

May 29, 2024

## 0.1 Develop a machine learning model to classify restaurants based on their cuisines.

```
[1]: # Import Libraries
import numpy as np
import pandas as pd
```

```
[2]: import warnings
warnings.filterwarnings("ignore")
```

## 0.2 Pre-processing Steps

```
[6]: # Creating the Dataframe
file_path = r'D:\Software\New Project\Internship\Cognifyz\Predict Restaurant_
↳Ratings\Dataset .csv'
df = pd.read_csv(file_path)
df.head(1)
```

```
[6]: Restaurant ID  Restaurant Name  Country Code      City \
0          6317637  Le Petit Souffle          162  Makati City

                                     Address \
0  Third Floor, Century City Mall, Kalayaan Avenu...

                                     Locality \
0  Century City Mall, Poblacion, Makati City

                                     Locality Verbose  Longitude  Latitude \
0  Century City Mall, Poblacion, Makati City, Mak...  121.027535  14.565443

                                     Cuisines  ...      Currency Has Table booking \
0  French, Japanese, Desserts  ...  Botswana Pula(P)          Yes

Has Online delivery  Is delivering now  Switch to order menu  Price range \
0          No          No          No          3

Aggregate rating  Rating color  Rating text  Votes
```

[1 rows x 21 columns]

```
[7]: # Dropping un-necessary Columns
df.drop('Restaurant ID', axis=1, inplace=True)
df.drop('Country Code', axis=1, inplace=True)
df.drop('City', axis=1, inplace=True)
df.drop('Address', axis=1, inplace=True)
df.drop('Locality', axis=1, inplace=True)
df.drop('Locality Verbose', axis=1, inplace=True)
df.drop('Longitude', axis=1, inplace=True)
df.drop('Latitude', axis=1, inplace=True)
df.drop('Currency', axis=1, inplace=True)
df.drop('Has Table booking', axis=1, inplace=True)
df.drop('Has Online delivery', axis=1, inplace=True)
df.drop('Is delivering now', axis=1, inplace=True)
df.drop('Switch to order menu', axis=1, inplace=True)
df.drop('Price range', axis=1, inplace=True)
df.drop('Aggregate rating', axis=1, inplace=True)
df.drop('Rating color', axis=1, inplace=True)
df.drop('Rating text', axis=1, inplace=True)
df.drop('Votes', axis=1, inplace=True)
```

```
[8]: df
```

```
[8]:
```

	Restaurant Name	Cuisines \
0	Le Petit Souffle	French, Japanese, Desserts
1	Izakaya Kikufuji	Japanese
2	Heat - Edsa Shangri-La	Seafood, Asian, Filipino, Indian
3	Ooma	Japanese, Sushi
4	Sambo Kojin	Japanese, Korean
...	...	...
9546	Naml Gurme	Turkish
9547	Ceviz A ac	World Cuisine, Patisserie, Cafe
9548	Huqqa	Italian, World Cuisine
9549	A k Kahve	Restaurant Cafe
9550	Walter's Coffee Roastery	Cafe
	Average Cost for two	
0	1100	
1	1200	
2	4000	
3	1500	
4	1500	
...	...	
9546	80	

```

9547          105
9548          170
9549          120
9550           55

```

```
[9551 rows x 3 columns]
```

```
[9]: # Checking for missing values
df.isnull().sum()
```

```
[9]: Restaurant Name      0
      Cuisines            9
      Average Cost for two 0
      dtype: int64
```

```
[10]: df.dropna(inplace=True)
```

```
[11]: df.shape
```

```
[11]: (9542, 3)
```

```
[12]: # Checking missing values for each col
missing_values = df.isna().sum()
missing_values_column = df['Restaurant Name'].isna().sum()
missing_values_column = df['Cuisines'].isna().sum()
missing_values_column = df['Average Cost for two'].isna().sum()
```

```
[13]: df_cleaned = df.dropna()
df_cleaned = df.dropna(subset=['Restaurant Name'])
df_cleaned = df.dropna(subset=['Cuisines'])
df_cleaned = df.dropna(subset=['Average Cost for two'])
```

```
[14]: df.describe(include="all")
```

```
[14]:
```

	Restaurant Name	Cuisines	Average Cost for two
count	9542	9542	9542.000000
unique	7437	1825	NaN
top	Cafe Coffee Day	North Indian	NaN
freq	83	936	NaN
mean	NaN	NaN	1200.326137
std	NaN	NaN	16128.743876
min	NaN	NaN	0.000000
25%	NaN	NaN	250.000000
50%	NaN	NaN	400.000000
75%	NaN	NaN	700.000000
max	NaN	NaN	800000.000000

```
[15]: # Converting Categorical data to NUmerical
from sklearn.preprocessing import LabelEncoder

label_encoder = LabelEncoder()
df['Restaurant Name'] = label_encoder.fit_transform(df['Restaurant Name'])
df['Cuisines'] = label_encoder.fit_transform(df['Cuisines'])
```

```
[16]: df
```

```
[16]:      Restaurant Name  Cuisines  Average Cost for two
0                3742      920             1100
1                3167     1111             1200
2                2892     1671             4000
3                4700     1126             1500
4                5515     1122             1500
...                ...      ...
9546             4436     1813              80
9547             1310     1824             105
9548             3063     1110             170
9549              512     1657             120
9550             7231      331              55
```

[9542 rows x 3 columns]

### 0.3 Building Random Forest Model

```
[17]: # Create X and Y
X = df[['Restaurant Name', 'Average Cost for two']]
Y = df['Cuisines']
```

```
[18]: from sklearn.preprocessing import StandardScaler

scaler= StandardScaler()

scaler.fit(X)
X= scaler.transform(X)
```

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

#Split the data into test and train
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2,
                                                    random_state=10)
```

```
[20]: # predicting using Decision Tree Classifier.
from sklearn.tree import DecisionTreeClassifier

model_DT = DecisionTreeClassifier(random_state=10,
```

```

criterion="gini")

# fit the model on data and predict the values
model_DT.fit(X_train,Y_train) # fit is the function that is used for
↪training the data
Y_pred = model_DT.predict(X_test) # Validation Data
#print(Y_pred)
print(list(zip(Y_test,Y_pred)))

```

