Analysis

February 9, 2024

0.1 Importing Libraries

[ ]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import  CountVectorizer
from sklearn.feature_extraction.text import TfidfTransformer
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import confusion_matrix
```

0.2 Preprocessing

0.2.1 Splitting Data

[ ]:
```
df = pd.read_csv('cleaned.csv')
df.dropna(inplace=True)
df.drop(columns='Unnamed: 0', inplace=True)
df.head()
```

[ ]:
```
   Review  Rating
0   night       4
1  seattl       2
2   going       3
3    stay       5
4    tell       5
```

[ ]:
```
X = df['Review']
y = df['Rating']

X_train, X_test, y_train, y_test = train_test_split(X,y, test_size = 0.3)
```

[ ]:
```
X_train.shape
```

[ ]:
```
(14343,)
```

[ ]:
```
X_test.shape
```

[ ]:
```
(6147,)
```

0.2.2 Vectorizing

[ ]:
```
Vect = CountVectorizer()

Vect.fit(X_train)
X_train_vect = Vect.transform(X_train)
X_test_vect = Vect.transform(X_test)
```

[ ]:
```
X_train_vect.shape
```

[ ]:
```
(14343, 2989)
```

[ ]:
```
X_test_vect.shape
```

[ ]:
```
(6147, 2989)
```

[ ]:
```
Vect.get_feature_names_out()
```

[ ]:
```
array(['aaa', 'aaaa', 'aald', …, 'zzzzzzzzz', 'än', 'üè'], dtype=object)
```

0.2.3 Normalizing

[ ]:
```
Tfidf = TfidfTransformer()
X_train_norm = Tfidf.fit_transform(X_train_vect)
X_test_norm = Tfidf.fit_transform(X_test_vect)
```

[ ]:
```
X_train_norm.shape
```

[ ]:
```
(14343, 2989)
```

[ ]:
```
X_test_norm.shape
```

[ ]:
```
(6147, 2989)
```

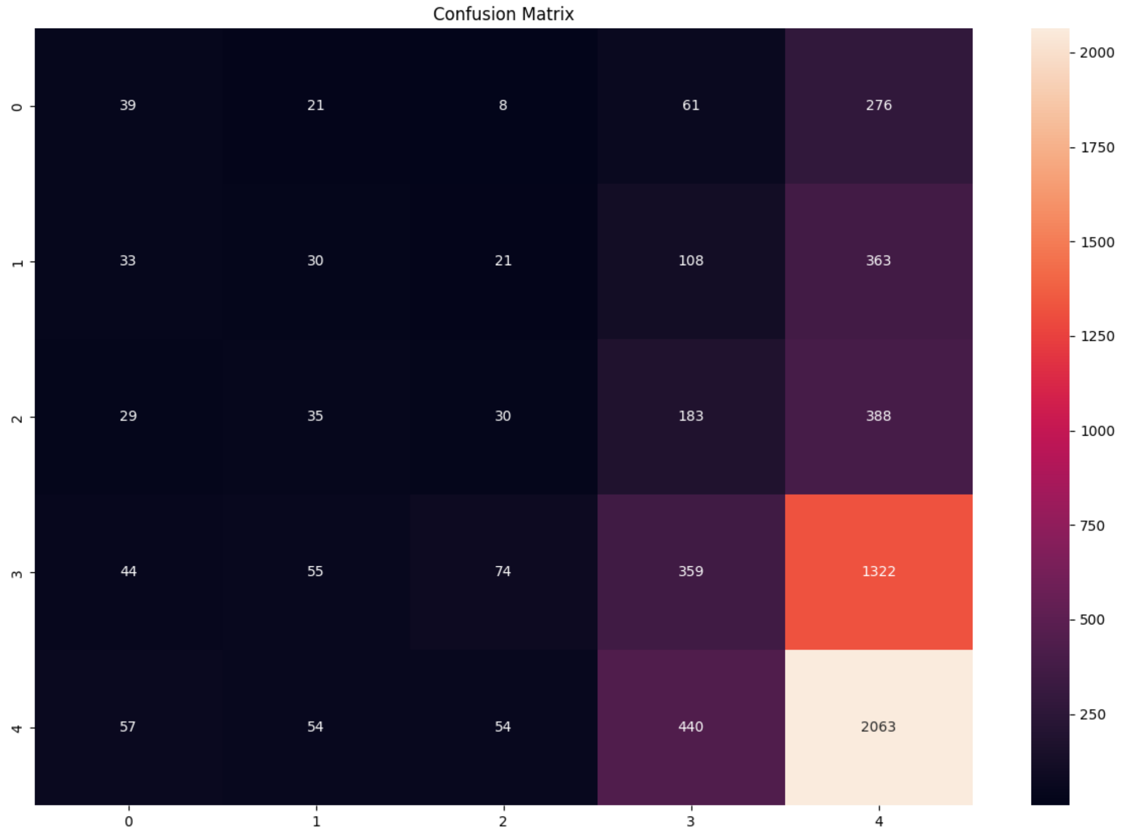
0.3 Models Construction

[ ]:
```
def plot_conf_matrix (conf_matrix):

    plt.figure(figsize=(15,10))
    sns.heatmap(conf_matrix, annot=True,  fmt="d")
    plt.title('Confusion Matrix')

    plt.show()
```

0.3.1 Decision Tree

```
[ ]: Decision_Tree = DecisionTreeClassifier()
     Decision_Tree.fit(X_train_norm, y_train)
     y_pred = Decision_Tree.predict(X_test_norm)
     conf_matrix = confusion_matrix(y_test, y_pred)
```

