Introduction

This project analyzes a data set containing information on traffic stops made based on the notion of "reasonable suspicion" in order to create statistical models which accurately predict whether an arrest was made after a "Terry Stop."

In [133…
```
import numpy as np
import pandas as pd
```

In [134…
```
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
```

In [135…
```
df = pd.read_csv("Terry_Stops.csv")
```

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

Out[4]:

	Subject Age Group	Subject ID	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	...	Reported Time	Initial Call Type	Final Call Type	Call Type	Officer Squad
0	-	-1	20140000120677	92317	Arrest	None	7500	1984	M	Black or African American	...	11:32:00	-	-	-	SOUTH PCT 1ST W - ROBERT
1	-	-1	20150000001463	28806	Field Contact	None	5670	1965	M	White	...	07:59:00	-	-	-	NaN
2	-	-1	20150000001516	29599	Field Contact	None	4844	1961	M	White	...	19:12:00	-	-	-	NaN
3	-	-1	20150000001670	32260	Field Contact	None	7539	1963	M	White	...	04:55:00	-	-	-	NaN
4	-	-1	20150000001739	33155	Field Contact	None	6973	1977	M	White	...	00:41:00	-	-	-	NaN

5 rows × 23 columns

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 49020 entries, 0 to 49019
Data columns (total 23 columns):
 #   Column                   Non-Null Count  Dtype 
---  ------                   --------------  ----- 
 0   Subject Age Group        49020 non-null  object
 1   Subject ID               49020 non-null  int64 
 2   GO / SC Num              49020 non-null  int64 
 3   Terry Stop ID            49020 non-null  int64 
 4   Stop Resolution          49020 non-null  object
 5   Weapon Type              49020 non-null  object
 6   Officer ID               49020 non-null  object
 7   Officer YOB              49020 non-null  int64 
 8   Officer Gender           49020 non-null  object
 9   Officer Race             49020 non-null  object
 10  Subject Perceived Race   49020 non-null  object
 11  Subject Perceived Gender 49020 non-null  object
 12  Reported Date            49020 non-null  object
 13  Reported Time            49020 non-null  object
 14  Initial Call Type        49020 non-null  object
 15  Final Call Type          49020 non-null  object
 16  Call Type                49020 non-null  object
 17  Officer Squad            48369 non-null  object
 18  Arrest Flag              49020 non-null  object
 19  Frisk Flag               49020 non-null  object
 20  Precinct                 49020 non-null  object
 21  Sector                   49020 non-null  object
 22  Beat                     49020 non-null  object
dtypes: int64(4), object(19)
memory usage: 8.6+ MB
```

In [6]:
```
df.describe()
```

Out[6]:

	Subject ID	GO / SC Num	Terry Stop ID	Officer YOB
count	4.902000e+04	4.902000e+04	4.902000e+04	49020.000000

	Subject ID	GO / SC Num	Terry Stop ID	Officer YOB
mean	2.990501e+09	2.017683e+13	4.443287e+09	1983.064055
std	5.283252e+09	9.294550e+10	7.470587e+09	9.423197
min	-1.000000e+00	-1.000000e+00	2.802000e+04	1900.000000
25%	-1.000000e+00	2.016000e+13	1.892298e+05	1978.000000
50%	-1.000000e+00	2.018000e+13	4.203125e+05	1985.000000
75%	7.727135e+09	2.019000e+13	9.739575e+09	1990.000000
max	2.794456e+10	2.021000e+13	2.794508e+10	1998.000000

In [7]:
```
df.isna().any()
```

Out[7]:
```
Subject Age Group           False
Subject ID                  False
GO / SC Num                 False
Terry Stop ID               False
Stop Resolution             False
Weapon Type                 False
Officer ID                  False
Officer YOB                 False
Officer Gender              False
Officer Race                False
Subject Perceived Race      False
Subject Perceived Gender    False
Reported Date               False
Reported Time               False
Initial Call Type           False
Final Call Type             False
Call Type                   False
Officer Squad                True
Arrest Flag                 False
Frisk Flag                  False
Precinct                    False
Sector                      False
Beat                        False
dtype: bool
```

In [125…
```
df.head(10)
```

Out[125…

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0
8	20150000002392	45365	0	0	7560	1986	1	1	White	0	2015-05-22T00:00:00	07:39:00	0	0
15	20150000002677	49772	0	0	5065	1959	1	1	White	1	2015-06-03T00:00:00	10:08:00	0	0
16	20150000002678	49779	0	0	5065	1959	1	1	Black or African American	1	2015-06-03T00:00:00	09:49:00	0	1
22	20150000002833	52166	0	0	5966	1969	1	1	Other	1	2015-06-11T00:00:00	00:58:00	0	0
23	20150000002833	52167	0	0	5966	1969	1	1	American Indian or Alaska Native	1	2015-06-11T00:00:00	01:21:00	0	0

In [9]:
```
df = df.drop("Subject Age Group", axis = 1)
df = df.drop("Initial Call Type", axis = 1)
df = df.drop("Final Call Type", axis = 1)
df = df.drop("Call Type", axis = 1)
df = df.drop("Precinct", axis = 1)
df = df.drop("Sector", axis = 1)
df = df.drop("Beat", axis = 1)
df = df.drop("Subject ID", axis = 1)
```

In [127…
```
df.head(10)
```

Out[127…

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0
8	20150000002392	45365	0	0	7560	1986	1	1	White	0	2015-05-22T00:00:00	07:39:00	0	0
15	20150000002677	49772	0	0	5065	1959	1	1	White	1	2015-06-03T00:00:00	10:08:00	0	0
16	20150000002678	49779	0	0	5065	1959	1	1	Black or African American	1	2015-06-03T00:00:00	09:49:00	0	1
22	20150000002833	52166	0	0	5966	1969	1	1	Other	1	2015-06-11T00:00:00	00:58:00	0	0
23	20150000002833	52167	0	0	5966	1969	1	1	American Indian or Alaska Native	1	2015-06-11T00:00:00	01:21:00	0	0

In [11]:
```
df = df[df["Subject Perceived Race"] != "-"]
```

In [12]:
```
df = df[df["Arrest Flag"] != "-"]
```

In [13]:
```
df = df[df["Frisk Flag"] != "-"]
```

In [128…
```
df.head(10)
```

Out[128…

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0
8	20150000002392	45365	0	0	7560	1986	1	1	White	0	2015-05-22T00:00:00	07:39:00	0	0

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
15	20150000002677	49772	0	0	5065	1959	1	1	White	1	2015-06-03T00:00:00	10:08:00	0	0
16	20150000002678	49779	0	0	5065	1959	1	1	Black or African American	1	2015-06-03T00:00:00	09:49:00	0	1
22	20150000002833	52166	0	0	5966	1969	1	1	Other	1	2015-06-11T00:00:00	00:58:00	0	0
23	20150000002833	52167	0	0	5966	1969	1	1	American Indian or Alaska Native	1	2015-06-11T00:00:00	01:21:00	0	0

In [15]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 46798 entries, 0 to 49019
Data columns (total 15 columns):
 #   Column                   Non-Null Count  Dtype 
---  ------                   --------------  ----- 
 0   GO / SC Num              46798 non-null  int64 
 1   Terry Stop ID            46798 non-null  int64 
 2   Stop Resolution          46798 non-null  object
 3   Weapon Type              46798 non-null  object
 4   Officer ID               46798 non-null  object
 5   Officer YOB              46798 non-null  int64 
 6   Officer Gender           46798 non-null  object
 7   Officer Race             46798 non-null  object
 8   Subject Perceived Race   46798 non-null  object
 9   Subject Perceived Gender 46798 non-null  object
 10  Reported Date            46798 non-null  object
 11  Reported Time            46798 non-null  object
 12  Officer Squad            46184 non-null  object
 13  Arrest Flag              46798 non-null  object
 14  Frisk Flag               46798 non-null  object
dtypes: int64(3), object(12)
memory usage: 5.7+ MB
```

