/2013	This is located on the site of the old Spruce ...
3	5047	0	5	0	11/30/2014	I enjoyed coffee and breakfast twice at Toast ...
4	5048	0	5	0	8/28/2014	I love Toast! The food choices are fantastic -...
5	5049	0	5	0	7/16/2013	The egg on an English muffin (their take on eg...
6	5050	0	5	0	3/3/2013	wonderful relaxed vibe and fantastic homemade ...
7	5051	0	1	1	12/5/2014	Extremely slow kitchen. I went with an hour to...
8	5052	0	2	1	11/26/2014	I really wanted to love toast. It's quaint and...
9	5053	0	4	1	11/17/2014	First brunch experience here in Philly (actual...

```
labels=dataset.label
labels.head(10)
```

```
0    0
1    0
2    0
3    0
4    0
5    0
6    0
7    1
8    1
9    1
Name: label, dtype: object
```

```
dataset.replace(to_replace="0",value="FAKE",inplace=True)
dataset.replace(to_replace="1",value="REAL",inplace=True)
```

```
labels=dataset.label
labels.head(10)
```

```
0    FAKE
1    FAKE
2    FAKE
3    FAKE
4    FAKE
5    FAKE
6    FAKE
7    REAL
8    REAL
9    REAL
Name: label, dtype: object
```

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(dataset['text_'],labels,test_size=0.2,random_state=10)
```

```
from sklearn.feature_extraction.text import TfidfVectorizer
tfidf_vectorizer=TfidfVectorizer(stop_words='english',max_df=0.7)
tfidf_train=tfidf_vectorizer.fit_transform(x_train)
tfidf_test=tfidf_vectorizer.transform(x_test)
```

```
from sklearn.linear_model import PassiveAggressiveClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
pac=PassiveAggressiveClassifier(max_iter=50)
pac.fit(tfidf_train,y_train)

y_pred=pac.predict(tfidf_test)
score=accuracy_score(y_test,y_pred)
print(f'Accuracy: {round(score*100,2)}%')
```

```
Accuracy: 68.25%
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_stochastic_gradient.py:702: ConvergenceWarning: Maximum number of iter
  warnings.warn(
```

```
confusion_matrix(y_test,y_pred,labels=['FAKE','REAL'])
```

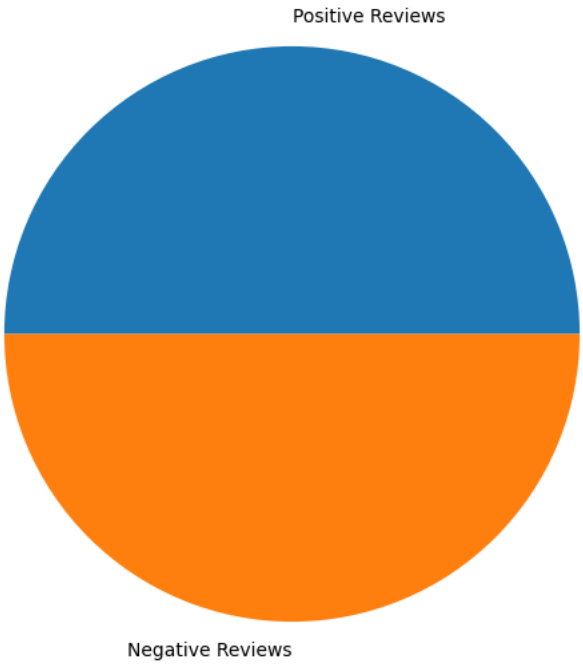
```
array([[10448,  5597],
       [ 4623, 11519]])
```

```
from matplotlib import pyplot as plt
pos=0
neg=0
for score in dataset['label']:
  if score == "REAL":
    pos+=1
  elif score == "FAKE":
    neg+=1

values=[int(pos),int(neg)]
label = ['Positive Reviews','Negative Reviews']

fig = plt.figure(figsize=(10,7))
plt.pie(values,labels=label)
print(pos,"POSITIVE REVIEW")
print(neg,"NEGATIVE REVIEW")
```