```

[(1348, 1348), (1329, 1611), (1608, 1235), (1650, 1655), (1306, 1749), (1514,
549), (168, 50), (331, 1424), (1723, 1723), (582, 865), (682, 682), (1306,
1329), (159, 1098), (201, 1306), (1306, 1306), (58, 58), (1520, 546), (1597,
1381), (774, 765), (518, 497), (1626, 1626), (1306, 1714), (1749, 331), (1520,
186), (546, 684), (1514, 1306), (1334, 684), (1212, 518), (958, 1444), (986,
986), (1306, 1626), (1256, 177), (177, 518), (58, 58), (1626, 1626), (1288,
1650), (1514, 1514), (12, 1813), (497, 497), (1306, 1444), (233, 1792), (1554,
1765), (828, 331), (1559, 1598), (230, 230), (1306, 828), (1514, 549), (199,
1444), (1275, 249), (1520, 677), (937, 809), (331, 331), (576, 1340), (1329,
835), (955, 362), (1325, 865), (1306, 1334), (1014, 1691), (518, 1723), (177,
299), (1306, 1306), (1547, 549), (1384, 331), (986, 828), (1618, 280), (1429,
475), (841, 834), (243, 251), (1306, 1329), (1323, 1323), (1699, 1699), (497,
435), (1789, 1789), (1130, 82), (828, 518), (828, 828), (1329, 837), (1048,
797), (1126, 1124), (1235, 1306), (1235, 1306), (828, 1749), (497, 497), (670,
1394), (331, 331), (1647, 1306), (382, 1275), (1699, 828), (1405, 851), (549,
840), (1482, 1306), (1626, 1626), (331, 331), (1348, 1348), (186, 837), (1373,
1306), (1306, 1699), (352, 564), (441, 331), (986, 986), (1441, 1334), (549,
1514), (251, 251), (486, 186), (205, 1306), (1514, 1520), (986, 986), (1306,
1306), (518, 497), (497, 1329), (1520, 1306), (828, 1348), (1306, 1306), (1655,
1655), (518, 497), (497, 588), (298, 1315), (58, 58), (220, 326), (1650, 226),
(497, 1329), (177, 1348), (1699, 394), (868, 1306), (1306, 1275), (191, 191),
(1306, 1306), (1306, 1306), (549, 549), (626, 635), (828, 982), (568, 1329),
(1212, 1212), (828, 1212), (1606, 331), (1153, 186), (1514, 1288), (1306, 1626),
(1334, 331), (191, 191), (828, 837), (1504, 143), (1554, 312), (1520, 1329),
(1306, 1520), (1573, 1306), (1699, 1723), (497, 1306), (507, 1667), (18, 21),
(846, 1306), (1306, 744), (1306, 1699), (177, 177), (420, 549), (1338, 1426),
(134, 670), (1792, 1792), (327, 1667), (1329, 331), (1514, 1573), (58, 58),
(1514, 1329), (1373, 1514), (143, 1394), (1520, 1329), (1238, 1237), (1235, 29),
(1481, 1288), (563, 1306), (1061, 1520), (191, 339), (1306, 1650), (1038, 1315),
(1306, 1749), (1514, 1520), (1559, 828), (331, 331), (1306, 1514), (1520, 1520),
(1306, 1306), (243, 1554), (1245, 1244), (1699, 1153), (837, 837), (1705, 518),
(986, 986), (1329, 1547), (1329, 684), (331, 424), (1334, 1402), (1329, 1329),
(828, 1306), (1329, 1514), (758, 758), (972, 972), (865, 841), (1474, 1722),
(544, 1235), (1381, 1306), (1098, 1713), (1761, 518), (1306, 1306), (986, 986),
(1559, 1381), (101, 950), (310, 310), (1329, 191), (1435, 1329), (487, 331),
(243, 1306), (1792, 233), (895, 1329), (1275, 1329), (1262, 1241), (397, 1373),
(1329, 1329), (774, 1306), (307, 307), (1306, 177), (1262, 224), (1306, 1306),
(243, 243), (177, 1306), (770, 1306), (1008, 1019), (1306, 1355), (1406, 684),

```

(582, 497), (1084, 1306), (168, 221), (394, 394), (230, 1749), (1262, 1262), (186, 1262), (186, 654), (201, 201), (732, 637), (828, 854), (331, 331), (1306, 1306), (796, 804), (230, 1135), (1655, 1655), (1520, 54), (1262, 1262), (1277, 1762), (729, 1390), (986, 986), (497, 1306), (400, 297), (1306, 865), (828, 186), (226, 1514), (186, 1306), (1699, 1306), (939, 1520), (634, 1348), (1329, 1448), (201, 201), (953, 953), (1126, 396), (834, 189), (1381, 1520), (1334, 1275), (497, 497), (1559, 1381), (758, 177), (177, 1334), (1514, 806), (465, 834), (770, 1329), (604, 1373), (600, 651), (1214, 1514), (201, 1306), (1444, 497), (1530, 115), (1235, 1235), (331, 331), (1329, 1514), (895, 820), (1520, 545), (583, 1235), (1406, 588), (1288, 1514), (186, 834), (497, 1329), (1212, 554), (1262, 1235), (285, 219), (186, 177), (518, 497), (1306, 1306), (1460, 1306), (226, 1514), (1514, 549), (285, 999), (1306, 497), (1306, 1431), (1699, 1306), (177, 865), (1373, 1514), (516, 1306), (1705, 1699), (880, 497), (1329, 1788), (1275, 1275), (331, 331), (1329, 1520), (982, 982), (828, 828), (1373, 588), (1306, 177), (1262, 1262), (518, 1306), (837, 828), (1306, 1275), (1749, 1235), (331, 338), (828, 828), (1546, 1329), (1329, 1329), (1030, 1749), (170, 581), (995, 57), (972, 1144), (178, 1749), (1329, 1514), (331, 331), (1514, 1604), (813, 1125), (1104, 169), (465, 358), (1520, 1355), (1329, 1554), (1514, 1749), (1749, 1749), (859, 828), (1590, 1306), (1306, 1306), (1334, 1334), (1026, 950), (177, 186), (1749, 1749), (1306, 1290), (1618, 828), (331, 331), (1514, 1618), (1461, 1329), (1306, 1306), (518, 828), (1589, 1329), (1185, 837), (1531, 1401), (1329, 1288), (159, 497), (1336, 1514), (177, 177), (1514, 1514), (1329, 1329), (331, 331), (842, 497), (1329, 1329), (1, 1275), (1514, 1329), (363, 549), (1262, 1306), (234, 828), (828, 841), (1114, 1334), (1306, 979), (828, 828), (1306, 1189), (625, 1329), (1373, 1559), (982, 982), (1520, 394), (1160, 1685), (1306, 251), (1554, 177), (549, 1749), (372, 588), (497, 1514), (1306, 1514), (1626, 1626), (1306, 1306), (1514, 1306), (1444, 1444), (191, 191), (1749, 1329), (518, 497), (201, 1306), (331, 117), (810, 1315), (195, 196), (1235, 1262), (331, 331), (1802, 1065), (1514, 1514), (1554, 1153), (427, 1275), (1321, 249), (1002, 1609), (1031, 549), (1655, 1655), (1329, 331), (1306, 828), (420, 1520), (986, 986), (1321, 1806), (1288, 1288), (1665, 481), (1290, 565), (589, 589), (1650, 986), (1306, 1306), (802, 802), (1212, 1212), (497, 828), (1655, 1655), (1329, 1321), (1595, 1699), (1705, 1306), (276, 310), (1448, 986), (549, 1789), (1559, 1329), (201, 518), (497, 6), (837, 837), (121, 1212), (417, 417), (1626, 1626), (1520, 1329), (1373, 1554), (834, 828), (1723, 1723), (1288, 1348), (986, 986), (1306, 1749), (1027, 1738), (1306, 1306), (1306, 1306), (828, 186), (1120, 637), (1329, 1329), (1631, 1278), (1373, 331), (1299, 828), (58, 58), (177, 186), (1020, 1262), (1070, 1288), (1329, 964), (1329, 1554), (58, 58), (331, 331), (1306, 1536), (344, 344), (1306, 1288), (1554, 951), (1406, 1306), (608, 1514), (738, 1536), (1775, 1775), (1514, 1226), (331, 1336), (1416, 44), (310, 310), (1329, 895), (1601, 811), (177, 1306), (1717, 1618), (211, 1708), (1306, 1381), (549, 868), (1797, 497), (1184, 1093), (38, 913), (1198, 1306), (497, 1559), (1514, 1288), (1520, 1082), (1626, 1626), (783, 549), (1306, 1262), (1098, 1098), (1329, 986), (331, 331), (982, 982), (1699, 1699), (1743, 61), (1203, 1329), (1514, 1675), (186, 1306), (497, 497), (1765, 1749), (1373, 379), (1065, 1623), (0, 1306), (257, 828), (1306, 497), (1306, 497), (1520, 1520), (982, 982), (1520, 497), (331, 1329), (1329, 518), (1650, 1373), (1275, 1275), (1293, 1111), (828, 201), (1306, 1306), (758, 982), (1045,

1288), (331, 117), (1329, 1723), (1262, 1306), (1334, 1227), (177, 186), (331, 1401), (1039, 828), (331, 1329), (1749, 1444), (251, 1306), (497, 1554), (307, 307), (6, 828), (16, 16), (1397, 960), (1321, 1086), (1334, 1309), (1631, 1520), (462, 518), (177, 177), (1306, 1306), (1329, 497), (828, 1560), (1448, 556), (858, 1485), (1514, 1758), (1159, 251), (497, 1749), (1514, 1518), (405, 1444), (307, 307), (882, 1306), (517, 291), (1306, 1401), (1306, 497), (236, 515), (177, 177), (1699, 497), (1458, 1329), (89, 93), (6, 1212), (1618, 1618), (379, 1373), (1626, 1626), (1477, 1514), (1262, 1329), (1277, 1306), (331, 331), (1520, 1275), (1520, 1444), (500, 500), (1020, 316), (588, 588), (1357, 1520), (331, 331), (1329, 1598), (1478, 1417), (6, 6), (177, 186), (58, 58), (828, 1044), (1514, 1514), (1306, 1306), (497, 497), (1514, 1514), (1626, 1626), (1334, 412), (1043, 1043), (1651, 1651), (533, 736), (331, 331), (1514, 1520), (277, 302), (1008, 788), (1306, 1137), (191, 243), (758, 758), (1126, 1019), (1520, 186), (331, 331), (1152, 1814), (1306, 1749), (828, 865), (1444, 841), (1626, 1626), (1271, 53), (230, 230), (469, 546), (1095, 1126), (1306, 202), (1381, 1306), (177, 1306), (1641, 135), (1559, 1509), (1514, 1329), (191, 1586), (346, 361), (1306, 497), (1329, 1306), (1306, 1699), (828, 1554), (1315, 229), (772, 476), (828, 1765), (1790, 233), (1223, 728), (1262, 1262), (1348, 1645), (518, 518), (707, 331), (331, 331), (1407, 1212), (828, 406), (1306, 1306), (1520, 1514), (497, 518), (34, 1031), (1699, 1699), (1749, 1749), (1562, 511), (1520, 1329), (1655, 1655), (703, 1315), (1262, 1262), (1655, 1655), (223, 475), (1275, 249), (497, 497), (1306, 993), (669, 644), (1749, 549), (191, 1334), (497, 518), (1650, 1306), (1514, 556), (186, 186), (1650, 1650), (1329, 1329), (1306, 1329), (1520, 575), (1329, 1306), (186, 623), (1306, 497), (1329, 1275), (969, 549), (784, 171), (497, 344), (1745, 518), (1329, 1329), (1520, 1514), (548, 518), (1306, 1306), (1306, 1306), (1235, 230), (1329, 177), (153, 310), (625, 911), (1306, 251), (1306, 1262), (1402, 636), (1520, 1306), (1275, 1275), (497, 497), (201, 331), (1306, 1306), (1098, 1667), (953, 953), (1743, 177), (1520, 1306), (865, 865), (1514, 1514), (1306, 1306), (549, 1329), (1329, 177), (1464, 177), (568, 1559), (621, 1270), (843, 1594), (1199, 916), (1306, 497), (834, 1093), (1655, 1655), (1275, 556), (1290, 823), (1514, 1406), (1306, 1306), (1514, 1514), (361, 361), (1411, 1411), (331, 1278), (802, 331), (497, 497), (1520, 1520), (837, 837), (660, 687), (932, 1329), (1357, 1520), (786, 1738), (671, 497), (468, 1618), (1306, 913), (1329, 518), (1329, 895), (1171, 1514), (49, 1169), (177, 177), (331, 331), (1031, 518), (201, 201), (549, 1514), (1306, 1306), (1520, 1306), (1306, 1749), (1723, 1559), (177, 865), (331, 331), (1520, 575), (104, 1794), (344, 400), (1306, 1262), (1699, 1699), (1329, 395), (201, 201), (497, 177), (364, 1348), (1699, 1699), (331, 1520), (1357, 1212), (370, 107), (828, 828), (1306, 828), (104, 104), (865, 986), (1336, 177), (251, 251), (765, 177), (497, 828), (98, 1126), (1699, 1235), (1126, 736), (497, 861), (186, 1722), (1329, 1329), (386, 1288), (331, 331), (230, 1135), (497, 497), (1619, 310), (370, 628), (1102, 1102), (497, 854), (518, 518), (828, 828), (841, 166), (971, 419), (719, 564), (1631, 1631), (497, 1306), (1262, 1262), (1667, 1169), (461, 1519), (1749, 1306), (693, 426), (1694, 1300), (186, 1329), (1306, 663), (719, 721), (6, 177), (1306, 1275), (1514, 1520), (1655, 1655), (37, 1785), (177, 828), (1329, 1306), (186, 177), (878, 1623), (1306, 1306), (497, 497), (1514, 497), (1306, 1329), (828, 29), (201, 1265), (340, 458), (828, 1306), (168, 11), (191, 191), (588, 1811), (1102, 1102), (1514, 1334), (1306, 1749),

(1514, 201), (1520, 518), (1288, 177), (1514, 1329), (1435, 1031), (331, 1424),  
 (549, 1306), (420, 471), (1514, 1514), (1171, 1329), (986, 986), (865, 865),  
 (1652, 1468), (933, 28), (1818, 1098), (331, 834), (177, 177), (177, 1235),  
 (770, 177), (1065, 546), (1329, 1329), (1705, 177), (1329, 1626), (1514, 1514),  
 (177, 828), (497, 186), (1618, 1618), (1422, 938), (191, 1699), (798, 1306),  
 (255, 1514), (16, 16), (1306, 833), (828, 177), (1212, 1212), (675, 850), (1699,  
 1514), (1283, 1554), (1626, 1626), (1105, 1098), (1161, 1161), (1275, 1762),  
 (770, 1306), (331, 331), (1243, 1765), (1604, 1749), (748, 1514), (1329, 177),  
 (177, 554), (1306, 447), (595, 331), (1559, 201), (1583, 701), (982, 982), (828,  
 828), (872, 870), (775, 828), (85, 1357), (497, 833), (865, 865), (831, 1373),  
 (1305, 1235), (311, 312), (467, 1520), (1306, 1618), (1518, 656), (1306, 203),  
 (828, 1306), (331, 233), (186, 177), (1401, 1542), (1321, 1162), (930, 358),  
 (1559, 1649), (47, 344), (1626, 1626), (983, 828), (828, 201), (1231, 168),  
 (1514, 1306), (186, 886), (810, 1401), (497, 1329), (1520, 985), (1520, 1329),  
 (518, 1514), (1699, 1705), (1262, 1262), (1306, 1275), (191, 191), (497, 394),  
 (878, 6), (1444, 1455), (1628, 1093), (1262, 1235), (1722, 1699), (828, 1320),  
 (1118, 1419), (758, 828), (344, 1110), (1186, 1614), (1126, 686), (58, 58),  
 (1262, 1262), (284, 1639), (1306, 1306), (549, 1621), (1329, 1329), (1815, 135),  
 (1306, 1306), (518, 850), (626, 1113), (186, 951), (828, 1406), (230, 230),  
 (437, 437), (920, 807), (152, 115), (788, 1749), (1306, 201), (743, 797), (588,  
 251), (1306, 518), (1329, 1329), (1262, 1262), (201, 1306), (1235, 1306), (1306,  
 1348), (497, 518), (1699, 1699), (1588, 1588), (1765, 1262), (828, 1445), (1306,  
 201), (310, 310), (1528, 1528), (1306, 399), (1031, 201), (874, 610), (1626,  
 1329), (549, 768), (1306, 865), (1631, 1315), (1306, 1712), (518, 497), (243,  
 243), (1723, 1306), (1306, 166), (216, 1306), (1761, 1306), (1705, 1699), (1329,  