In [16]:
```
df.isna().any()
```

Out[16]:
```
GO / SC Num                False
Terry Stop ID              False
Stop Resolution            False
Weapon Type                False
Officer ID                 False
Officer YOB                False
Officer Gender             False
Officer Race               False
Subject Perceived Race     False
Subject Perceived Gender   False
Reported Date              False
Reported Time              False
Officer Squad               True
Arrest Flag                False
Frisk Flag                 False
dtype: bool
```

In [17]:
```
df = df.drop("Officer Squad", axis = 1)
```

In [18]:
```
df.isna().any()
```

Out[18]:
```
GO / SC Num                False
Terry Stop ID              False
Stop Resolution            False
Weapon Type                False
Officer ID                 False
Officer YOB                False
Officer Gender             False
Officer Race               False
Subject Perceived Race     False
Subject Perceived Gender   False
Reported Date              False
Reported Time              False
Arrest Flag                False
Frisk Flag                 False
dtype: bool
```

```
df.head()
```

In [19]:

Out[19]:

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	Arrest	None	7500	1984	M	Black or African American	Asian	Male	2015-10-16T00:00:00	11:32:00	N	N
4	20150000001739	33155	Field Contact	None	6973	1977	M	White	Black or African American	Male	2015-04-03T00:00:00	00:41:00	N	N
5	20150000001755	33571	Field Contact	None	7402	1973	M	White	Black or African American	Male	2015-04-05T00:00:00	23:46:00	N	N
6	20150000002351	45252	Field Contact	None	7591	1985	M	Hispanic or Latino	Other	Female	2015-05-20T00:00:00	21:39:00	N	N
7	20150000002363	45182	Field Contact	None	7591	1985	M	Hispanic or Latino	White	Male	2015-05-20T00:00:00	22:40:00	N	N

In [20]:
```
df.loc[df["Stop Resolution"] == "Arrest", "Stop Resolution"] = "1"
df.loc[df["Stop Resolution"] == "Field Contact", "Stop Resolution"] = "0"
df.loc[df["Stop Resolution"] == "Citation / Infraction", "Stop Resolution"] = "0"
```

In [21]:
```
df.loc[df["Officer Gender"] == "M", "Officer Gender"] = "1"
df.loc[df["Officer Gender"] == "F", "Officer Gender"] = "0"
```

In [22]:
```
df.loc[df["Arrest Flag"] == "Y", "Arrest Flag"] = "1"
df.loc[df["Arrest Flag"] == "N", "Arrest Flag"] = "0"
```

In [23]:
```
df.loc[df["Frisk Flag"] == "Y", "Frisk Flag"] = "1"
df.loc[df["Frisk Flag"] == "N", "Frisk Flag"] = "0"
```

In [24]:
```
df.loc[df["Subject Perceived Gender"] == "Male", "Subject Perceived Gender"] = "1"
df.loc[df["Subject Perceived Gender"] == "Female", "Subject Perceived Gender"] = "0"
df.loc[df["Subject Perceived Gender"] == "Unable to Determine", "Subject Perceived Gender"] = "0"
```