```
80466 POSITIVE REVIEW
80466 NEGATIVE REVIEW
```



```
from sklearn.metrics import classification_report


print(classification_report(y_test,y_pred))
```

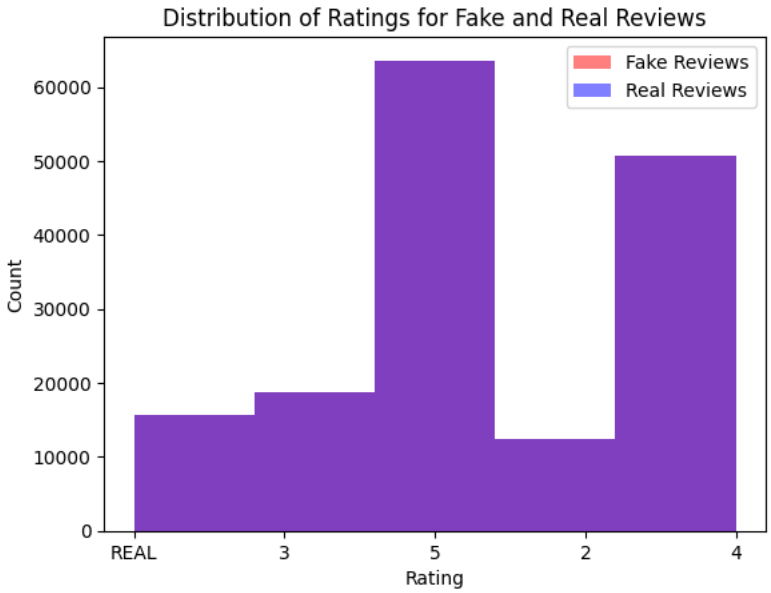
```
                  precision    recall  f1-score   support

            FAKE       0.69      0.65      0.67     16045
            REAL       0.67      0.71      0.69     16142

        accuracy                           0.68     32187
       macro avg       0.68      0.68      0.68     32187
    weighted avg       0.68      0.68      0.68     32187
```

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, confusion_matrix
import matplotlib.pyplot as plt

plt.hist(dataset['rating'], bins=5, alpha=0.5, label='Fake Reviews', color='red')
plt.hist(dataset['rating'], bins=5, alpha=0.5, label='Real Reviews', color='blue')
plt.xlabel('Rating')
plt.ylabel('Count')
plt.legend(loc='best')
plt.title('Distribution of Ratings for Fake and Real Reviews')
plt.show()
```




```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

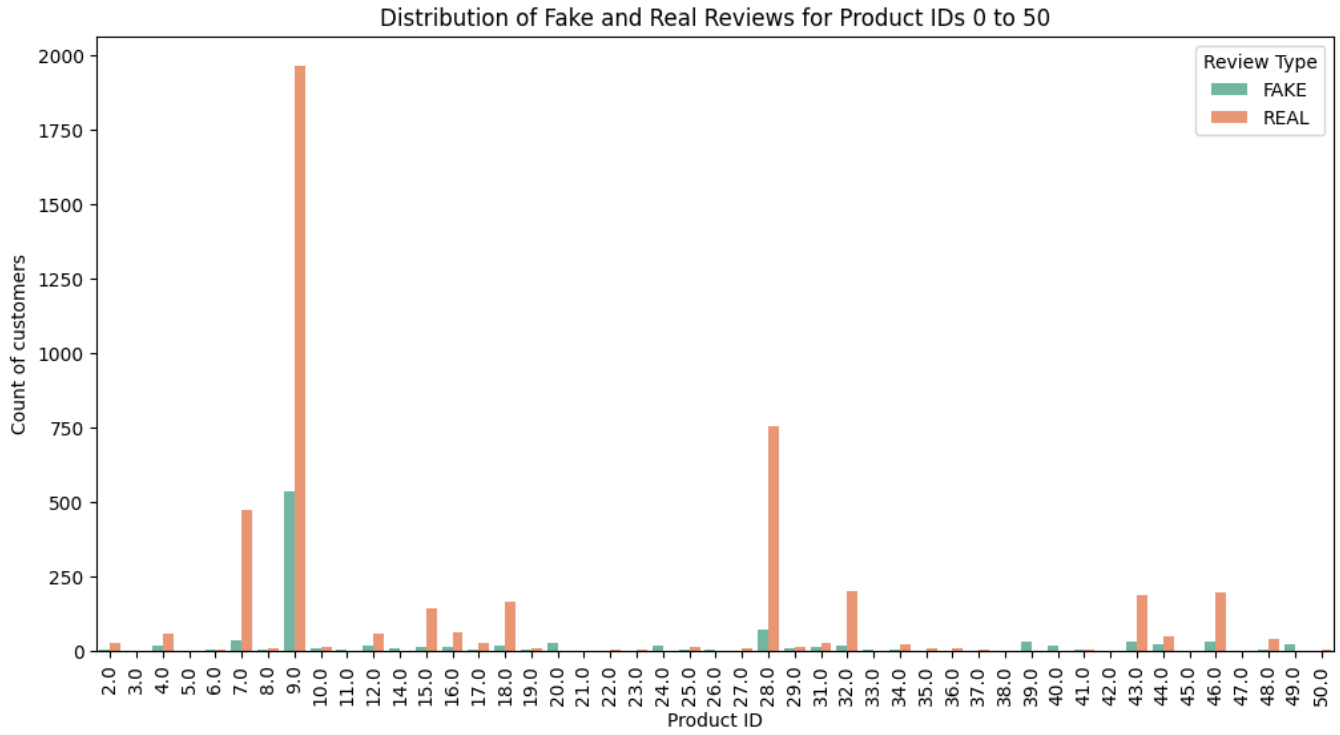
start_prod_id = 0  # Change this to your desired starting product ID
end_prod_id = 50   # Change this to your desired ending product ID


dataset['prod_id'] = pd.to_numeric(dataset['prod_id'], errors='coerce')

# Filter the dataset for the specified product ID range
subset_data = dataset[(dataset['prod_id'] >= start_prod_id) & (dataset['prod_id'] <= end_prod_id)]

# Create a bar plot
plt.figure(figsize=(12, 6))
sns.countplot(data=subset_data, x='prod_id', hue='label', palette='Set2')
plt.xlabel('Product ID')
plt.ylabel('Count of customers')
plt.legend(title='Review Type', loc='upper right')
plt.title(f'Distribution of Fake and Real Reviews for Product IDs {start_prod_id} to {end_prod_id}')
plt.xticks(rotation=90)  # Rotate x-axis labels for better readability

plt.show()
```