 1329), (1329, 1329), (497, 886), (1477, 1290), (1554, 828), (865, 865), (1469,  
 549), (451, 1514), (1514, 426), (1514, 1065), (497, 497), (1444, 1723), (177,  
 834), (625, 1683), (213, 1444), (15, 537), (1329, 1329), (760, 1044), (1520,  
 759), (497, 1533), (1329, 1306), (497, 1699), (1133, 102), (1288, 1183), (828,  
 1774), (290, 1554), (69, 117), (1306, 1448), (1352, 610), (274, 1795), (1306,  
 1749), (1796, 102), (865, 1306), (1754, 1762), (7, 1079), (310, 310), (1336,  
 1532), (471, 1275), (1699, 1699), (1306, 1235), (177, 1514), (828, 1306), (230,  
 834), (1329, 982), (986, 986), (357, 1306), (1338, 1450), (257, 1786), (1306,  
 595), (1520, 1329), (834, 106), (1306, 1515), (367, 1619), (1329, 1306), (1507,  
 895), (833, 1749), (1520, 344), (418, 1329), (1306, 331), (186, 1699), (834,  
 1306), (1306, 1737), (243, 243), (444, 122), (1520, 1329), (810, 635), (521,  
 1701), (1306, 1559), (627, 1193), (1388, 1574), (1329, 1329), (1134, 549),  
 (1329, 1353), (1306, 470), (6, 331), (734, 1329), (1262, 828), (1406, 1354),  
 (1384, 183), (956, 331), (828, 1329), (1306, 1306), (201, 828), (1235, 1699),  
 (1288, 1288), (986, 986), (1743, 1667), (177, 233), (58, 58), (1650, 201),  
 (1098, 1306), (1373, 1329), (972, 420), (1306, 1306), (1142, 995), (249, 243),  
 (1538, 1334), (1306, 1650), (1348, 1373), (746, 497), (1602, 684), (1422, 1670),  
 (1520, 1520), (1444, 1444), (736, 1437), (1288, 877), (1275, 1261), (1514,  
 1514), (1699, 394), (1217, 1216), (186, 331), (1441, 1329), (186, 1306), (986,  
 986), (1559, 1306), (549, 656), (1329, 1392), (1554, 1306), (1306, 1348), (201,  
 191), (1306, 1459), (1009, 828), (1262, 1235), (1622, 1622), (420, 646), (1514,  
 804), (433, 433), (54, 828), (1760, 1261), (1306, 1590), (177, 186), (186,  
 1306), (1566, 1329), (588, 588), (1306, 1306), (1098, 1102), (828, 828), (1306,



1262), (1444, 1329), (923, 1111), (1212, 1212), (1306, 1749), (1556, 828),  
 (1514, 1458), (1306, 191), (1391, 1306), (497, 828), (828, 828), (588, 588),  
 (1306, 1306), (872, 870), (564, 828), (622, 554), (1520, 847), (158, 24), (1334,  
 601), (186, 207), (1290, 1381), (1699, 1749), (201, 1262), (1306, 1235), (1306,  
 232), (1306, 497), (331, 331), (1514, 1514), (1329, 1559), (1306, 1306), (186,  
 1262), (1306, 1306), (828, 1275), (650, 1329), (177, 828), (828, 828), (1406,  
 426), (230, 828), (1212, 25), (1520, 1288), (1723, 1723), (1334, 1329), (518,  
 1699), (518, 989), (491, 317), (1348, 473), (1306, 549), (995, 1795), (332, 6),  
 (6, 223), (230, 230), (1642, 1642), (497, 982), (1373, 161), (531, 951), (1275,  
 1448), (867, 549), (29, 78), (186, 186), (895, 497), (895, 331), (1626, 1626),  
 (1514, 1319), (58, 58), (1306, 568), (1723, 1723), (331, 1329), (1723, 1699),  
 (1532, 1520), (1329, 346), (774, 774), (853, 1520), (837, 837), (1288, 1813),  
 (1514, 1723), (497, 518), (230, 1306), (1262, 1235), (1306, 1749), (518, 497),  
 (758, 257), (1529, 1529), (1329, 497), (1477, 331), (1570, 1570), (1722, 1699),  
 (1520, 346), (828, 828), (1583, 497), (1306, 497), (1651, 1651), (1650, 1650),  
 (1520, 549), (181, 1413), (201, 177), (255, 255), (1329, 1520), (186, 1669),  
 (526, 974), (1402, 627), (1821, 1151), (1306, 1306), (1428, 819), (518, 1306),  
 (6, 219), (344, 1699), (909, 1309), (828, 1329), (1093, 931), (1705, 1705),  
 (243, 518), (1514, 1275), (828, 828), (1204, 1514), (1329, 1348), (787, 90),  
 (1514, 371), (1520, 436), (871, 1170), (722, 342), (1723, 1306), (1031, 950),  
 (1306, 497), (549, 1778), (1306, 186), (1590, 497), (177, 186), (1306, 834),  
 (201, 1220), (616, 303), (331, 331), (1514, 331), (618, 1212), (1699, 177),  
 (1699, 1699), (1306, 1749), (1306, 1235), (959, 1306), (1306, 1618), (1618,  
 1667), (1329, 1312), (124, 1329), (331, 331), (986, 186), (1707, 955), (1306,  
 1306), (1514, 251), (1277, 358), (1306, 991), (55, 54), (828, 1329), (58, 58),  
 (828, 828), (1699, 882), (828, 331), (951, 991), (1275, 1306), (1705, 1705),  
 (331, 331), (337, 177), (112, 293), (758, 758), (1348, 1373), (177, 1306), (549,  
 1306), (1626, 1626), (1329, 1329), (1514, 400), (1749, 1749), (329, 329), (390,  
 1406), (837, 837), (1284, 1514), (1373, 497), (791, 177), (420, 828), (1306,  
 754), (201, 1306), (1329, 1306), (1306, 1306), (1381, 296), (1699, 1275), (9,  
 710), (1555, 701), (1334, 792), (8, 895), (595, 595), (722, 364), (1040, 1040),  
 (946, 1579), (760, 1306), (1290, 1520), (1795, 950), (331, 331), (177, 177),  
 (463, 379), (217, 18), (177, 201), (1361, 400), (986, 986), (1655, 1655), (731,  
 186), (1457, 1306), (828, 1306), (995, 1607), (1306, 201), (528, 1514), (1306,  
 251), (1626, 1626), (1306, 828), (225, 1275), (1514, 1514), (1554, 166), (1401,  
 680), (1514, 1306), (982, 497), (1430, 1087), (828, 833), (1611, 1444), (1516,  
 902), (1749, 450), (791, 331), (1650, 863), (834, 201), (1306, 1306), (982,  
 982), (201, 1760), (730, 344), (1275, 1275), (1306, 1329), (582, 497), (1306,  
 1306), (1554, 1306), (1401, 341), (1306, 1712), (1514, 599), (1705, 1262),  
 (1031, 331), (29, 90), (1626, 1626), (588, 1549), (1329, 1559), (1348, 1554),  
 (1808, 1306), (331, 331), (987, 1306), (1791, 1031), (310, 310), (810, 792),  
 (1126, 232), (549, 331), (335, 1329), (58, 58), (1306, 1384), (1044, 895),  
 (1100, 485), (522, 1520), (251, 589), (177, 1749), (1373, 518), (1705, 1306),  
 (1192, 1306), (1272, 1272), (1306, 1031), (1650, 1306), (1306, 1712), (201,  
 201), (497, 497), (1756, 1712), (1520, 1306), (1514, 1306), (518, 1348), (1699,  
 497), (1355, 1626), (865, 1514), (1272, 1439), (828, 1306), (1275, 1571), (1262,  
 1749), (186, 186), (1044, 721), (1655, 1655), (201, 1329), (331, 331), (191,  
 497), (1329, 1444), (404, 1406), (1712, 1262), (1514, 186), (230, 1559), (243,

243), (1306, 1705), (1514, 1514), (1792, 1792), (518, 1329), (497, 497), (1306, 828), (549, 122), (828, 834), (186, 186), (1040, 1040), (1306, 177), (1329, 1329), (1329, 1329), (1599, 1599), (982, 828), (834, 834), (1514, 1514), (1281, 497), (309, 779), (1590, 1306), (512, 1520), (1288, 1288), (837, 837), (828, 828), (828, 106), (497, 1212), (1514, 1631), (886, 886), (35, 102), (828, 828), (1306, 1031), (1306, 1329), (828, 760), (1244, 1373), (230, 230), (1329, 549), (372, 807), (1275, 1604), (497, 549), (243, 1306), (400, 201), (1220, 610), (582, 1243), (1807, 589), (427, 1419), (1749, 996), (1765, 1306), (1329, 1458), (177, 186), (1021, 1820), (1645, 361), (1329, 1329), (1657, 1749), (828, 828), (331, 1348), (950, 271), (226, 579), (1582, 1306), (54, 54), (1306, 1329), (828, 1650), (1275, 1306), (1306, 1448), (336, 854), (177, 177), (371, 1141), (1329, 122), (1574, 254), (1514, 1514), (1348, 1590), (497, 497), (1031, 1031), (1306, 1329), (1143, 331), (1236, 1235), (243, 1262), (1514, 656), (982, 982), (1306, 986), (1446, 1329), (1306, 1306), (370, 1306), (1626, 1559), (1031, 736), (310, 310), (834, 1559), (1348, 1312), (1288, 1288), (724, 457), (1386, 1386), (549, 1329), (660, 1272), (331, 177), (177, 177), (828, 828), (1560, 1306), (536, 1306), (497, 497), (709, 1338), (1306, 1329), (497, 497), (767, 950), (233, 233), (1329, 1306), (1520, 1520), (497, 497), (982, 1243), (297, 297), (912, 1401), (828, 828), (1306, 1257), (1306, 1487), (951, 1652), (1319, 1098), (407, 497), (1275, 1275), (331, 331), (497, 828), (331, 331), (1655, 1655), (1178, 1178), (1646, 1334), (497, 497), (1696, 294), (1329, 1329), (1275, 32), (1068, 1473), (828, 828), (268, 1165), (1520, 1334), (791, 804), (294, 25), (895, 1740), (464, 555), (828, 1621), (1306, 1699), (876, 1306), (1111, 704), (1663, 924), (201, 201), (1065, 331), (222, 1031), (1590, 394), (1306, 1306), (177, 177), (1306, 1306), (1204, 1514), (177, 177), (1514, 1514), (191, 201), (1807, 177), (1031, 828), (177, 1723), (1334, 1554), (1306, 1306), (951, 1306), (1401, 1514), (1031, 542), (425, 139), (331, 115), (54, 828), (1321, 331), (982, 982), (1306, 187), (1306, 1265), (895, 1122), (1306, 497), (177, 177), (940, 78), (1699, 1618), (1314, 331), (589, 366), (1306, 1262), (258, 483), (1765, 774), (1514, 549), (1651, 1651), (1384, 1288), (828, 828), (589, 1055), (1514, 562), (184, 497), (986, 986), (1329, 625), (497, 1329), (1329, 186), (497, 497), (1306, 518), (849, 1765), (828, 497), (1693, 82), (0, 1728), (774, 497), (1626, 1626), (1322, 1520), (828, 828), (828, 828), (1329, 497), (331, 331), (1306, 1306), (1402, 627), (841, 1749), (1514, 1373), (1590, 1749), (11, 1667), (1329, 497), (1520, 673), (1514, 1749), (1348, 1373), (243, 164), (1329, 1329), (1306, 1306), (828, 828), (828, 1262), (331, 465), (1171, 1329), (1512, 1508), (1514, 331), (191, 1306), (1265, 1574), (1816, 841), (1348, 361), (201, 1699), (1514, 976), (1170, 331), (1373, 1373), (1749, 1306), (841, 828), (1514, 1514), (188, 1329), (1153, 1306), (653, 1309), (331, 331), (1631, 1631), (294, 79), (1749, 788), (774, 982), (1699, 1699), (294, 1695), (549, 1329), (986, 986), (191, 177), (201, 201), (1590, 497), (1573, 1329), (1809, 1807), (837, 837), (865, 828), (1150, 294), (1514, 1514), (1554, 201), (828, 1520), (1102, 1102), (672, 672), (1329, 497), (1514, 1514), (591, 591), (865, 865), (1329, 1554), (765, 177), (1749, 828), (584, 1705), (1306, 1262), (1514, 1109), (1626, 221), (445, 509), (186, 201), (497, 497), (944, 497), (954, 1329), (837, 837), (1306, 1306), (1031, 895), (1749, 1235), (121, 591), (400, 331), (1329, 1329), (223, 895), (1619, 1667), (331, 162), (618, 1212), (1711, 549), (828, 344), (331, 331), (895, 895), (1374, 736), (1306, 201), (1749, 346), (1401, 1461), (177, 1329),

(768, 768), (588, 588), (1705, 1329), (1306, 1275), (98, 1795), (1514, 1386), (1031, 324), (1125, 98), (1394, 497), (1306, 1514), (1126, 1161), (331, 331), (1776, 1329), (1373, 1357), (497, 518), (186, 177), (886, 1749), (1306, 1306), (1373, 1520), (1459, 1514), (1792, 331), (1329, 630), (837, 837), (1709, 1111), (497, 1157), (1369, 1306), (1011, 1007), (1306, 1306), (995, 995), (1402, 1469), (1306, 186), (1329, 828), (1514, 1288), (191, 191), (1749, 964), (426, 828), (1690, 295), (1559, 1321), (1650, 1650), (1275, 518), (1590, 1520), (1444, 310), (1391, 497), (331, 412), (1306, 832), (1275, 1329), (549, 1364), (828, 828), (1373, 895), (841, 518), (878, 189), (766, 518), (1334, 1161), (606, 1306), (1262, 177), (58, 58), (1765, 1329), (1306, 828), (588, 1167), (1384, 1795), (1306, 556), (315, 989), (1212, 1787), (828, 828), (1306, 1306), (828, 243), (177, 177), (13, 1079), (1173, 1173), (1334, 1486), (758, 828), (381, 1520), (1751, 1520), (331, 331), (828, 251), (497, 243), (1514, 1306), (1520, 1306), (1373, 1306), (323, 106), (1306, 1306), (1699, 582), (123, 107), (552, 1213), (1381, 497), (1514, 1329), (186, 758), (1719, 1514), (1334, 1227), (1699, 1699), (1329, 1668), (982, 1306), (1111, 1401), (1650, 1306), (497, 497), (1373, 1753), (497, 497), (1235, 1235), (1444, 828), (1749, 1320), (283, 1741), (370, 1514), (1306, 1275), (1306, 177), (1749, 1769), (1357, 1406), (1626, 1626), (1433, 43), (176, 151), (588, 588), (307, 307), (1098, 1031), (1514, 1329), (1626, 1514), (625, 1329), (834, 834), (1306, 1699), (1306, 758), (995, 1148), (1329, 1394), (81, 1031), (1406, 1406), (331, 1306), (201, 1560), (331, 895), (852, 257), (635, 635), (1125, 331), (588, 588), (1275, 1306), (331, 331), (549, 1288), (1306, 1262), (1381, 854), (1306, 1329), (1560, 1514), (502, 201), (1321, 1306), (1655, 1655), (331, 201), (331, 331), (331, 344), (1349, 1334), (1306, 186), (1480, 1031), (1514, 1277), (1514, 1329), (177, 186), (402, 1373), (828, 201), (1319, 191), (1210, 1693), (765, 769), (1290, 1373), (1155, 497), (986, 986), (177, 186), (799, 1657), (1329, 1514), (1348, 546), (1626, 1626), (1576, 1574), (828, 828), (1102, 1102), (1306, 1520), (1723, 1723), (986, 774), (20, 57), (21, 331), (1306, 1306), (1520, 1306), (1275, 243), (722, 497), (1275, 549), (828, 828), (1771, 1597), (26, 1031), (1306, 1329), (758, 1235), (682, 682), (186, 186), (1497, 704), (497, 982), (1342, 1514), (497, 986), (246, 719), (886, 886), (598, 509), (1514, 497), (115, 497), (895, 1087), (115, 684), (331, 331), (1749, 365), (512, 456), (310, 310), (1514, 204), (1348, 549), (1047, 1288), (1514, 804), (549, 828), (865, 497), (1329, 549), (837, 837), (1306, 828), (1306, 1373), (1306, 1708), (722, 578), (828, 1306), (1306, 1306), (1329, 1329), (1527, 562), (1559, 841), (982, 1306), (625, 497), (1381, 1306), (1306, 518), (1667, 860), (1040, 1040), (331, 465), (761, 1306), (1699, 1705), (968, 394), (1235, 992), (546, 497), (1306, 1699), (1031, 1031), (1288, 1288), (1749, 1261), (958, 1444), (1616, 1394), (201, 201), (21, 1639), (497, 91)]