In [129…
```
df.head(10)
```

Out[129…

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0
8	20150000002392	45365	0	0	7560	1986	1	1	White	0	2015-05-22T00:00:00	07:39:00	0	0
15	20150000002677	49772	0	0	5065	1959	1	1	White	1	2015-06-03T00:00:00	10:08:00	0	0
16	20150000002678	49779	0	0	5065	1959	1	1	Black or African American	1	2015-06-03T00:00:00	09:49:00	0	1
22	20150000002833	52166	0	0	5966	1969	1	1	Other	1	2015-06-11T00:00:00	00:58:00	0	0
23	20150000002833	52167	0	0	5966	1969	1	1	American Indian or Alaska Native	1	2015-06-11T00:00:00	01:21:00	0	0

In [26]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 46798 entries, 0 to 49019
Data columns (total 14 columns):
 #   Column                   Non-Null Count  Dtype 
---  ------                   --------------  ----- 
 0   GO / SC Num              46798 non-null  int64 
 1   Terry Stop ID            46798 non-null  int64 
 2   Stop Resolution          46798 non-null  object
 3   Weapon Type              46798 non-null  object
 4   Officer ID               46798 non-null  object
 5   Officer YOB              46798 non-null  int64 
 6   Officer Gender           46798 non-null  object
 7   Officer Race             46798 non-null  object
 8   Subject Perceived Race   46798 non-null  object
 9   Subject Perceived Gender 46798 non-null  object
 10  Reported Date            46798 non-null  object
 11  Reported Time            46798 non-null  object
 12  Arrest Flag              46798 non-null  object
 13  Frisk Flag               46798 non-null  object
dtypes: int64(3), object(11)
memory usage: 5.4+ MB
```

In [27]:
```
df.drop(df.loc[df['Stop Resolution'] == '-'].index, inplace=True)
df.drop(df.loc[df['Weapon Type'] == '-'].index, inplace=True)
df.drop(df.loc[df['Officer ID'] == '-'].index, inplace=True)
df.drop(df.loc[df['Officer YOB'] == '-'].index, inplace=True)
df.drop(df.loc[df['Officer Gender'] == '-'].index, inplace=True)
df.drop(df.loc[df['Officer Race'] == '-'].index, inplace=True)
df.drop(df.loc[df['Subject Perceived Race'] == '-'].index, inplace=True)
df.drop(df.loc[df['Subject Perceived Gender'] == '-'].index, inplace=True)
df.drop(df.loc[df['Reported Date'] == '-'].index, inplace=True)
df.drop(df.loc[df['Reported Time'] == '-'].index, inplace=True)
df.drop(df.loc[df['Arrest Flag'] == '-'].index, inplace=True)
df.drop(df.loc[df['Frisk Flag'] == '-'].index, inplace=True)
```

In [28]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 34551 entries, 0 to 48985
Data columns (total 14 columns):
 #   Column                   Non-Null Count  Dtype 
---  ------                   --------------  ----- 
 0   GO / SC Num              34551 non-null  int64 
 1   Terry Stop ID            34551 non-null  int64 
 2   Stop Resolution          34551 non-null  object
 3   Weapon Type              34551 non-null  object
 4   Officer ID               34551 non-null  object
 5   Officer YOB              34551 non-null  int64 
 6   Officer Gender           34551 non-null  object
 7   Officer Race             34551 non-null  object
 8   Subject Perceived Race   34551 non-null  object
 9   Subject Perceived Gender 34551 non-null  object
 10  Reported Date            34551 non-null  object
 11  Reported Time            34551 non-null  object
 12  Arrest Flag              34551 non-null  object
 13  Frisk Flag               34551 non-null  object
dtypes: int64(3), object(11)
memory usage: 5.2+ MB
```

In [29]:
```
df.head()
```

Out[29]:

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	None	7500	1984	1	Black or African American	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	None	6973	1977	1	White	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	None	7402	1973	1	White	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	None	7591	1985	1	Hispanic or Latino	Other	0	2015-05-20T00:00:00	21:39:00	0	0

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
7	20150000002363	45182	0	None	7591	1985	1	Hispanic or Latino	White	1	2015-05-20T00:00:00	22:40:00	0	0

In [130…
```
df.head(10)
```

Out[130…

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0
8	20150000002392	45365	0	0	7560	1986	1	1	White	0	2015-05-22T00:00:00	07:39:00	0	0
15	20150000002677	49772	0	0	5065	1959	1	1	White	1	2015-06-03T00:00:00	10:08:00	0	0
16	20150000002678	49779	0	0	5065	1959	1	1	Black or African American	1	2015-06-03T00:00:00	09:49:00	0	1
22	20150000002833	52166	0	0	5966	1969	1	1	Other	1	2015-06-11T00:00:00	00:58:00	0	0
23	20150000002833	52167	0	0	5966	1969	1	1	American Indian or Alaska Native	1	2015-06-11T00:00:00	01:21:00	0	0

In [31]:
```
df.loc[df['Weapon Type'] != "None", 'Weapon Type'] = "1"
```

In [32]:
```
df.loc[df['Weapon Type'] == "None", 'Weapon Type'] = "0"
```

In [33]:
```
df.loc[df['Officer Race'] != "White", 'Officer Race'] = "0"
```

In [34]:
```
df.loc[df['Officer Race'] == "White", 'Officer Race'] = "1"
```

In [131…
```
df.head(10)
```

Out[131…

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
8	20150000002392	45365	0	0	7560	1986	1	1	White	0	2015-05-22T00:00:00	07:39:00	0	0
15	20150000002677	49772	0	0	5065	1959	1	1	White	1	2015-06-03T00:00:00	10:08:00	0	0
16	20150000002678	49779	0	0	5065	1959	1	1	Black or African American	1	2015-06-03T00:00:00	09:49:00	0	1
22	20150000002833	52166	0	0	5966	1969	1	1	Other	1	2015-06-11T00:00:00	00:58:00	0	0
23	20150000002833	52167	0	0	5966	1969	1	1	American Indian or Alaska Native	1	2015-06-11T00:00:00	01:21:00	0	0