```
[ ]: plot_conf_matrix(conf_matrix)
```



```
[ ]: DecisionTree_score = Decision_Tree.score(X_train_norm, y_train)
     DecisionTree_test = Decision_Tree.score(X_test_norm, y_test)

     print('Training Score', DecisionTree_score)
     print('Testing Score', DecisionTree_test)
```

```
Training Score 0.5733110227985777
Testing Score 0.410118757117293
```

0.3.2 Random Forest

[ ]:

```
RandomForest = RandomForestClassifier(n_estimators = 100)
RandomForest.fit(X_train_norm, y_train)
y_pred = RandomForest.predict(X_test_norm)
conf_matrix = confusion_matrix(y_test, y_pred)
```

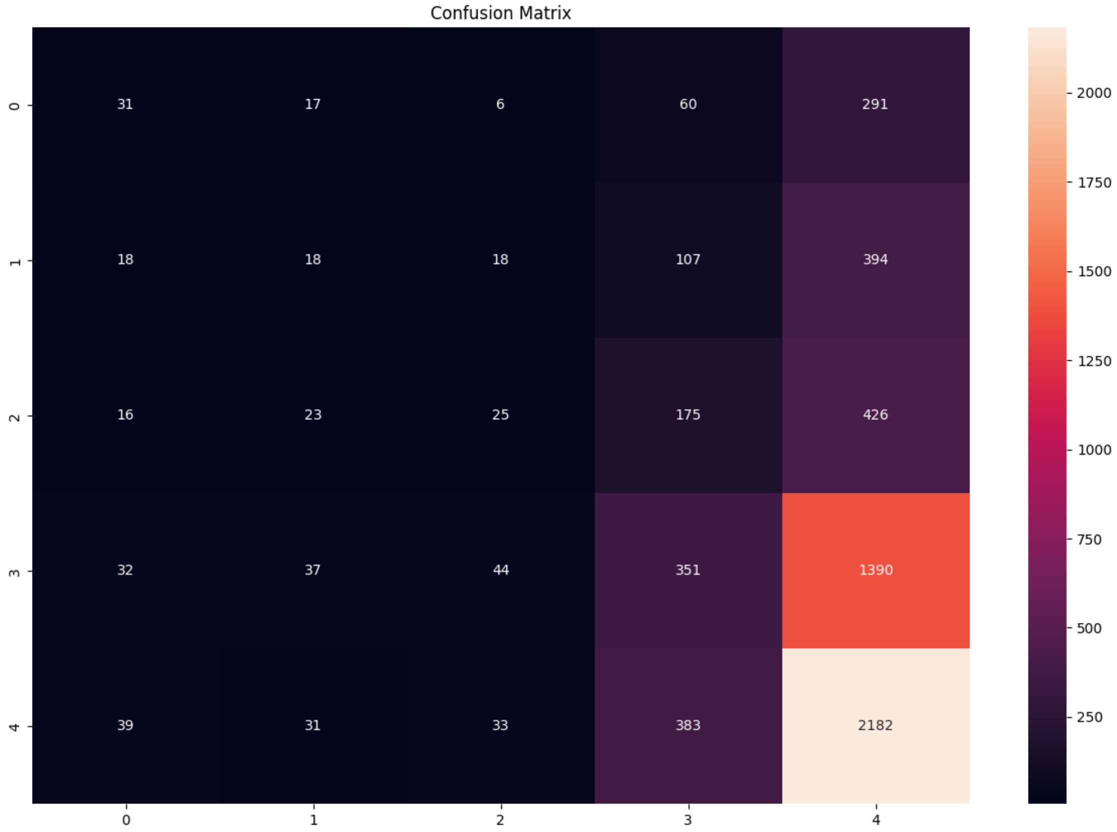
[ ]:

```
RandomForest_score = RandomForest.score(X_train_norm, y_train)
RandomForest_test = RandomForest.score(X_test_norm, y_test)

print('Training Score',RandomForest_score)
print('Testing Score',RandomForest_test)
```

```
Training Score 0.5733110227985777
Testing Score 0.42410932162030257
```

[ ]:

```
plot_conf_matrix(conf_matrix)
```


Confusion Matrix