```
[21]: from sklearn.metrics import confusion_matrix, accuracy_score, \
      ↪ classification_report

      cfm=confusion_matrix(Y_test,Y_pred)
      print(cfm)

      print("Classification report: ")
```

```
print(classification_report(Y_test,Y_pred))

acc=accuracy_score(Y_test, Y_pred)
print("Accuracy of the model: ",acc)
```

```
[[0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 1 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]
```

Classification report:

	precision	recall	f1-score	support
0	0.00	0.00	0.00	2
1	0.00	0.00	0.00	1
6	0.25	0.14	0.18	7
7	0.00	0.00	0.00	1
8	0.00	0.00	0.00	1
9	0.00	0.00	0.00	1
11	0.00	0.00	0.00	1
12	0.00	0.00	0.00	1
13	0.00	0.00	0.00	1
15	0.00	0.00	0.00	1
16	1.00	1.00	1.00	2
18	0.00	0.00	0.00	1
20	0.00	0.00	0.00	1
21	0.00	0.00	0.00	2
24	0.00	0.00	0.00	0
25	0.00	0.00	0.00	0
26	0.00	0.00	0.00	1
28	0.00	0.00	0.00	0
29	0.00	0.00	0.00	2
32	0.00	0.00	0.00	0
34	0.00	0.00	0.00	1
35	0.00	0.00	0.00	1
37	0.00	0.00	0.00	1
38	0.00	0.00	0.00	1
43	0.00	0.00	0.00	0
44	0.00	0.00	0.00	0
47	0.00	0.00	0.00	1
49	0.00	0.00	0.00	1
50	0.00	0.00	0.00	0
53	0.00	0.00	0.00	0
54	0.33	0.33	0.33	3

55	0.00	0.00	0.00	1
57	0.00	0.00	0.00	0
58	1.00	1.00	1.00	13
61	0.00	0.00	0.00	0
69	0.00	0.00	0.00	1
78	0.00	0.00	0.00	0
79	0.00	0.00	0.00	0
81	0.00	0.00	0.00	1
82	0.00	0.00	0.00	0
85	0.00	0.00	0.00	1
89	0.00	0.00	0.00	1
90	0.00	0.00	0.00	0
91	0.00	0.00	0.00	0
93	0.00	0.00	0.00	0
98	0.00	0.00	0.00	2
101	0.00	0.00	0.00	1
102	0.00	0.00	0.00	0
104	1.00	0.50	0.67	2
106	0.00	0.00	0.00	0
107	0.00	0.00	0.00	0
112	0.00	0.00	0.00	1
115	0.00	0.00	0.00	2
117	0.00	0.00	0.00	0
121	0.00	0.00	0.00	2
122	0.00	0.00	0.00	0
123	0.00	0.00	0.00	1
124	0.00	0.00	0.00	1
134	0.00	0.00	0.00	1
135	0.00	0.00	0.00	0
139	0.00	0.00	0.00	0
143	0.00	0.00	0.00	1
151	0.00	0.00	0.00	0
152	0.00	0.00	0.00	1
153	0.00	0.00	0.00	1
158	0.00	0.00	0.00	1
159	0.00	0.00	0.00	2
161	0.00	0.00	0.00	0
162	0.00	0.00	0.00	0
164	0.00	0.00	0.00	0
166	0.00	0.00	0.00	0
168	0.00	0.00	0.00	3
169	0.00	0.00	0.00	0
170	0.00	0.00	0.00	1
171	0.00	0.00	0.00	0
176	0.00	0.00	0.00	1
177	0.28	0.30	0.29	44
178	0.00	0.00	0.00	1
181	0.00	0.00	0.00	1

183	0.00	0.00	0.00	0
184	0.00	0.00	0.00	1
186	0.18	0.17	0.18	29
187	0.00	0.00	0.00	0
188	0.00	0.00	0.00	1
189	0.00	0.00	0.00	0
191	0.60	0.40	0.48	15
195	0.00	0.00	0.00	1
196	0.00	0.00	0.00	0
199	0.00	0.00	0.00	1
201	0.30	0.32	0.31	25
202	0.00	0.00	0.00	0
203	0.00	0.00	0.00	0
204	0.00	0.00	0.00	0
205	0.00	0.00	0.00	1
207	0.00	0.00	0.00	0
211	0.00	0.00	0.00	1
213	0.00	0.00	0.00	1
216	0.00	0.00	0.00	1
217	0.00	0.00	0.00	1
219	0.00	0.00	0.00	0
220	0.00	0.00	0.00	1
221	0.00	0.00	0.00	0
222	0.00	0.00	0.00	1
223	0.00	0.00	0.00	2
224	0.00	0.00	0.00	0
225	0.00	0.00	0.00	1
226	0.00	0.00	0.00	3
229	0.00	0.00	0.00	0
230	0.83	0.42	0.56	12
232	0.00	0.00	0.00	0
233	0.20	0.50	0.29	2
234	0.00	0.00	0.00	1
236	0.00	0.00	0.00	1
243	0.44	0.36	0.40	11
246	0.00	0.00	0.00	1
249	0.00	0.00	0.00	1
251	0.20	0.50	0.29	4
254	0.00	0.00	0.00	0
255	1.00	0.50	0.67	2
257	0.00	0.00	0.00	2
258	0.00	0.00	0.00	1
268	0.00	0.00	0.00	1
271	0.00	0.00	0.00	0
274	0.00	0.00	0.00	1
276	0.00	0.00	0.00	1
277	0.00	0.00	0.00	1
280	0.00	0.00	0.00	0

283	0.00	0.00	0.00	1
284	0.00	0.00	0.00	1
285	0.00	0.00	0.00	2
290	0.00	0.00	0.00	1
291	0.00	0.00	0.00	0
293	0.00	0.00	0.00	0
294	0.00	0.00	0.00	3
295	0.00	0.00	0.00	0
296	0.00	0.00	0.00	0
297	0.50	1.00	0.67	1
298	0.00	0.00	0.00	1
299	0.00	0.00	0.00	0
302	0.00	0.00	0.00	0
303	0.00	0.00	0.00	0
307	1.00	1.00	1.00	4
309	0.00	0.00	0.00	1
310	0.64	1.00	0.78	7
311	0.00	0.00	0.00	1
312	0.00	0.00	0.00	0
315	0.00	0.00	0.00	1
316	0.00	0.00	0.00	0
317	0.00	0.00	0.00	0
323	0.00	0.00	0.00	1
324	0.00	0.00	0.00	0
326	0.00	0.00	0.00	0
327	0.00	0.00	0.00	1
329	1.00	1.00	1.00	1
331	0.53	0.60	0.56	65
332	0.00	0.00	0.00	1
335	0.00	0.00	0.00	1
336	0.00	0.00	0.00	1
337	0.00	0.00	0.00	1
338	0.00	0.00	0.00	0
339	0.00	0.00	0.00	0
340	0.00	0.00	0.00	1
341	0.00	0.00	0.00	0
342	0.00	0.00	0.00	0
344	0.14	0.25	0.18	4
346	0.00	0.00	0.00	1
352	0.00	0.00	0.00	1
357	0.00	0.00	0.00	1
358	0.00	0.00	0.00	0
361	0.25	1.00	0.40	1
362	0.00	0.00	0.00	0
363	0.00	0.00	0.00	1
364	0.00	0.00	0.00	1
365	0.00	0.00	0.00	0
366	0.00	0.00	0.00	0

367	0.00	0.00	0.00	1
370	0.00	0.00	0.00	4
371	0.00	0.00	0.00	1
372	0.00	0.00	0.00	2
379	0.00	0.00	0.00	1
381	0.00	0.00	0.00	1
382	0.00	0.00	0.00	1
386	0.00	0.00	0.00	1
390	0.00	0.00	0.00	1
394	0.14	1.00	0.25	1
395	0.00	0.00	0.00	0
396	0.00	0.00	0.00	0
397	0.00	0.00	0.00	1
399	0.00	0.00	0.00	0
400	0.00	0.00	0.00	3
402	0.00	0.00	0.00	1
404	0.00	0.00	0.00	1
405	0.00	0.00	0.00	1
406	0.00	0.00	0.00	0
407	0.00	0.00	0.00	1
412	0.00	0.00	0.00	0
417	1.00	1.00	1.00	1
418	0.00	0.00	0.00	1
419	0.00	0.00	0.00	0
420	0.00	0.00	0.00	5
424	0.00	0.00	0.00	0
425	0.00	0.00	0.00	1
426	0.00	0.00	0.00	1
427	0.00	0.00	0.00	2
433	1.00	1.00	1.00	1
435	0.00	0.00	0.00	0
436	0.00	0.00	0.00	0
437	1.00	1.00	1.00	1
441	0.00	0.00	0.00	1
444	0.00	0.00	0.00	1
445	0.00	0.00	0.00	1
447	0.00	0.00	0.00	0
450	0.00	0.00	0.00	0
451	0.00	0.00	0.00	1
456	0.00	0.00	0.00	0
457	0.00	0.00	0.00	0
458	0.00	0.00	0.00	0
461	0.00	0.00	0.00	1
462	0.00	0.00	0.00	1
463	0.00	0.00	0.00	1
464	0.00	0.00	0.00	1
465	0.00	0.00	0.00	2
467	0.00	0.00	0.00	1



468	0.00	0.00	0.00	1
469	0.00	0.00	0.00	1
470	0.00	0.00	0.00	0
471	0.00	0.00	0.00	1
473	0.00	0.00	0.00	0
475	0.00	0.00	0.00	0
476	0.00	0.00	0.00	0
481	0.00	0.00	0.00	0
483	0.00	0.00	0.00	0
485	0.00	0.00	0.00	0
486	0.00	0.00	0.00	1
487	0.00	0.00	0.00	1
491	0.00	0.00	0.00	1
497	0.27	0.34	0.30	64
500	1.00	1.00	1.00	1
502	0.00	0.00	0.00	1
507	0.00	0.00	0.00	1
509	0.00	0.00	0.00	0
511	0.00	0.00	0.00	0
512	0.00	0.00	0.00	2
515	0.00	0.00	0.00	0
516	0.00	0.00	0.00	1
517	0.00	0.00	0.00	1
518	0.07	0.11	0.09	19
521	0.00	0.00	0.00	1
522	0.00	0.00	0.00	1
526	0.00	0.00	0.00	1
528	0.00	0.00	0.00	1
531	0.00	0.00	0.00	1
533	0.00	0.00	0.00	1
536	0.00	0.00	0.00	1
537	0.00	0.00	0.00	0
542	0.00	0.00	0.00	0
544	0.00	0.00	0.00	1
545	0.00	0.00	0.00	0
546	0.00	0.00	0.00	2
548	0.00	0.00	0.00	1
549	0.04	0.05	0.05	21
552	0.00	0.00	0.00	1
554	0.00	0.00	0.00	0
555	0.00	0.00	0.00	0
556	0.00	0.00	0.00	0
562	0.00	0.00	0.00	0
563	0.00	0.00	0.00	1
564	0.00	0.00	0.00	1
565	0.00	0.00	0.00	0
568	0.00	0.00	0.00	2
575	0.00	0.00	0.00	0

576	0.00	0.00	0.00	1
578	0.00	0.00	0.00	0