In [36]:
```
df1 = df.filter(["Stop Resolution", "Weapon Type", "Officer Gender", "Officer Race", "Subject Perceived Gender", "Arrest F
```

In [37]:
```
df1.head()
```

Out[37]:

	Stop Resolution	Weapon Type	Officer Gender	Officer Race	Subject Perceived Gender	Arrest Flag	Frisk Flag
0	1	0	1	0	1	0	0
4	0	0	1	1	1	0	0
5	0	0	1	1	1	0	0
6	0	0	1	0	0	0	0
7	0	0	1	0	1	0	0

In [38]:
```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 34551 entries, 0 to 48985
Data columns (total 7 columns):
 #   Column                   Non-Null Count  Dtype 
---  ------                   --------------  ----- 
 0   Stop Resolution          34551 non-null  object
 1   Weapon Type              34551 non-null  object
 2   Officer Gender           34551 non-null  object
 3   Officer Race             34551 non-null  object
 4   Subject Perceived Gender  34551 non-null  object
 5   Arrest Flag              34551 non-null  object
 6   Frisk Flag               34551 non-null  object
dtypes: object(7)
memory usage: 3.4+ MB
```

In [39]:
```
df1.drop(df.loc[df['Stop Resolution'] == 'N'].index, inplace=True)
df1.drop(df.loc[df['Officer Gender'] == 'N'].index, inplace=True)
df1.drop(df.loc[df['Subject Perceived Gender'] == 'N'].index, inplace=True)
df1.drop(df.loc[df['Arrest Flag'] == 'N'].index, inplace=True)
df1.drop(df.loc[df['Frisk Flag'] == 'N'].index, inplace=True)
```

In [40]:
```
df1.drop(df.loc[df['Stop Resolution'] == 'Unknown'].index, inplace=True)
df1.drop(df.loc[df['Officer Gender'] == 'Unknown'].index, inplace=True)
df1.drop(df.loc[df['Subject Perceived Gender'] == 'Unknown'].index, inplace=True)
df1.drop(df.loc[df['Arrest Flag'] == 'Unknown'].index, inplace=True)
df1.drop(df.loc[df['Frisk Flag'] == 'Unknown'].index, inplace=True)
```

In [41]:
```
df1.drop(df.loc[df['Stop Resolution'] == 'Offense Report'].index, inplace=True)
df1.drop(df.loc[df['Officer Gender'] == 'Offense Report'].index, inplace=True)
df1.drop(df.loc[df['Subject Perceived Gender'] == 'Offense Report'].index, inplace=True)
df1.drop(df.loc[df['Arrest Flag'] == 'Offense Report'].index, inplace=True)
df1.drop(df.loc[df['Frisk Flag'] == 'Offense Report'].index, inplace=True)
```

In [42]:
```
df1.drop(df.loc[df['Stop Resolution'] == 'Referred for Prosecution'].index, inplace=True)
df1.drop(df.loc[df['Officer Gender'] == 'Referred for Prosecution'].index, inplace=True)
df1.drop(df.loc[df['Subject Perceived Gender'] == 'Referred for Prosecution'].index, inplace=True)
df1.drop(df.loc[df['Arrest Flag'] == 'Referred for Prosecution'].index, inplace=True)
df1.drop(df.loc[df['Frisk Flag'] == 'Referred for Prosecution'].index, inplace=True)
```

In [43]:
```
# DF1 to be used for model 1 keep DF as main dataframe
```

In [44]:
```
df.drop(df.loc[df['Stop Resolution'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Weapon Type'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Officer ID'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Officer YOB'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Officer Gender'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Officer Race'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Subject Perceived Race'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Subject Perceived Gender'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Reported Date'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Reported Time'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Arrest Flag'] == 'N'].index, inplace=True)
df.drop(df.loc[df['Frisk Flag'] == 'N'].index, inplace=True)
```

In [45]:
```
df.drop(df.loc[df['Stop Resolution'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Weapon Type'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Officer ID'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Officer YOB'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Officer Gender'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Officer Race'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Subject Perceived Race'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Subject Perceived Gender'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Reported Date'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Reported Time'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Arrest Flag'] == 'Unknown'].index, inplace=True)
df.drop(df.loc[df['Frisk Flag'] == 'Unknown'].index, inplace=True)
```

In [46]:
```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 20996 entries, 0 to 48985
Data columns (total 7 columns):
 #   Column                   Non-Null Count  Dtype 
---  ------                   --------------  ----- 
 0   Stop Resolution          20996 non-null  object
 1   Weapon Type              20996 non-null  object
 2   Officer Gender           20996 non-null  object
 3   Officer Race             20996 non-null  object
 4   Subject Perceived Gender  20996 non-null  object
 5   Arrest Flag              20996 non-null  object
 6   Frisk Flag               20996 non-null  object
dtypes: object(7)
memory usage: 1.9+ MB
```

In [47]:
```
df1.isna().any()
```

Out[47]:
```
Stop Resolution            False
Weapon Type                False
Officer Gender             False
Officer Race               False
Subject Perceived Gender   False
Arrest Flag                False
Frisk Flag                 False
dtype: bool
```

