Sejal Sanas

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

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

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

In [3]:
```python
# Creating the Dataframe
df=pd.read_csv(r'C:/Users/Shejal Sanas/Downloads/Dataset.csv')
```

In [4]:
```python
df.head(1)
```

Out[4]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	...	Currency	bc
0	6317637	Le Petit Souffle	162	Makati City	Third Floor, Century City Mall, Kalayaan Avenu...	Century City Mall, Poblacion, Makati City	Century City Mall, Poblacion, Makati City, Mak...	121.027535	14.565443	French, Japanese, Desserts	...	Botswana Pula(P)	

1 rows × 21 columns

In [5]:
```python
# Droping 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)
```

In [6]:
```python
df
```

Out[6]:

	Restaurant Name	Cuisines	Average Cost for two
0	Le Petit Souffle	French, Japanese, Desserts	1100
1	Izakaya Kikufuji	Japanese	1200
2	Heat - Edsa Shangri-La	Seafood, Asian, Filipino, Indian	4000
3	Ooma	Japanese, Sushi	1500
4	Sambo Kojin	Japanese, Korean	1500
...	...	...	...
9546	Naml\ Gurme	Turkish	80
9547	Ceviz A��ac\	World Cuisine, Patisserie, Cafe	105
9548	Huqqa	Italian, World Cuisine	170
9549	A���k Kahve	Restaurant Cafe	120
9550	Walter's Coffee Roastery	Cafe	55

9551 rows × 3 columns

Loading [MathJax]/extensions/Safe.js

```python
In [7]:   # Checking for missing values
          df.isnull().sum()
```

```
Out[7]:   Restaurant Name       0
          Cuisines              9
          Average Cost for two  0
          dtype: int64
```

```python
In [8]:   df.dropna(inplace=True)
```

```python
In [9]:
          df.shape
```

```
Out[9]:   (9542, 3)
```

```python
In [10]:  # Checking missing vaalues 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()
```

```python
In [11]:  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'])
```

```python
In [12]:  df.describe(include="all")
```

Out[12]:

	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

```python
In [13]:  # 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'])
```

```python
In [14]:  df
```

Out[14]:

	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 × 3 columns

Building Random Forest Model

Loading [MathJax]/extensions/Safe.js

In [15]:
```python
# Create X and Y
X = df[['Restaurant Name', 'Average Cost for two']]
Y = df['Cuisines']
```

In [16]:
```python
from sklearn.preprocessing import StandardScaler

scaler= StandardScaler()

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

In [17]:
```python
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)
```

Loading [MathJax]/extensions/Safe.js

In [18]:
```python
# 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)))
```

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```python
In [19]: 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)
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```python
In [19]: 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)
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Classification report:
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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
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35	0.00	0.00	0.00	1
37	0.00	0.00	0.00	1
38	0.00	0.00	0.00	1
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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

Loading [MathJax]/extensions/Safe.js

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

Loading [MathJax]/extensions/Safe.js

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

Loading [MathJax]/extensions/Safe.js

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

Loading [MathJax]/extensions/Safe.js

```
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
```

Loading [MathJax]/extensions/Safe.js

```
 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
```

Loading [MathJax]/extensions/Safe.js

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

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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

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```
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
```

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```
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
```

Loading [MathJax]/extensions/Safe.js

```
      macro avg       0.07      0.07      0.07      1909
   weighted avg       0.24      0.24      0.24      1909
```

```
Accuracy of the model:  0.24358302776322682
```

Building Logistic Regression

In [20]:
```python
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]
```

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In [21]:
```python
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)
```

In [21]:
```python
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)
```

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```
[[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
```

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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

Loading [MathJax]/extensions/Safe.js

```
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
```

Loading [MathJax]/extensions/Safe.js

```
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
```

Loading [MathJax]/extensions/Safe.js

```
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
```

Loading [MathJax]/extensions/Safe.js

```
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
```

Loading [MathJax]/extensions/Safe.js

```
         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
```

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

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