579	0.00	0.00	0.00	0
581	0.00	0.00	0.00	0
582	0.00	0.00	0.00	4
583	0.00	0.00	0.00	1
584	0.00	0.00	0.00	1
588	0.60	0.60	0.60	10
589	0.33	0.33	0.33	3
591	0.50	1.00	0.67	1
595	0.50	0.50	0.50	2
598	0.00	0.00	0.00	1
599	0.00	0.00	0.00	0
600	0.00	0.00	0.00	1
601	0.00	0.00	0.00	0
604	0.00	0.00	0.00	1
606	0.00	0.00	0.00	1
608	0.00	0.00	0.00	1
610	0.00	0.00	0.00	0
616	0.00	0.00	0.00	1
618	0.00	0.00	0.00	2
621	0.00	0.00	0.00	1
622	0.00	0.00	0.00	1
623	0.00	0.00	0.00	0
625	0.00	0.00	0.00	5
626	0.00	0.00	0.00	2
627	0.00	0.00	0.00	1
628	0.00	0.00	0.00	0
630	0.00	0.00	0.00	0
634	0.00	0.00	0.00	1
635	0.33	1.00	0.50	1
636	0.00	0.00	0.00	0
637	0.00	0.00	0.00	0
644	0.00	0.00	0.00	0
646	0.00	0.00	0.00	0
650	0.00	0.00	0.00	1
651	0.00	0.00	0.00	0
653	0.00	0.00	0.00	1
654	0.00	0.00	0.00	0
656	0.00	0.00	0.00	0
660	0.00	0.00	0.00	2
663	0.00	0.00	0.00	0
669	0.00	0.00	0.00	1
670	0.00	0.00	0.00	1
671	0.00	0.00	0.00	1
672	1.00	1.00	1.00	1
673	0.00	0.00	0.00	0
675	0.00	0.00	0.00	1

677	0.00	0.00	0.00	0
680	0.00	0.00	0.00	0
682	1.00	1.00	1.00	2
684	0.00	0.00	0.00	0
686	0.00	0.00	0.00	0
687	0.00	0.00	0.00	0
693	0.00	0.00	0.00	1
701	0.00	0.00	0.00	0
703	0.00	0.00	0.00	1
704	0.00	0.00	0.00	0
707	0.00	0.00	0.00	1
709	0.00	0.00	0.00	1
710	0.00	0.00	0.00	0
719	0.00	0.00	0.00	2
721	0.00	0.00	0.00	0
722	0.00	0.00	0.00	4
724	0.00	0.00	0.00	1
728	0.00	0.00	0.00	0
729	0.00	0.00	0.00	1
730	0.00	0.00	0.00	1
731	0.00	0.00	0.00	1
732	0.00	0.00	0.00	1
734	0.00	0.00	0.00	1
736	0.00	0.00	0.00	1
738	0.00	0.00	0.00	1
743	0.00	0.00	0.00	1
744	0.00	0.00	0.00	0
746	0.00	0.00	0.00	1
748	0.00	0.00	0.00	1
754	0.00	0.00	0.00	0
758	0.60	0.33	0.43	9
759	0.00	0.00	0.00	0
760	0.00	0.00	0.00	2
761	0.00	0.00	0.00	1
765	0.00	0.00	0.00	3
766	0.00	0.00	0.00	1
767	0.00	0.00	0.00	1
768	0.50	1.00	0.67	1
769	0.00	0.00	0.00	0
770	0.00	0.00	0.00	4
772	0.00	0.00	0.00	1
774	0.33	0.20	0.25	5
775	0.00	0.00	0.00	1
779	0.00	0.00	0.00	0
783	0.00	0.00	0.00	1
784	0.00	0.00	0.00	1
786	0.00	0.00	0.00	1
787	0.00	0.00	0.00	1

788	0.00	0.00	0.00	1
791	0.00	0.00	0.00	3
792	0.00	0.00	0.00	0
796	0.00	0.00	0.00	1
797	0.00	0.00	0.00	0
798	0.00	0.00	0.00	1
799	0.00	0.00	0.00	1
802	1.00	0.50	0.67	2
804	0.00	0.00	0.00	0
806	0.00	0.00	0.00	0
807	0.00	0.00	0.00	0
809	0.00	0.00	0.00	0
810	0.00	0.00	0.00	4
811	0.00	0.00	0.00	0
813	0.00	0.00	0.00	1
819	0.00	0.00	0.00	0
820	0.00	0.00	0.00	0
823	0.00	0.00	0.00	0
828	0.35	0.35	0.35	77
831	0.00	0.00	0.00	1
832	0.00	0.00	0.00	0
833	0.00	0.00	0.00	1
834	0.20	0.22	0.21	9
835	0.00	0.00	0.00	0
837	0.71	0.91	0.80	11
840	0.00	0.00	0.00	0
841	0.00	0.00	0.00	5
842	0.00	0.00	0.00	1
843	0.00	0.00	0.00	1
846	0.00	0.00	0.00	1
847	0.00	0.00	0.00	0
849	0.00	0.00	0.00	1
850	0.00	0.00	0.00	0
851	0.00	0.00	0.00	0
852	0.00	0.00	0.00	1
853	0.00	0.00	0.00	1
854	0.00	0.00	0.00	0
858	0.00	0.00	0.00	1
859	0.00	0.00	0.00	1
860	0.00	0.00	0.00	0
861	0.00	0.00	0.00	0
863	0.00	0.00	0.00	0
865	0.42	0.45	0.43	11
867	0.00	0.00	0.00	1
868	0.00	0.00	0.00	1
870	0.00	0.00	0.00	0
871	0.00	0.00	0.00	1
872	0.00	0.00	0.00	2

874	0.00	0.00	0.00	1
876	0.00	0.00	0.00	1
877	0.00	0.00	0.00	0
878	0.00	0.00	0.00	3
880	0.00	0.00	0.00	1
882	0.00	0.00	0.00	1
886	0.50	0.67	0.57	3
895	0.10	0.12	0.11	8
902	0.00	0.00	0.00	0
909	0.00	0.00	0.00	1
911	0.00	0.00	0.00	0
912	0.00	0.00	0.00	1
913	0.00	0.00	0.00	0
916	0.00	0.00	0.00	0
920	0.00	0.00	0.00	1
923	0.00	0.00	0.00	1
924	0.00	0.00	0.00	0
930	0.00	0.00	0.00	1
931	0.00	0.00	0.00	0
932	0.00	0.00	0.00	1
933	0.00	0.00	0.00	1
937	0.00	0.00	0.00	1
938	0.00	0.00	0.00	0
939	0.00	0.00	0.00	1
940	0.00	0.00	0.00	1
944	0.00	0.00	0.00	1
946	0.00	0.00	0.00	1
950	0.00	0.00	0.00	1
951	0.00	0.00	0.00	3
953	1.00	1.00	1.00	2
954	0.00	0.00	0.00	1
955	0.00	0.00	0.00	1
956	0.00	0.00	0.00	1
958	0.00	0.00	0.00	2
959	0.00	0.00	0.00	1
960	0.00	0.00	0.00	0
964	0.00	0.00	0.00	0
968	0.00	0.00	0.00	1
969	0.00	0.00	0.00	1
971	0.00	0.00	0.00	1
972	1.00	0.33	0.50	3
974	0.00	0.00	0.00	0
976	0.00	0.00	0.00	0
979	0.00	0.00	0.00	0
982	0.57	0.62	0.59	13
983	0.00	0.00	0.00	1
985	0.00	0.00	0.00	0
986	0.73	0.84	0.78	19

987	0.00	0.00	0.00	1
989	0.00	0.00	0.00	0
991	0.00	0.00	0.00	0
992	0.00	0.00	0.00	0
993	0.00	0.00	0.00	0
995	0.50	0.20	0.29	5
996	0.00	0.00	0.00	0
999	0.00	0.00	0.00	0
1002	0.00	0.00	0.00	1
1007	0.00	0.00	0.00	0
1008	0.00	0.00	0.00	2
1009	0.00	0.00	0.00	1
1011	0.00	0.00	0.00	1
1014	0.00	0.00	0.00	1
1019	0.00	0.00	0.00	0
1020	0.00	0.00	0.00	2
1021	0.00	0.00	0.00	1
1026	0.00	0.00	0.00	1
1027	0.00	0.00	0.00	1
1030	0.00	0.00	0.00	1
1031	0.17	0.17	0.17	12
1038	0.00	0.00	0.00	1
1039	0.00	0.00	0.00	1
1040	1.00	1.00	1.00	3
1043	1.00	1.00	1.00	1
1044	0.00	0.00	0.00	2
1045	0.00	0.00	0.00	1
1047	0.00	0.00	0.00	1
1048	0.00	0.00	0.00	1
1055	0.00	0.00	0.00	0
1061	0.00	0.00	0.00	1
1065	0.00	0.00	0.00	3
1068	0.00	0.00	0.00	1
1070	0.00	0.00	0.00	1
1079	0.00	0.00	0.00	0
1082	0.00	0.00	0.00	0
1084	0.00	0.00	0.00	1
1086	0.00	0.00	0.00	0
1087	0.00	0.00	0.00	0
1093	0.00	0.00	0.00	1
1095	0.00	0.00	0.00	1
1098	0.20	0.17	0.18	6
1100	0.00	0.00	0.00	1
1102	0.80	1.00	0.89	4
1104	0.00	0.00	0.00	1
1105	0.00	0.00	0.00	1
1109	0.00	0.00	0.00	0
1110	0.00	0.00	0.00	0

1111	0.00	0.00	0.00	2
1113	0.00	0.00	0.00	0
1114	0.00	0.00	0.00	1
1118	0.00	0.00	0.00	1
1120	0.00	0.00	0.00	1
1122	0.00	0.00	0.00	0
1124	0.00	0.00	0.00	0
1125	0.00	0.00	0.00	2
1126	0.00	0.00	0.00	7
1130	0.00	0.00	0.00	1
1133	0.00	0.00	0.00	1
1134	0.00	0.00	0.00	1
1135	0.00	0.00	0.00	0
1137	0.00	0.00	0.00	0
1141	0.00	0.00	0.00	0
1142	0.00	0.00	0.00	1
1143	0.00	0.00	0.00	1
1144	0.00	0.00	0.00	0
1148	0.00	0.00	0.00	0
1150	0.00	0.00	0.00	1
1151	0.00	0.00	0.00	0
1152	0.00	0.00	0.00	1
1153	0.00	0.00	0.00	2
1155	0.00	0.00	0.00	1
1157	0.00	0.00	0.00	0
1159	0.00	0.00	0.00	1
1160	0.00	0.00	0.00	1
1161	0.33	1.00	0.50	1
1162	0.00	0.00	0.00	0
1165	0.00	0.00	0.00	0
1167	0.00	0.00	0.00	0
1169	0.00	0.00	0.00	0
1170	0.00	0.00	0.00	1
1171	0.00	0.00	0.00	3
1173	1.00	1.00	1.00	1
1178	1.00	1.00	1.00	1
1183	0.00	0.00	0.00	0
1184	0.00	0.00	0.00	1
1185	0.00	0.00	0.00	1
1186	0.00	0.00	0.00	1
1189	0.00	0.00	0.00	0
1192	0.00	0.00	0.00	1
1193	0.00	0.00	0.00	0
1198	0.00	0.00	0.00	1
1199	0.00	0.00	0.00	1
1203	0.00	0.00	0.00	1
1204	0.00	0.00	0.00	2
1210	0.00	0.00	0.00	1

1212	0.33	0.50	0.40	8
1213	0.00	0.00	0.00	0
1214	0.00	0.00	0.00	1
1216	0.00	0.00	0.00	0