In [48]:
```
df.head()
```

Out[48]:

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0

In [49]:
```
df1 = df1.astype({"Stop Resolution": float, "Weapon Type": float, "Officer Gender": float, "Officer Race": float, "Subject
```

In [50]:
```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 20996 entries, 0 to 48985
Data columns (total 7 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Stop Resolution           20996 non-null  float64
 1   Weapon Type               20996 non-null  float64
 2   Officer Gender            20996 non-null  float64
 3   Officer Race              20996 non-null  float64
 4   Subject Perceived Gender  20996 non-null  float64
 5   Arrest Flag               20996 non-null  float64
 6   Frisk Flag                20996 non-null  float64
dtypes: float64(7)
memory usage: 1.9 MB
```

In [51]:
```
# Main dataframe and first model DF Cleaned...
```

In [52]:
```
y = df1["Stop Resolution"]
X = df1.drop(columns=["Stop Resolution"], axis =1)
```

In [53]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=0)
```

In [54]:
```
logreg = LogisticRegression(fit_intercept = False, C=1e12, solver = 'liblinear')
```

In [55]:
```
logreg.fit(X_train, y_train)
```

Out[55]:
```
LogisticRegression(C=1000000000000.0, fit_intercept=False, solver='liblinear')
```

In [56]:
```
y_g_train = logreg.predict(X_train)
y_g_test = logreg.predict(X_test)
```

In [57]:
```
residuals = np.abs(y_train - y_g_train)
```

In [58]:
```
print(pd.Series(residuals).value_counts())
print("---------------------------------")
print(pd.Series(residuals).value_counts(normalize = True))
```

```
0.0    10393
1.0     5354
Name: Stop Resolution, dtype: int64
---------------------------------
0.0    0.659999
1.0    0.340001
Name: Stop Resolution, dtype: float64
```

In [59]:
```
residuals = np.abs(y_test - y_g_test)
```

In [60]:
```
print(pd.Series(residuals).value_counts())
print("---------------------------------")
print(pd.Series(residuals).value_counts(normalize = True))
```

```
0.0    3483
1.0    1766
Name: Stop Resolution, dtype: int64
---------------------------------
0.0    0.663555
1.0    0.336445
Name: Stop Resolution, dtype: float64
```

In [62]:
```
df.head()
```

Out[62]:

	GO / SC Num	Terry Stop ID	Stop Resolution	Weapon Type	Officer ID	Officer YOB	Officer Gender	Officer Race	Subject Perceived Race	Subject Perceived Gender	Reported Date	Reported Time	Arrest Flag	Frisk Flag
0	20140000120677	92317	1	0	7500	1984	1	0	Asian	1	2015-10-16T00:00:00	11:32:00	0	0
4	20150000001739	33155	0	0	6973	1977	1	1	Black or African American	1	2015-04-03T00:00:00	00:41:00	0	0
5	20150000001755	33571	0	0	7402	1973	1	1	Black or African American	1	2015-04-05T00:00:00	23:46:00	0	0
6	20150000002351	45252	0	0	7591	1985	1	0	Other	0	2015-05-20T00:00:00	21:39:00	0	0
7	20150000002363	45182	0	0	7591	1985	1	0	White	1	2015-05-20T00:00:00	22:40:00	0	0

In [63]:
```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 20996 entries, 0 to 48985
Data columns (total 7 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Stop Resolution           20996 non-null  float64
 1   Weapon Type               20996 non-null  float64
 2   Officer Gender            20996 non-null  float64
 3   Officer Race              20996 non-null  float64
 4   Subject Perceived Gender  20996 non-null  float64
 5   Arrest Flag               20996 non-null  float64
 6   Frisk Flag                20996 non-null  float64
dtypes: float64(7)
memory usage: 1.9 MB
```

In [64]:
```
df1.head(10)
```

Out[64]:

	Stop Resolution	Weapon Type	Officer Gender	Officer Race	Subject Perceived Gender	Arrest Flag	Frisk Flag
0	1.0	0.0	1.0	0.0	1.0	0.0	0.0
4	0.0	0.0	1.0	1.0	1.0	0.0	0.0
5	0.0	0.0	1.0	1.0	1.0	0.0	0.0
6	0.0	0.0	1.0	0.0	0.0	0.0	0.0
7	0.0	0.0	1.0	0.0	1.0	0.0	0.0
8	0.0	0.0	1.0	1.0	0.0	0.0	0.0
10	0.0	0.0	1.0	0.0	1.0	0.0	0.0
12	0.0	0.0	0.0	1.0	0.0	0.0	0.0
13	0.0	0.0	1.0	1.0	0.0	0.0	0.0
15	0.0	0.0	1.0	1.0	1.0	0.0	0.0

In [67]:
```
y = df1["Stop Resolution"]
X = df1.drop(columns=["Stop Resolution"], axis =1)
```

In [68]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.25, random_state=0)
```

In [69]:
```
df1.head()
```

Out[69]:

	Stop Resolution	Weapon Type	Officer Gender	Officer Race	Subject Perceived Gender	Arrest Flag	Frisk Flag
0	1.0	0.0	1.0	0.0	1.0	0.0	0.0
4	0.0	0.0	1.0	1.0	1.0	0.0	0.0
5	0.0	0.0	1.0	1.0	1.0	0.0	0.0
6	0.0	0.0	1.0	0.0	0.0	0.0	0.0
7	0.0	0.0	1.0	0.0	1.0	0.0	0.0