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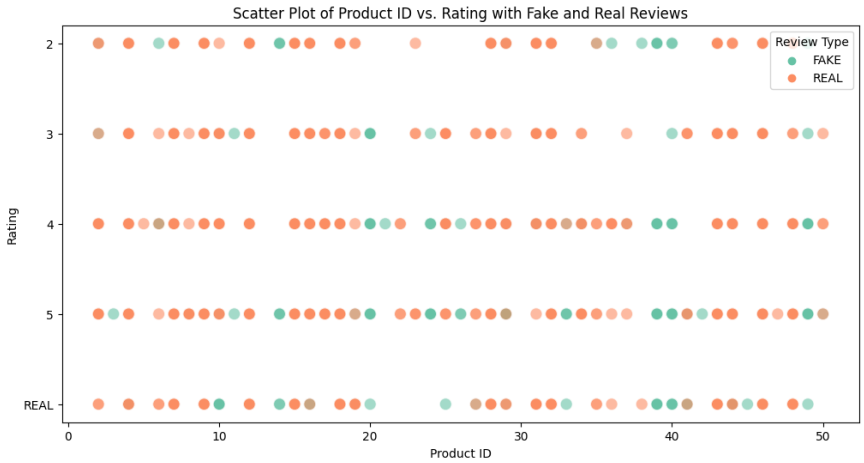
import matplotlib.pyplot as plt

start_prod_id = 0  # Change this to your desired starting product ID
end_prod_id = 50   # Change this to your desired ending product ID

# Filter the dataset for the specified product ID range
subset_data = dataset[(dataset['prod_id'] >= start_prod_id) & (dataset['prod_id'] <= end_prod_id)]

# Create a bar plot
plt.figure(figsize=(12, 6))
sns.scatterplot(data=subset_data, x='prod_id', y='rating', hue='label', palette='Set2', alpha=0.6, s=100)
plt.xlabel('Product ID')
plt.ylabel('Rating')
plt.legend(title='Review Type')
plt.title('Scatter Plot of Product ID vs. Rating with Fake and Real Reviews')

plt.show()
```




```
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import seaborn as sns
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```