1217	0.00	0.00	0.00	1
1220	0.00	0.00	0.00	1
1223	0.00	0.00	0.00	1
1226	0.00	0.00	0.00	0
1227	0.00	0.00	0.00	0
1231	0.00	0.00	0.00	1
1235	0.11	0.20	0.14	10
1236	0.00	0.00	0.00	1
1237	0.00	0.00	0.00	0
1238	0.00	0.00	0.00	1
1241	0.00	0.00	0.00	0
1243	0.00	0.00	0.00	1
1244	0.00	0.00	0.00	1
1245	0.00	0.00	0.00	1
1256	0.00	0.00	0.00	1
1257	0.00	0.00	0.00	0
1261	0.00	0.00	0.00	0
1262	0.35	0.43	0.38	21
1265	0.00	0.00	0.00	1
1270	0.00	0.00	0.00	0
1271	0.00	0.00	0.00	1
1272	0.50	0.50	0.50	2
1275	0.23	0.23	0.23	22
1277	0.00	0.00	0.00	3
1278	0.00	0.00	0.00	0
1281	0.00	0.00	0.00	1
1283	0.00	0.00	0.00	1
1284	0.00	0.00	0.00	1
1288	0.28	0.42	0.33	12
1290	0.00	0.00	0.00	5
1293	0.00	0.00	0.00	1
1299	0.00	0.00	0.00	1
1300	0.00	0.00	0.00	0
1305	0.00	0.00	0.00	1
1306	0.30	0.26	0.28	204
1309	0.00	0.00	0.00	0
1312	0.00	0.00	0.00	0
1314	0.00	0.00	0.00	1
1315	0.00	0.00	0.00	1
1319	0.00	0.00	0.00	2
1320	0.00	0.00	0.00	0
1321	0.00	0.00	0.00	6
1322	0.00	0.00	0.00	1
1323	1.00	1.00	1.00	1



1325	0.00	0.00	0.00	1
1329	0.23	0.27	0.25	90
1334	0.09	0.07	0.08	15
1336	0.00	0.00	0.00	3
1338	0.00	0.00	0.00	2
1340	0.00	0.00	0.00	0
1342	0.00	0.00	0.00	1
1348	0.17	0.15	0.16	13
1349	0.00	0.00	0.00	1
1352	0.00	0.00	0.00	1
1353	0.00	0.00	0.00	0
1354	0.00	0.00	0.00	0
1355	0.00	0.00	0.00	1
1357	0.00	0.00	0.00	4
1361	0.00	0.00	0.00	1
1364	0.00	0.00	0.00	0
1369	0.00	0.00	0.00	1
1373	0.07	0.06	0.06	18
1374	0.00	0.00	0.00	1
1381	0.00	0.00	0.00	7
1384	0.00	0.00	0.00	4
1386	0.50	1.00	0.67	1
1388	0.00	0.00	0.00	1
1390	0.00	0.00	0.00	0
1391	0.00	0.00	0.00	2
1392	0.00	0.00	0.00	0
1394	0.00	0.00	0.00	1
1397	0.00	0.00	0.00	1
1401	0.00	0.00	0.00	5
1402	0.00	0.00	0.00	4
1405	0.00	0.00	0.00	1
1406	0.17	0.17	0.17	6
1407	0.00	0.00	0.00	1
1411	1.00	1.00	1.00	1
1413	0.00	0.00	0.00	0
1416	0.00	0.00	0.00	1
1417	0.00	0.00	0.00	0
1419	0.00	0.00	0.00	0
1422	0.00	0.00	0.00	2
1424	0.00	0.00	0.00	0
1426	0.00	0.00	0.00	0
1428	0.00	0.00	0.00	1
1429	0.00	0.00	0.00	1
1430	0.00	0.00	0.00	1
1431	0.00	0.00	0.00	0
1433	0.00	0.00	0.00	1
1435	0.00	0.00	0.00	2
1437	0.00	0.00	0.00	0

1439	0.00	0.00	0.00	0
1441	0.00	0.00	0.00	2
1444	0.17	0.22	0.19	9
1445	0.00	0.00	0.00	0
1446	0.00	0.00	0.00	1
1448	0.00	0.00	0.00	2
1450	0.00	0.00	0.00	0
1455	0.00	0.00	0.00	0
1457	0.00	0.00	0.00	1
1458	0.00	0.00	0.00	1
1459	0.00	0.00	0.00	1
1460	0.00	0.00	0.00	1
1461	0.00	0.00	0.00	1
1464	0.00	0.00	0.00	1
1468	0.00	0.00	0.00	0
1469	0.00	0.00	0.00	1
1473	0.00	0.00	0.00	0
1474	0.00	0.00	0.00	1
1477	0.00	0.00	0.00	3
1478	0.00	0.00	0.00	1
1480	0.00	0.00	0.00	1
1481	0.00	0.00	0.00	1
1482	0.00	0.00	0.00	1
1485	0.00	0.00	0.00	0
1486	0.00	0.00	0.00	0
1487	0.00	0.00	0.00	0
1497	0.00	0.00	0.00	1
1504	0.00	0.00	0.00	1
1507	0.00	0.00	0.00	1
1508	0.00	0.00	0.00	0
1509	0.00	0.00	0.00	0
1512	0.00	0.00	0.00	1
1514	0.32	0.23	0.27	83
1515	0.00	0.00	0.00	0
1516	0.00	0.00	0.00	1
1518	0.00	0.00	0.00	1
1519	0.00	0.00	0.00	0
1520	0.15	0.11	0.13	46
1527	0.00	0.00	0.00	1
1528	1.00	1.00	1.00	1
1529	1.00	1.00	1.00	1
1530	0.00	0.00	0.00	1
1531	0.00	0.00	0.00	1
1532	0.00	0.00	0.00	1
1533	0.00	0.00	0.00	0
1536	0.00	0.00	0.00	0
1538	0.00	0.00	0.00	1
1542	0.00	0.00	0.00	0

1546	0.00	0.00	0.00	1
1547	0.00	0.00	0.00	1
1549	0.00	0.00	0.00	0
1554	0.00	0.00	0.00	10
1555	0.00	0.00	0.00	1
1556	0.00	0.00	0.00	1
1559	0.00	0.00	0.00	11
1560	0.00	0.00	0.00	2
1562	0.00	0.00	0.00	1
1566	0.00	0.00	0.00	1
1570	1.00	1.00	1.00	1
1571	0.00	0.00	0.00	0
1573	0.00	0.00	0.00	2
1574	0.00	0.00	0.00	1
1576	0.00	0.00	0.00	1
1579	0.00	0.00	0.00	0
1582	0.00	0.00	0.00	1
1583	0.00	0.00	0.00	2
1586	0.00	0.00	0.00	0
1588	1.00	1.00	1.00	1
1589	0.00	0.00	0.00	1
1590	0.00	0.00	0.00	7
1594	0.00	0.00	0.00	0
1595	0.00	0.00	0.00	1
1597	0.00	0.00	0.00	1
1598	0.00	0.00	0.00	0
1599	1.00	1.00	1.00	1
1601	0.00	0.00	0.00	1
1602	0.00	0.00	0.00	1
1604	0.00	0.00	0.00	1
1606	0.00	0.00	0.00	1
1607	0.00	0.00	0.00	0
1608	0.00	0.00	0.00	1
1609	0.00	0.00	0.00	0
1611	0.00	0.00	0.00	1
1614	0.00	0.00	0.00	0
1616	0.00	0.00	0.00	1
1618	0.25	0.40	0.31	5
1619	0.00	0.00	0.00	2
1621	0.00	0.00	0.00	0
1622	1.00	1.00	1.00	1
1623	0.00	0.00	0.00	0
1626	0.82	0.82	0.82	22
1628	0.00	0.00	0.00	1
1631	0.67	0.40	0.50	5
1639	0.00	0.00	0.00	0
1641	0.00	0.00	0.00	1
1642	1.00	1.00	1.00	1

1645	0.00	0.00	0.00	1
1646	0.00	0.00	0.00	1
1647	0.00	0.00	0.00	1
1649	0.00	0.00	0.00	0
1650	0.43	0.25	0.32	12
1651	1.00	1.00	1.00	3
1652	0.00	0.00	0.00	1
1655	0.92	1.00	0.96	12
1657	0.00	0.00	0.00	1
1663	0.00	0.00	0.00	1
1665	0.00	0.00	0.00	1
1667	0.00	0.00	0.00	2
1668	0.00	0.00	0.00	0
1669	0.00	0.00	0.00	0
1670	0.00	0.00	0.00	0
1675	0.00	0.00	0.00	0
1683	0.00	0.00	0.00	0
1685	0.00	0.00	0.00	0
1690	0.00	0.00	0.00	1
1691	0.00	0.00	0.00	0
1693	0.00	0.00	0.00	1
1694	0.00	0.00	0.00	1
1695	0.00	0.00	0.00	0
1696	0.00	0.00	0.00	1
1699	0.34	0.34	0.34	29
1701	0.00	0.00	0.00	0
1705	0.33	0.20	0.25	10
1707	0.00	0.00	0.00	1
1708	0.00	0.00	0.00	0
1709	0.00	0.00	0.00	1
1711	0.00	0.00	0.00	1
1712	0.00	0.00	0.00	1
1713	0.00	0.00	0.00	0
1714	0.00	0.00	0.00	0
1717	0.00	0.00	0.00	1
1719	0.00	0.00	0.00	1
1722	0.00	0.00	0.00	2
1723	0.45	0.56	0.50	9
1728	0.00	0.00	0.00	0
1737	0.00	0.00	0.00	0
1738	0.00	0.00	0.00	0
1740	0.00	0.00	0.00	0
1741	0.00	0.00	0.00	0
1743	0.00	0.00	0.00	3
1745	0.00	0.00	0.00	1
1749	0.12	0.18	0.15	22
1751	0.00	0.00	0.00	1
1753	0.00	0.00	0.00	0

1754	0.00	0.00	0.00	1
1756	0.00	0.00	0.00	1
1758	0.00	0.00	0.00	0
1760	0.00	0.00	0.00	1
1761	0.00	0.00	0.00	2
1762	0.00	0.00	0.00	0
1765	0.00	0.00	0.00	5
1769	0.00	0.00	0.00	0
1771	0.00	0.00	0.00	1
1774	0.00	0.00	0.00	0
1775	1.00	1.00	1.00	1
1776	0.00	0.00	0.00	1
1778	0.00	0.00	0.00	0
1785	0.00	0.00	0.00	0
1786	0.00	0.00	0.00	0
1787	0.00	0.00	0.00	0
1788	0.00	0.00	0.00	0
1789	0.50	1.00	0.67	1
1790	0.00	0.00	0.00	1
1791	0.00	0.00	0.00	1
1792	0.67	0.50	0.57	4
1794	0.00	0.00	0.00	0
1795	0.00	0.00	0.00	1
1796	0.00	0.00	0.00	1
1797	0.00	0.00	0.00	1
1802	0.00	0.00	0.00	1
1806	0.00	0.00	0.00	0
1807	0.00	0.00	0.00	2
1808	0.00	0.00	0.00	1
1809	0.00	0.00	0.00	1
1811	0.00	0.00	0.00	0
1813	0.00	0.00	0.00	0
1814	0.00	0.00	0.00	0
1815	0.00	0.00	0.00	1
1816	0.00	0.00	0.00	1
1818	0.00	0.00	0.00	1
1820	0.00	0.00	0.00	0
1821	0.00	0.00	0.00	1
accuracy			0.24	1909
macro avg	0.07	0.07	0.07	1909
weighted avg	0.24	0.24	0.24	1909

Accuracy of the model: 0.24358302776322682

## 0.4 Building Logistic Regression