In [70]:
```
from sklearn.neighbors import KNeighborsClassifier
```

In [71]:
```
clf = KNeighborsClassifier()
```

In [72]:
```
clf.fit(X_train, y_train)
```

Out[72]:
```
KNeighborsClassifier()
```

In [73]:
```
test_preds = clf.predict(X_test)
```

In [74]:
```
from sklearn.metrics import precision_score, recall_score, accuracy_score, f1_score
```

In [75]:
```
def print_metrics(labels, preds):
    print("Precision Score: {}".format(precision_score(labels, preds)))
    print("Recall Score: {}".format(recall_score(labels, preds)))
    print("Accuracy Score: {}".format(accuracy_score(labels, preds)))
    print("F1 Score: {}".format(f1_score(labels, preds)))
```

In [76]:
```
print_metrics(y_test, test_preds)
```

```
Precision Score: 0.5155763239875389
Recall Score: 0.47878495660559306
Accuracy Score: 0.6163078681653649
F1 Score: 0.4965
```

In [86]:
```
import matplotlib.pyplot as plt
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, roc_curve, auc
from sklearn.preprocessing import OneHotEncoder
from sklearn import tree
```

In [87]:
```
df1.describe()
```

Out[87]:

	Stop Resolution	Weapon Type	Officer Gender	Officer Race	Subject Perceived Gender	Arrest Flag	Frisk Flag
count	20996.000000	20996.000000	20996.000000	20996.000000	20996.000000	20996.000000	20996.000000
mean	0.401696	0.093446	0.893742	0.761669	0.801677	0.021290	0.234187
std	0.490253	0.291064	0.308175	0.426073	0.398747	0.144352	0.423500
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	1.000000	1.000000	1.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	1.000000	1.000000	0.000000	0.000000
75%	1.000000	0.000000	1.000000	1.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

In [88]:
```
X = df1.drop("Stop Resolution", axis = 1)
y = df1["Stop Resolution"]
```

In [89]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.20, random_state=10)
```

In [90]:
```
classifier = DecisionTreeClassifier(random_state = 10)
classifier.fit(X_train, y_train)
```

Out[90]:
```
DecisionTreeClassifier(random_state=10)
```

In [91]:
```
y_pred = classifier.predict(X_test)
```

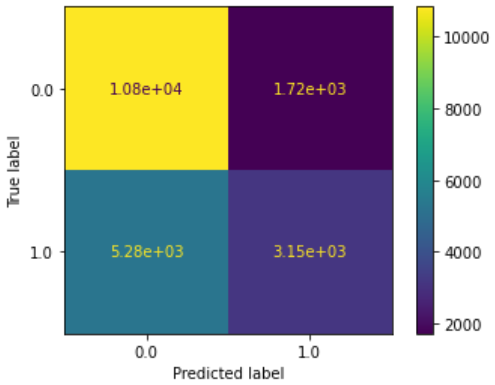
In [92]:
```
# Calculate accuracy
acc = accuracy_score(y_test,y_pred) * 100
print('Accuracy is :{0}'.format(acc))

# Check the AUC for predictions
false_positive_rate, true_positive_rate, thresholds = roc_curve(y_test, y_pred)
roc_auc = auc(false_positive_rate, true_positive_rate)
print('\nAUC is :{0}'.format(round(roc_auc, 2)))

# Create and print a confusion matrix
print('\nConfusion Matrix')
print('----------------')
pd.crosstab(y_test, y_pred, rownames=['True'], colnames=['Predicted'], margins=True)
```

```
Accuracy is :66.0952380952381

AUC is :0.61

Confusion Matrix
----------------
```

Out[92]:

Predicted	0.0	1.0	All
True			
0.0	2162	345	2507
1.0	1079	614	1693
All	3241	959	4200

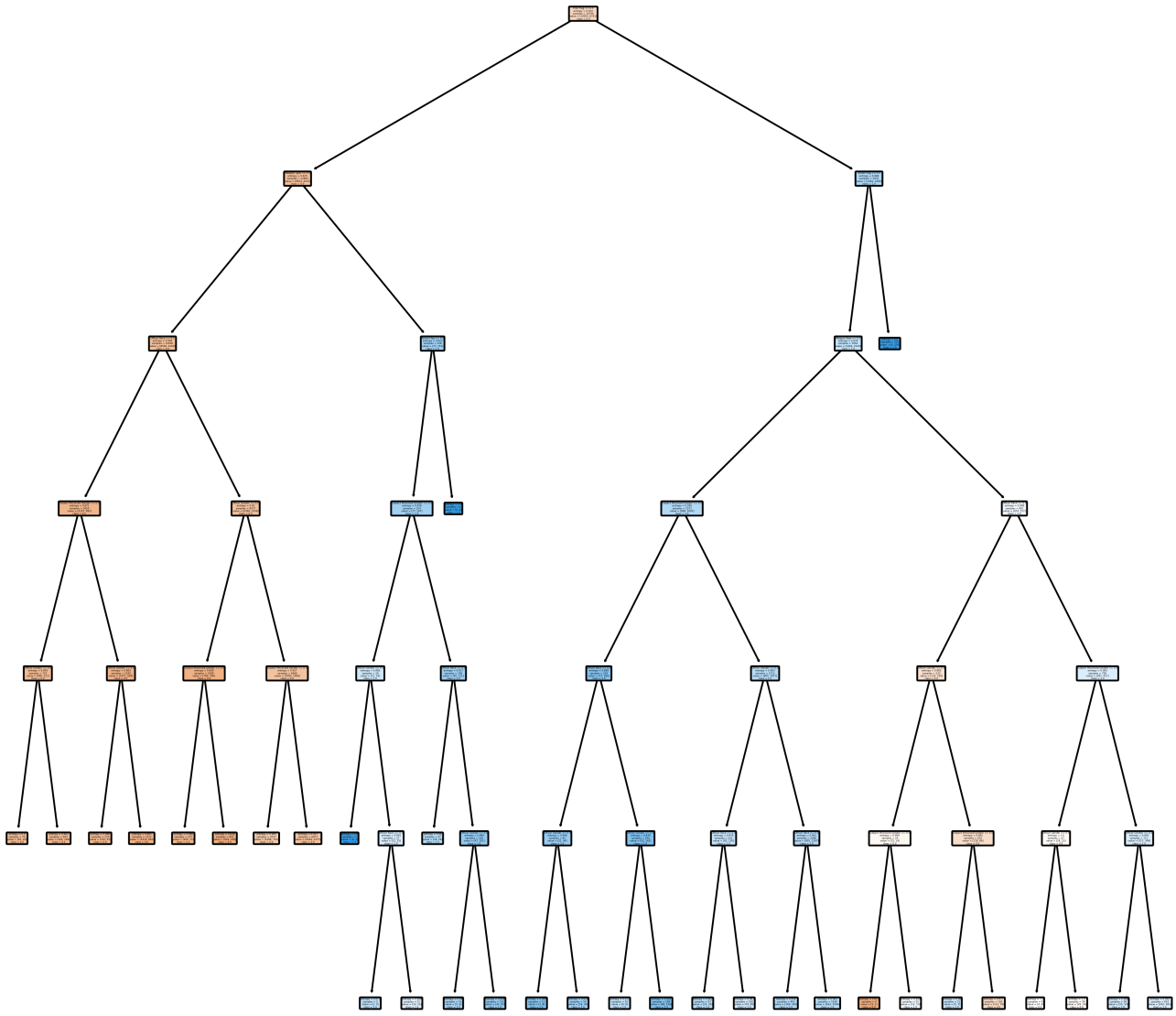
In [93]:
```
from sklearn.metrics import plot_confusion_matrix

plot_confusion_matrix(classifier, X, y, values_format='.3g')
plt.show()
```



In [94]:
```
classifier_2 = DecisionTreeClassifier(random_state=10, criterion='entropy')
classifier_2.fit(X_train, y_train)
```

Out[94]:
```
DecisionTreeClassifier(criterion='entropy', random_state=10)
```

In [95]:
```
plt.figure(figsize=(12,12), dpi=500)
tree.plot_tree(classifier_2,
               feature_names=X.columns,
               class_names=np.unique(y).astype('str'),
               filled=True, rounded=True)
plt.show()
```



In [96]:
```
import matplotlib.pyplot as plt
%matplotlib inline
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.ensemble import AdaBoostClassifier, GradientBoostingClassifier
from sklearn.metrics import accuracy_score, f1_score, confusion_matrix, classification_report
```

In [97]:
```
df1["Stop Resolution"].value_counts()
```

Out[97]:
```
0.0    12562
1.0     8434
Name: Stop Resolution, dtype: int64
```

In [98]:
```
target = df1["Stop Resolution"]
df4 = df1.drop("Stop Resolution", axis = 1)
```

In [99]:
```
X_train, X_test, y_train, y_test = train_test_split(df4, target, test_size = 0.25, random_state=42)
```

In [100…
```
adaboost_clf = AdaBoostClassifier(random_state = 42)
gbt_clf = GradientBoostingClassifier(random_state = 42)
```

In [101…
```
adaboost_clf.fit(X_train, y_train)
```

Out[101…
```
AdaBoostClassifier(random_state=42)
```

In [102…
```
gbt_clf.fit(X_train, y_train)
```

Out[102…
```
GradientBoostingClassifier(random_state=42)
```

In [103…
```
adaboost_train_preds = adaboost_clf.predict(X_train)
adaboost_test_preds = adaboost_clf.predict(X_test)

gbt_clf_train_preds = gbt_clf.predict(X_train)
gbt_clf_test_preds = gbt_clf.predict(X_test)
```

In [104…
```
def display_acc_and_f1_score(true, preds, model_name):
    acc = accuracy_score(true, preds)
    f1 = f1_score(true, preds)
    print("Model: {}".format(model_name))
    print("Accuracy: {}".format(acc))
    print("F1-Score: {}".format(f1))

print("Training Metrics")
display_acc_and_f1_score(y_train, adaboost_train_preds, model_name='AdaBoost')
print("")
display_acc_and_f1_score(y_train, gbt_clf_train_preds, model_name='Gradient Boosted Trees')
print("")
print("Testing Metrics")
display_acc_and_f1_score(y_test, adaboost_test_preds, model_name='AdaBoost')
print("")
display_acc_and_f1_score(y_test, gbt_clf_test_preds, model_name='Gradient Boosted Trees')
```

```
Training Metrics
Model: AdaBoost
Accuracy: 0.6617768463834381
F1-Score: 0.4678257394084732

Model: Gradient Boosted Trees
Accuracy: 0.668127262335683
F1-Score: 0.47719087635054025

Testing Metrics
Model: AdaBoost
Accuracy: 0.658220613450181
F1-Score: 0.46415770609318996