```
[22]: from sklearn.linear_model import LogisticRegression
      #create a model object
      classifier = LogisticRegression(multi_class="multinomial")
      #train the model object
      classifier.fit(X_train,Y_train)      # fit is the function that is used for
      ↪training the data

      Y_pred = classifier.predict(X_test)
      print(Y_pred)
```

```
[1306 1306 1306 ... 1306 1306 1306]
```

```
[23]: from sklearn.metrics import confusion_matrix, accuracy_score,
      ↪classification_report

      cfm=confusion_matrix(Y_test,Y_pred)
      print(cfm)

      print("Classification report: ")

      print(classification_report(Y_test,Y_pred))

      acc=accuracy_score(Y_test, Y_pred)
      print("Accuracy of the model: ",acc)
```

```
[[0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]
```

Classification report:

	precision	recall	f1-score	support
0	0.00	0.00	0.00	2
1	0.00	0.00	0.00	1
6	0.00	0.00	0.00	7
7	0.00	0.00	0.00	1
8	0.00	0.00	0.00	1
9	0.00	0.00	0.00	1
11	0.00	0.00	0.00	1
12	0.00	0.00	0.00	1
13	0.00	0.00	0.00	1
15	0.00	0.00	0.00	1
16	0.00	0.00	0.00	2

18	0.00	0.00	0.00	1
20	0.00	0.00	0.00	1
21	0.00	0.00	0.00	2
26	0.00	0.00	0.00	1
29	0.00	0.00	0.00	2
34	0.00	0.00	0.00	1
35	0.00	0.00	0.00	1
37	0.00	0.00	0.00	1
38	0.00	0.00	0.00	1
47	0.00	0.00	0.00	1
49	0.00	0.00	0.00	1
54	0.00	0.00	0.00	3
55	0.00	0.00	0.00	1
58	0.00	0.00	0.00	13
69	0.00	0.00	0.00	1
81	0.00	0.00	0.00	1
85	0.00	0.00	0.00	1
89	0.00	0.00	0.00	1
98	0.00	0.00	0.00	2
101	0.00	0.00	0.00	1
104	0.00	0.00	0.00	2
112	0.00	0.00	0.00	1
115	0.00	0.00	0.00	2
121	0.00	0.00	0.00	2
123	0.00	0.00	0.00	1
124	0.00	0.00	0.00	1
134	0.00	0.00	0.00	1
143	0.00	0.00	0.00	1
152	0.00	0.00	0.00	1
153	0.00	0.00	0.00	1
158	0.00	0.00	0.00	1
159	0.00	0.00	0.00	2
168	0.00	0.00	0.00	3
170	0.00	0.00	0.00	1
176	0.00	0.00	0.00	1
177	0.00	0.00	0.00	44
178	0.00	0.00	0.00	1
181	0.00	0.00	0.00	1
184	0.00	0.00	0.00	1
186	0.00	0.00	0.00	29
188	0.00	0.00	0.00	1
191	0.00	0.00	0.00	15
195	0.00	0.00	0.00	1
199	0.00	0.00	0.00	1
201	0.00	0.00	0.00	25
205	0.00	0.00	0.00	1
211	0.00	0.00	0.00	1
213	0.00	0.00	0.00	1

216	0.00	0.00	0.00	1
217	0.00	0.00	0.00	1
220	0.00	0.00	0.00	1
222	0.00	0.00	0.00	1
223	0.00	0.00	0.00	2
225	0.00	0.00	0.00	1
226	0.00	0.00	0.00	3
230	0.00	0.00	0.00	12
233	0.00	0.00	0.00	2
234	0.00	0.00	0.00	1
236	0.00	0.00	0.00	1
243	0.00	0.00	0.00	11
246	0.00	0.00	0.00	1
249	0.00	0.00	0.00	1
251	0.00	0.00	0.00	4
255	0.00	0.00	0.00	2
257	0.00	0.00	0.00	2
258	0.00	0.00	0.00	1
268	0.00	0.00	0.00	1
274	0.00	0.00	0.00	1
276	0.00	0.00	0.00	1
277	0.00	0.00	0.00	1
283	0.00	0.00	0.00	1
284	0.00	0.00	0.00	1
285	0.00	0.00	0.00	2
290	0.00	0.00	0.00	1
294	0.00	0.00	0.00	3
297	0.00	0.00	0.00	1
298	0.00	0.00	0.00	1
307	0.00	0.00	0.00	4
309	0.00	0.00	0.00	1
310	0.00	0.00	0.00	7
311	0.00	0.00	0.00	1
315	0.00	0.00	0.00	1
323	0.00	0.00	0.00	1
327	0.00	0.00	0.00	1
329	0.00	0.00	0.00	1
331	0.00	0.00	0.00	65
332	0.00	0.00	0.00	1
335	0.00	0.00	0.00	1
336	0.00	0.00	0.00	1
337	0.00	0.00	0.00	1
340	0.00	0.00	0.00	1
344	0.00	0.00	0.00	4
346	0.00	0.00	0.00	1
352	0.00	0.00	0.00	1
357	0.00	0.00	0.00	1
361	0.00	0.00	0.00	1



363	0.00	0.00	0.00	1
364	0.00	0.00	0.00	1
367	0.00	0.00	0.00	1
370	0.00	0.00	0.00	4
371	0.00	0.00	0.00	1
372	0.00	0.00	0.00	2
379	0.00	0.00	0.00	1
381	0.00	0.00	0.00	1
382	0.00	0.00	0.00	1
386	0.00	0.00	0.00	1
390	0.00	0.00	0.00	1
394	0.00	0.00	0.00	1
397	0.00	0.00	0.00	1
400	0.00	0.00	0.00	3
402	0.00	0.00	0.00	1
404	0.00	0.00	0.00	1
405	0.00	0.00	0.00	1
407	0.00	0.00	0.00	1
417	0.00	0.00	0.00	1
418	0.00	0.00	0.00	1
420	0.00	0.00	0.00	5
425	0.00	0.00	0.00	1
426	0.00	0.00	0.00	1
427	0.00	0.00	0.00	2
433	0.00	0.00	0.00	1
437	0.00	0.00	0.00	1
441	0.00	0.00	0.00	1
444	0.00	0.00	0.00	1
445	0.00	0.00	0.00	1
451	0.00	0.00	0.00	1
461	0.00	0.00	0.00	1
462	0.00	0.00	0.00	1
463	0.00	0.00	0.00	1
464	0.00	0.00	0.00	1
465	0.00	0.00	0.00	2
467	0.00	0.00	0.00	1
468	0.00	0.00	0.00	1
469	0.00	0.00	0.00	1
471	0.00	0.00	0.00	1
486	0.00	0.00	0.00	1
487	0.00	0.00	0.00	1
491	0.00	0.00	0.00	1
497	0.00	0.00	0.00	64
500	0.00	0.00	0.00	1
502	0.00	0.00	0.00	1
507	0.00	0.00	0.00	1
512	0.00	0.00	0.00	2
516	0.00	0.00	0.00	1

517	0.00	0.00	0.00	1
518	0.00	0.00	0.00	19
521	0.00	0.00	0.00	1
522	0.00	0.00	0.00	1
526	0.00	0.00	0.00	1
528	0.00	0.00	0.00	1
531	0.00	0.00	0.00	1
533	0.00	0.00	0.00	1
536	0.00	0.00	0.00	1
544	0.00	0.00	0.00	1
546	0.00	0.00	0.00	2
548	0.00	0.00	0.00	1
549	0.00	0.00	0.00	21
552	0.00	0.00	0.00	1
563	0.00	0.00	0.00	1
564	0.00	0.00	0.00	1
568	0.00	0.00	0.00	2
576	0.00	0.00	0.00	1
582	0.00	0.00	0.00	4
583	0.00	0.00	0.00	1
584	0.00	0.00	0.00	1
588	0.00	0.00	0.00	10
589	0.00	0.00	0.00	3
591	0.00	0.00	0.00	1
595	0.00	0.00	0.00	2
598	0.00	0.00	0.00	1
600	0.00	0.00	0.00	1
604	0.00	0.00	0.00	1
606	0.00	0.00	0.00	1
608	0.00	0.00	0.00	1
616	0.00	0.00	0.00	1
618	0.00	0.00	0.00	2
621	0.00	0.00	0.00	1
622	0.00	0.00	0.00	1
625	0.00	0.00	0.00	5
626	0.00	0.00	0.00	2
627	0.00	0.00	0.00	1
634	0.00	0.00	0.00	1
635	0.00	0.00	0.00	1
650	0.00	0.00	0.00	1
653	0.00	0.00	0.00	1
660	0.00	0.00	0.00	2
669	0.00	0.00	0.00	1
670	0.00	0.00	0.00	1
671	0.00	0.00	0.00	1
672	0.00	0.00	0.00	1
675	0.00	0.00	0.00	1
682	0.00	0.00	0.00	2

693	0.00	0.00	0.00	1
703	0.00	0.00	0.00	1
707	0.00	0.00	0.00	1
709	0.00	0.00	0.00	1
719	0.00	0.00	0.00	2
722	0.00	0.00	0.00	4
724	0.00	0.00	0.00	1
729	0.00	0.00	0.00	1
730	0.00	0.00	0.00	1
731	0.00	0.00	0.00	1
732	0.00	0.00	0.00	1
734	0.00	0.00	0.00	1
736	0.00	0.00	0.00	1
738	0.00	0.00	0.00	1
743	0.00	0.00	0.00	1
746	0.00	0.00	0.00	1
748	0.00	0.00	0.00	1
758	0.00	0.00	0.00	9
760	0.00	0.00	0.00	2
761	0.00	0.00	0.00	1
765	0.00	0.00	0.00	3
766	0.00	0.00	0.00	1
767	0.00	0.00	0.00	1
768	0.00	0.00	0.00	1
770	0.00	0.00	0.00	4
772	0.00	0.00	0.00	1
774	0.00	0.00	0.00	5
775	0.00	0.00	0.00	1
783	0.00	0.00	0.00	1
784	0.00	0.00	0.00	1
786	0.00	0.00	0.00	1
787	0.00	0.00	0.00	1
788	0.00	0.00	0.00	1
791	0.00	0.00	0.00	3
796	0.00	0.00	0.00	1
798	0.00	0.00	0.00	1
799	0.00	0.00	0.00	1
802	0.00	0.00	0.00	2
810	0.00	0.00	0.00	4
813	0.00	0.00	0.00	1
828	0.00	0.00	0.00	77
831	0.00	0.00	0.00	1
833	0.00	0.00	0.00	1
834	0.00	0.00	0.00	9
837	0.00	0.00	0.00	11
841	0.00	0.00	0.00	5
842	0.00	0.00	0.00	1
843	0.00	0.00	0.00	1

846	0.00	0.00	0.00	1
849	0.00	0.00	0.00	1
852	0.00	0.00	0.00	1
853	0.00	0.00	0.00	1
858	0.00	0.00	0.00	1
859	0.00	0.00	0.00	1
865	0.00	0.00	0.00	11
867	0.00	0.00	0.00	1
868	0.00	0.00	0.00	1
871	0.00	0.00	0.00	1
872	0.00	0.00	0.00	2
874	0.00	0.00	0.00	1
876	0.00	0.00	0.00	1
878	0.00	0.00	0.00	3
880	0.00	0.00	0.00	1
882	0.00	0.00	0.00	1
886	0.00	0.00	0.00	3
895	0.00	0.00	0.00	8
909	0.00	0.00	0.00	1
912	0.00	0.00	0.00	1
920	0.00	0.00	0.00	1
923	0.00	0.00	0.00	1
930	0.00	0.00	0.00	1
932	0.00	0.00	0.00	1
933	0.00	0.00	0.00	1
937	0.00	0.00	0.00	1
939	0.00	0.00	0.00	1
940	0.00	0.00	0.00	1
944	0.00	0.00	0.00	1
946	0.00	0.00	0.00	1
950	0.00	0.00	0.00	1
951	0.00	0.00	0.00	3
953	0.00	0.00	0.00	2
954	0.00	0.00	0.00	1
955	0.00	0.00	0.00	1
956	0.00	0.00	0.00	1
958	0.00	0.00	0.00	2
959	0.00	0.00	0.00	1
968	0.00	0.00	0.00	1
969	0.00	0.00	0.00	1
971	0.00	0.00	0.00	1
972	0.00	0.00	0.00	3
982	0.00	0.00	0.00	13
983	0.00	0.00	0.00	1
986	0.00	0.00	0.00	19
987	0.00	0.00	0.00	1
995	0.00	0.00	0.00	5
1002	0.00	0.00	0.00	1

1008	0.00	0.00	0.00	2
1009	0.00	0.00	0.00	1
1011	0.00	0.00	0.00	1
1014	0.00	0.00	0.00	1
1020	0.00	0.00	0.00	2
1021	0.00	0.00	0.00	1
1026	0.00	0.00	0.00	1
1027	0.00	0.00	0.00	1
1030	0.00	0.00	0.00	1
1031	0.00	0.00	0.00	12
1038	0.00	0.00	0.00	1
1039	0.00	0.00	0.00	1
1040	0.00	0.00	0.00	3
1043	0.00	0.00	0.00	1
1044	0.00	0.00	0.00	2
1045	0.00	0.00	0.00	1
1047	0.00	0.00	0.00	1
1048	0.00	0.00	0.00	1
1061	0.00	0.00	0.00	1
1065	0.00	0.00	0.00	3
1068	0.00	0.00	0.00	1
1070	0.00	0.00	0.00	1
1084	0.00	0.00	0.00	1
1093	0.00	0.00	0.00	1
1095	0.00	0.00	0.00	1
1098	0.00	0.00	0.00	6
1100	0.00	0.00	0.00	1
1102	0.00	0.00	0.00	4
1104	0.00	0.00	0.00	1
1105	0.00	0.00	0.00	1
1111	0.00	0.00	0.00	2
1114	0.00	0.00	0.00	1
1118	0.00	0.00	0.00	1
1120	0.00	0.00	0.00	1
1125	0.00	0.00	0.00	2
1126	0.00	0.00	0.00	7
1130	0.00	0.00	0.00	1
1133	0.00	0.00	0.00	1
1134	0.00	0.00	0.00	1
1142	0.00	0.00	0.00	1
1143	0.00	0.00	0.00	1
1150	0.00	0.00	0.00	1
1152	0.00	0.00	0.00	1
1153	0.00	0.00	0.00	2
1155	0.00	0.00	0.00	1
1159	0.00	0.00	0.00	1
1160	0.00	0.00	0.00	1
1161	0.00	0.00	0.00	1

1170	0.00	0.00	0.00	1
1171	0.00	0.00	0.00	3
1173	0.00	0.00	0.00	1
1178	0.00	0.00	0.00	1
1184	0.00	0.00	0.00	1
1185	0.00	0.00	0.00	1
1186	0.00	0.00	0.00	1
1192	0.00	0.00	0.00	1
1198	0.00	0.00	0.00	1
1199	0.00	0.00	0.00	1
1203	0.00	0.00	0.00	1
1204	0.00	0.00	0.00	2
1210	0.00	0.00	0.00	1
1212	0.00	0.00	0.00	8
1214	0.00	0.00	0.00	1
1217	0.00	0.00	0.00	1
1220	0.00	0.00	0.00	1
1223	0.00	0.00	0.00	1
1231	0.00	0.00	0.00	1
1235	0.00	0.00	0.00	10
1236	0.00	0.00	0.00	1
1238	0.00	0.00	0.00	1
1243	0.00	0.00	0.00	1
1244	0.00	0.00	0.00	1
1245	0.00	0.00	0.00	1
1256	0.00	0.00	0.00	1
1262	0.00	0.00	0.00	21
1265	0.00	0.00	0.00	1
1271	0.00	0.00	0.00	1
1272	0.00	0.00	0.00	2
1275	0.00	0.00	0.00	22
1277	0.00	0.00	0.00	3
1281	0.00	0.00	0.00	1
1283	0.00	0.00	0.00	1
1284	0.00	0.00	0.00	1
1288	0.00	0.00	0.00	12
1290	0.00	0.00	0.00	5
1293	0.00	0.00	0.00	1
1299	0.00	0.00	0.00	1
1305	0.00	0.00	0.00	1
1306	0.11	0.99	0.19	204
1314	0.00	0.00	0.00	1
1315	0.00	0.00	0.00	1
1319	0.00	0.00	0.00	2
1321	0.00	0.00	0.00	6
1322	0.00	0.00	0.00	1
1323	0.00	0.00	0.00	1
1325	0.00	0.00	0.00	1

1329	0.00	0.00	0.00	90
1334	0.00	0.00	0.00	15
1336	0.00	0.00	0.00	3
1338	0.00	0.00	0.00	2
1342	0.00	0.00	0.00	1
1348	0.00	0.00	0.00	13
1349	0.00	0.00	0.00	1
1352	0.00	0.00	0.00	1
1355	0.00	0.00	0.00	1
1357	0.00	0.00	0.00	4
1361	0.00	0.00	0.00	1
1369	0.00	0.00	0.00	1
1373	0.00	0.00	0.00	18
1374	0.00	0.00	0.00	1
1381	0.00	0.00	0.00	7
1384	0.00	0.00	0.00	4
1386	0.00	0.00	0.00	1
1388	0.00	0.00	0.00	1
1391	0.00	0.00	0.00	2
1394	0.00	0.00	0.00	1
1397	0.00	0.00	0.00	1
1401	0.00	0.00	0.00	5
1402	0.00	0.00	0.00	4
1405	0.00	0.00	0.00	1
1406	0.00	0.00	0.00	6
1407	0.00	0.00	0.00	1
1411	0.00	0.00	0.00	1
1416	0.00	0.00	0.00	1
1422	0.00	0.00	0.00	2
1428	0.00	0.00	0.00	1
1429	0.00	0.00	0.00	1
1430	0.00	0.00	0.00	1
1433	0.00	0.00	0.00	1
1435	0.00	0.00	0.00	2
1441	0.00	0.00	0.00	2
1444	0.00	0.00	0.00	9
1446	0.00	0.00	0.00	1
1448	0.00	0.00	0.00	2
1457	0.00	0.00	0.00	1
1458	0.00	0.00	0.00	1
1459	0.00	0.00	0.00	1
1460	0.00	0.00	0.00	1
1461	0.00	0.00	0.00	1
1464	0.00	0.00	0.00	1
1469	0.00	0.00	0.00	1
1474	0.00	0.00	0.00	1
1477	0.00	0.00	0.00	3
1478	0.00	0.00	0.00	1

1480	0.00	0.00	0.00	1
1481	0.00	0.00	0.00	1
1482	0.00	0.00	0.00	1
1497	0.00	0.00	0.00	1
1504	0.00	0.00	0.00	1
1507	0.00	0.00	0.00	1
1512	0.00	0.00	0.00	1
1514	0.00	0.00	0.00	83
1516	0.00	0.00	0.00	1
1518	0.00	0.00	0.00	1
1520	0.00	0.00	0.00	46
1527	0.00	0.00	0.00	1
1528	0.00	0.00	0.00	1
1529	0.00	0.00	0.00	1
1530	0.00	0.00	0.00	1
1531	0.00	0.00	0.00	1
1532	0.00	0.00	0.00	1
1538	0.00	0.00	0.00	1
1546	0.00	0.00	0.00	1
1547	0.00	0.00	0.00	1
1554	0.00	0.00	0.00	10
1555	0.00	0.00	0.00	1
1556	0.00	0.00	0.00	1
1559	0.00	0.00	0.00	11
1560	0.00	0.00	0.00	2
1562	0.00	0.00	0.00	1
1566	0.00	0.00	0.00	1
1570	0.00	0.00	0.00	1
1573	0.00	0.00	0.00	2
1574	0.00	0.00	0.00	1
1576	0.00	0.00	0.00	1
1582	0.00	0.00	0.00	1
1583	0.00	0.00	0.00	2
1588	0.00	0.00	0.00	1
1589	0.00	0.00	0.00	1
1590	0.00	0.00	0.00	7
1595	0.00	0.00	0.00	1
1597	0.00	0.00	0.00	1
1599	0.00	0.00	0.00	1
1601	0.00	0.00	0.00	1
1602	0.00	0.00	0.00	1
1604	0.00	0.00	0.00	1
1606	0.00	0.00	0.00	1
1608	0.00	0.00	0.00	1
1611	0.00	0.00	0.00	1
1616	0.00	0.00	0.00	1
1618	0.00	0.00	0.00	5
1619	0.00	0.00	0.00	2



1622	0.00	0.00	0.00	1
1626	0.00	0.00	0.00	22
1628	0.00	0.00	0.00	1
1631	0.00	0.00	0.00	5
1641	0.00	0.00	0.00	1
1642	0.00	0.00	0.00	1
1645	0.00	0.00	0.00	1
1646	0.00	0.00	0.00	1
1647	0.00	0.00	0.00	1
1650	0.00	0.00	0.00	12
1651	0.00	0.00	0.00	3
1652	0.00	0.00	0.00	1
1655	0.00	0.00	0.00	12
1657	0.00	0.00	0.00	1
1663	0.00	0.00	0.00	1
1665	0.00	0.00	0.00	1
1667	0.00	0.00	0.00	2
1690	0.00	0.00	0.00	1
1693	0.00	0.00	0.00	1
1694	0.00	0.00	0.00	1
1695	0.00	0.00	0.00	0
1696	0.00	0.00	0.00	1
1699	0.00	0.00	0.00	29
1705	0.00	0.00	0.00	10
1707	0.00	0.00	0.00	1
1709	0.00	0.00	0.00	1
1711	0.00	0.00	0.00	1
1712	0.00	0.00	0.00	1
1717	0.00	0.00	0.00	1
1719	0.00	0.00	0.00	1
1722	0.00	0.00	0.00	2
1723	0.00	0.00	0.00	9
1743	0.00	0.00	0.00	3
1745	0.00	0.00	0.00	1
1749	0.00	0.00	0.00	22
1751	0.00	0.00	0.00	1
1754	0.00	0.00	0.00	1
1756	0.00	0.00	0.00	1
1760	0.00	0.00	0.00	1
1761	0.00	0.00	0.00	2
1765	0.00	0.00	0.00	5
1771	0.00	0.00	0.00	1
1775	0.00	0.00	0.00	1
1776	0.00	0.00	0.00	1
1789	0.00	0.00	0.00	1
1790	0.00	0.00	0.00	1
1791	0.00	0.00	0.00	1
1792	0.00	0.00	0.00	4

1795	0.00	0.00	0.00	1
1796	0.00	0.00	0.00	1
1797	0.00	0.00	0.00	1
1802	0.00	0.00	0.00	1
1807	0.00	0.00	0.00	2
1808	0.00	0.00	0.00	1
1809	0.00	0.00	0.00	1
1815	0.00	0.00	0.00	1
1816	0.00	0.00	0.00	1
1818	0.00	0.00	0.00	1
1821	0.00	0.00	0.00	1
accuracy			0.11	1909
macro avg	0.00	0.00	0.00	1909
weighted avg	0.01	0.11	0.02	1909

Accuracy of the model: 0.10581456259821896

#### 0.4.1 Conclusion:

By comparing Random Forest and Logistic Regression. Random Forest is Performing Better as compared to Logistic Regression.

#### 0.5 THANK YOU!!!

0.6 Github Link: <https://github.com/anujtiwari21?tab=repositories>