Model: Gradient Boosted Trees
Accuracy: 0.6599352257572871
F1-Score: 0.46444644464446444
```

In [105…
```
adaboost_confusion_matrix = confusion_matrix(y_test, adaboost_test_preds)
adaboost_confusion_matrix
```

Out[105…
```
array([[2678,  480],
       [1314,  777]], dtype=int64)
```

In [106…
```
gbt_confusion_matrix = confusion_matrix(y_test, gbt_clf_test_preds)
gbt_confusion_matrix
```

Out[106…
```
array([[2690,  468],
       [1317,  774]], dtype=int64)
```

In [107…
```
adaboost_classification_report = classification_report(y_test, adaboost_test_preds)
print(adaboost_classification_report)
```

```
              precision    recall  f1-score   support

         0.0       0.67      0.85      0.75      3158
         1.0       0.62      0.37      0.46      2091

    accuracy                           0.66      5249
   macro avg       0.64      0.61      0.61      5249
weighted avg       0.65      0.66      0.64      5249
```

In [108…
```
gbt_classification_report = classification_report(y_test, gbt_clf_test_preds)
print(gbt_classification_report)
```

```
              precision    recall  f1-score   support

         0.0       0.67      0.85      0.75      3158
         1.0       0.62      0.37      0.46      2091

    accuracy                           0.66      5249
   macro avg       0.65      0.61      0.61      5249
weighted avg       0.65      0.66      0.64      5249
```

In [109…
```
# Run DT Through Grid Search
```

In [110…
```
from sklearn.model_selection import train_test_split, GridSearchCV, cross_val_score
from sklearn.ensemble import RandomForestClassifier, AdaBoostClassifier
```

In [111…
```
y = df1["Stop Resolution"]
x = df.drop("Stop Resolution", axis = 1)
```

In [112…
```
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=42)
```

In [113…
```
dt_clf = DecisionTreeClassifier()
dt_cv_score = cross_val_score(dt_clf, X_train, y_train, cv=3)
mean_dt_cv_score = np.mean(dt_cv_score)
print(f"Mean Cross Validation Score: {mean_dt_cv_score :.2%}")
```

```
Mean Cross Validation Score: 66.55%
```

In [115…
```
dt_param_grid = {
    'criterion': ['gini', 'entropy'],
    'max_depth': [None, 2, 3, 4, 5, 6],
    'min_samples_split': [2, 5, 10],
    'min_samples_leaf': [1, 2, 3, 4, 5, 6]
    }
```

In [116…
```
num_decision_trees = 3 * 2 * 6 * 3 * 6
print(f"Grid Search will have to search through {num_decision_trees} different permutations.")
```

```
Grid Search will have to search through 648 different permutations.
```

In [117…
```
# Instantiate GridSearchCV
dt_grid_search = GridSearchCV(dt_clf, dt_param_grid, cv=3, return_train_score=True)
```

In [118…
```
# Fit to the data
dt_grid_search.fit(X_train, y_train)
```

Out[118…
```
GridSearchCV(cv=3, estimator=DecisionTreeClassifier(),
             param_grid={'criterion': ['gini', 'entropy'],
                         'max_depth': [None, 2, 3, 4, 5, 6],
                         'min_samples_leaf': [1, 2, 3, 4, 5, 6],
                         'min_samples_split': [2, 5, 10]},
             return_train_score=True)
```

In [119…
```
# Mean training score
dt_gs_training_score = np.mean(dt_grid_search.cv_results_['mean_train_score'])

# Mean test score
dt_gs_testing_score = dt_grid_search.score(X_test, y_test)

print(f"Mean Training Score: {dt_gs_training_score :.2%}")
print(f"Mean Test Score: {dt_gs_testing_score :.2%}")
print("Best Parameter Combination Found During Grid Search:")
dt_grid_search.best_params_
```

```
Mean Training Score: 66.78%
Mean Test Score: 66.01%
Best Parameter Combination Found During Grid Search:
```

Out[119…
```
{'criterion': 'entropy',
 'max_depth': 4,
 'min_samples_leaf': 1,
 'min_samples_split': 2}
```

In [120…
```
rf_clf = RandomForestClassifier()
mean_rf_cv_score = np.mean(cross_val_score(rf_clf, X_train, y_train, cv=3))

print(f"Mean Cross Validation Score for Random Forest Classifier: {mean_rf_cv_score :.2%}")
```

```
Mean Cross Validation Score for Random Forest Classifier: 66.57%
```

In [121…
```
rf_param_grid = {
    'n_estimators': [10, 30, 100],
    'criterion': ['gini', 'entropy'],
    'max_depth': [None, 2, 6, 10],
    'min_samples_split': [5, 10],
    'min_samples_leaf': [3, 6]
    }
```

In [132…
```
rf_grid_search = GridSearchCV(rf_clf, rf_param_grid, cv=3)
rf_grid_search.fit(X_train, y_train)
```

```
print(f"Training Accuracy: {rf_grid_search.best_score_ :.2%}")
print(f"Optimal Parameters: {rf_grid_search.best_params_}")
```

```
Training Accuracy: 66.71%
Optimal Parameters: {'criterion': 'gini', 'max_depth': 6, 'min_samples_leaf': 3, 'min_samples_split': 5, 'n_estimators': 10}
```

In [124…

```
dt_score = dt_grid_search.score(X_test, y_test)
rf_score = rf_grid_search.score(X_test, y_test)

print('Decision tree grid search: ', dt_score)
print('Random forest grid search: ', rf_score)
```

```
Decision tree grid search:  0.6601257382358544
Random forest grid search:  0.6599352257572871
```

In [ ]:

```
# Our DT Grid Search Score was slightly better than the Random Forest Grid Search
```

Summary + Conclusions

In [ ]: