```
#importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

```
from google.colab import drive
drive.mount('/content/drive')
```

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

```
data= pd.read_csv("/content/dataset_traffic_accident_prediction1.csv")
```

```
data.head(15)
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Condi
0	Rainy	City Road	Morning	1.0	100.0	5.0	0.0	NaN	
1	Clear	Rural Road	Night	NaN	120.0	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	1.0	60.0	4.0	0.0	Low	
3	Clear	City Road	Afternoon	2.0	60.0	3.0	0.0	Low	U Constru
4	Rainy	Highway	Morning	1.0	195.0	11.0	0.0	Low	
5	Clear	Rural Road	Night	0.0	120.0	3.0	0.0	Moderate	
6	Foggy	Highway	Afternoon	0.0	60.0	4.0	0.0	Low	
7	Rainy	City Road	Afternoon	0.0	60.0	4.0	0.0	Low	
8	Stormy	Highway	Morning	1.0	60.0	2.0	0.0	High	
9	Rainy	City Road	Afternoon	2.0	30.0	2.0	0.0	Low	
10	Foggy	NaN	Evening	NaN	60.0	2.0	0.0	Moderate	
11	Clear	Mountain Road	Night	2.0	100.0	5.0	0.0	Low	
12	NaN	Rural Road	Afternoon	0.0	60.0	4.0	0.0	NaN	
13	Rainy	City Road	Night	0.0	30.0	1.0	1.0	Moderate	
14	Clear	Rural Road	Morning	0.0	NaN	1.0	0.0	Low	

```
data.drop_duplicates(inplace=True)
```

```
data
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
0	Rainy	City Road	Morning	1.0	100.0	5.0	0.0	NaN	
1	Clear	Rural Road	Night	NaN	120.0	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	1.0	60.0	4.0	0.0	Low	
3	Clear	City Road	Afternoon	2.0	60.0	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	1.0	195.0	11.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
835	Clear	Highway	Night	2.0	30.0	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	2.0	60.0	4.0	0.0	Low	
837	Foggy	Highway	Evening	NaN	30.0	4.0	1.0	High	
838	Foggy	Highway	Afternoon	2.0	60.0	3.0	0.0	Low	
839	Clear	Highway	Afternoon	1.0	60.0	4.0	0.0	Low	

826 rows × 14 columns

```
data.columns
```

```
Index(['Weather', 'Road_Type', 'Time_of_Day', 'Traffic_Density', 'Speed_Limit',
       'Number_of_Vehicles', 'Driver_Alcohol', 'Accident_Severity',
       'Road_Condition', 'Vehicle_Type', 'Driver_Age', 'Driver_Experience',
       'Road_Light_Condition', 'Accident'],
      dtype='object')
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 826 entries, 0 to 839
Data columns (total 14 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   Weather               784 non-null    object 
 1   Road_Type             784 non-null    object 
 2   Time_of_Day           785 non-null    object 
 3   Traffic_Density       784 non-null    float64
 4   Speed_Limit           784 non-null    float64
 5   Number_of_Vehicles    784 non-null    float64
 6   Driver_Alcohol        784 non-null    float64
 7   Accident_Severity     785 non-null    object 
 8   Road_Condition        784 non-null    object 
 9   Vehicle_Type          784 non-null    object 
 10  Driver_Age            784 non-null    float64
 11  Driver_Experience     784 non-null    float64
 12  Road_Light_Condition  784 non-null    object 
 13  Accident              784 non-null    float64
dtypes: float64(7), object(7)
memory usage: 96.8+ KB
```

```
#finding missing values
data.isnull().sum()
```

```
                         0
             Weather    42
           Road_Type    42
         Time_of_Day    41
     Traffic_Density    42
         Speed_Limit    42
  Number_of_Vehicles    42
      Driver_Alcohol    42
   Accident_Severity    41
      Road_Condition    42
        Vehicle_Type    42
          Driver_Age    42
   Driver_Experience    42
Road_Light_Condition    42
            Accident    42

dtype: int64
```

```
data.duplicated().sum()
```

```
np.int64(0)
```

```
#dropping missing values
data.dropna()
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
2	Rainy	Highway	Evening	1.0	60.0	4.0	0.0	Low	
3	Clear	City Road	Afternoon	2.0	60.0	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	1.0	195.0	11.0	0.0	Low	
6	Foggy	Highway	Afternoon	0.0	60.0	4.0	0.0	Low	
7	Rainy	City Road	Afternoon	0.0	60.0	4.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
830	Clear	Highway	Morning	1.0	100.0	2.0	0.0	Moderate	
835	Clear	Highway	Night	2.0	30.0	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	2.0	60.0	4.0	0.0	Low	
838	Foggy	Highway	Afternoon	2.0	60.0	3.0	0.0	Low	
839	Clear	Highway	Afternoon	1.0	60.0	4.0	0.0	Low	

393 rows × 14 columns

```
#filling the null values
data["Traffic_Density"].fillna(data["Traffic_Density"].mean(), inplace=True)
data["Speed_Limit"].fillna(data["Speed_Limit"].mean(), inplace=True)
data["Number_of_Vehicles"].fillna(data["Number_of_Vehicles"].mean(), inplace=True)
data["Driver_Alcohol"].fillna(data["Driver_Alcohol"].mean(), inplace=True)
data["Accident_Severity"].fillna(data["Accident_Severity"].mode()[0], inplace=True)
data["Road_Condition"].fillna(data["Road_Condition"].mode()[0], inplace=True)
data["Vehicle_Type"].fillna(data["Vehicle_Type"].mode()[0], inplace=True)
data["Driver_Age"].fillna(data["Driver_Age"].mean(), inplace=True)
data["Driver_Experience"].fillna(data["Driver_Experience"].mean(), inplace=True)
data["Road_Light_Condition"].fillna(data["Road_Light_Condition"].mode()[0], inplace=True)
data["Accident"].fillna(data["Accident"].mean(), inplace=True)
data["Weather"].fillna(data["Weather"].mode()[0], inplace=True)
data["Road_Type"].fillna(data["Road_Type"].mode()[0], inplace=True)
data["Time_of_Day"].fillna(data["Time_of_Day"].mode()[0], inplace=True)
```

```
<ipython-input-24-230c89790859>:2: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Traffic_Density"].fillna(data["Traffic_Density"].mean(), inplace=True)
<ipython-input-24-230c89790859>:3: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Speed_Limit"].fillna(data["Speed_Limit"].mean(), inplace=True)
<ipython-input-24-230c89790859>:4: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Number_of_Vehicles"].fillna(data["Number_of_Vehicles"].mean(), inplace=True)
<ipython-input-24-230c89790859>:5: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Driver_Alcohol"].fillna(data["Driver_Alcohol"].mean(), inplace=True)
<ipython-input-24-230c89790859>:6: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Accident_Severity"].fillna(data["Accident_Severity"].mode()[0], inplace=True)
<ipython-input-24-230c89790859>:7: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[
  data["Road_Condition"].fillna(data["Road_Condition"].mode()[0], inplace=True)
<ipython-input-24-230c89790859>:8: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Vehicle_Type"].fillna(data["Vehicle_Type"].mode()[0], inplace=True)
<ipython-input-24-230c89790859>:9: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setti

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[


  data["Driver_Age"].fillna(data["Driver_Age"].mean(), inplace=True)
```

```
data
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
0	Rainy	City Road	Morning	1.000000	100.0	5.0	0.0	Low	
1	Clear	Rural Road	Night	0.998724	120.0	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	1.000000	60.0	4.0	0.0	Low	
3	Clear	City Road	Afternoon	2.000000	60.0	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	1.000000	195.0	11.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
835	Clear	Highway	Night	2.000000	30.0	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	2.000000	60.0	4.0	0.0	Low	
837	Foggy	Highway	Evening	0.998724	30.0	4.0	1.0	High	
838	Foggy	Highway	Afternoon	2.000000	60.0	3.0	0.0	Low	
839	Clear	Highway	Afternoon	1.000000	60.0	4.0	0.0	Low	

826 rows × 14 columns

```
data.isnull().sum()
```

	0
Weather	0
Road_Type	0
Time_of_Day	0
Traffic_Density	0
Speed_Limit	0
Number_of_Vehicles	0
Driver_Alcohol	0
Accident_Severity	0
Road_Condition	0
Vehicle_Type	0
Driver_Age	0
Driver_Experience	0
Road_Light_Condition	0
Accident	0

dtype: int64

```
#categorical data
data["Road_Light_Condition"].fillna(data["Road_Light_Condition"].mode()[0], inplace = True)
```

```
<ipython-input-26-8de2997c5d88>:2: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained as
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col
```

```
    data["Road_Light_Condition"].fillna(data["Road_Light_Condition"].mode()[0], inplace = True)
```

```
data
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
0	Rainy	City Road	Morning	1.000000	100.0	5.0	0.0	Low	
1	Clear	Rural Road	Night	0.998724	120.0	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	1.000000	60.0	4.0	0.0	Low	
3	Clear	City Road	Afternoon	2.000000	60.0	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	1.000000	195.0	11.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
835	Clear	Highway	Night	2.000000	30.0	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	2.000000	60.0	4.0	0.0	Low	
837	Foggy	Highway	Evening	0.998724	30.0	4.0	1.0	High	
838	Foggy	Highway	Afternoon	2.000000	60.0	3.0	0.0	Low	
839	Clear	Highway	Afternoon	1.000000	60.0	4.0	0.0	Low	

826 rows × 14 columns

```
#removing duplicates
data.drop_duplicates(inplace=True)
```

```
data
```

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
data_scaled = data.copy()
data_scaled[["Traffic_Density","Speed_Limit"]] =scaler.fit_transform(data[["Traffic_Density","Speed_Limit"]])
data_scaled
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
0	Rainy	City Road	Morning	0.001672	0.918165	5.0	0.0	Low	
1	Clear	Rural Road	Night	0.000002	1.555111	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	0.001672	-0.355726	4.0	0.0	Low	
3	Clear	City Road	Afternoon	1.311322	-0.355726	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	0.001672	3.943656	11.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
835	Clear	Highway	Night	1.311322	-1.311144	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	1.311322	-0.355726	4.0	0.0	Low	
837	Foggy	Highway	Evening	0.000002	-1.311144	4.0	1.0	High	
838	Foggy	Highway	Afternoon	1.311322	-0.355726	3.0	0.0	Low	
839	Clear	Highway	Afternoon	0.001672	-0.355726	4.0	0.0	Low	

825 rows × 14 columns

```
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()

data_scaled[["Traffic_Density","Speed_Limit"]] =scaler.fit_transform(data[["Traffic_Density","Speed_Limit"]])
data_scaled
```

	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
0	Rainy	City Road	Morning	0.500000	0.382514	5.0	0.0	Low	
1	Clear	Rural Road	Night	0.499362	0.491803	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	0.500000	0.163934	4.0	0.0	Low	
3	Clear	City Road	Afternoon	1.000000	0.163934	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	0.500000	0.901639	11.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
835	Clear	Highway	Night	1.000000	0.000000	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	1.000000	0.163934	4.0	0.0	Low	
837	Foggy	Highway	Evening	0.499362	0.000000	4.0	1.0	High	
838	Foggy	Highway	Afternoon	1.000000	0.163934	3.0	0.0	Low	
839	Clear	Highway	Afternoon	0.500000	0.163934	4.0	0.0	Low	

825 rows × 14 columns

```
data_encoded = pd.get_dummies(data, columns=["Road_Light_Condition"],drop_first=True)
print(data_encoded)
```

```
    Weather   Road_Type Time_of_Day  Traffic_Density  Speed_Limit  \
0     Rainy   City Road     Morning         1.000000        100.0   
1     Clear  Rural Road       Night         0.998724        120.0   
2     Rainy     Highway     Evening         1.000000         60.0   
3     Clear   City Road   Afternoon         2.000000         60.0   
4     Rainy     Highway     Morning         1.000000        195.0   
..      ...         ...         ...              ...          ...   
835   Clear     Highway       Night         2.000000         30.0   
836   Rainy  Rural Road     Evening         2.000000         60.0   
837   Foggy     Highway     Evening         0.998724         30.0   
838   Foggy     Highway   Afternoon         2.000000         60.0   
839   Clear     Highway   Afternoon         1.000000         60.0   

     Number_of_Vehicles  Driver_Alcohol Accident_Severity      Road_Condition  \
0                   5.0             0.0               Low                 Wet   
1                   3.0             0.0          Moderate                 Wet   
2                   4.0             0.0               Low                 Icy   
3                   3.0             0.0               Low  Under Construction   
4                  11.0             0.0               Low                 Dry   
..                  ...             ...               ...                 ...   
835                 4.0             0.0               Low                 Dry   
836                 4.0             0.0               Low                 Dry   
837                 4.0             1.0              High                 Dry   
838                 3.0             0.0               Low                 Dry   
839                 4.0             0.0               Low                 Dry   

    Vehicle_Type  Driver_Age  Driver_Experience  Accident  \
0            Car   51.000000               48.0  0.000000   
1          Truck   49.000000               43.0  0.000000   
2            Car   54.000000               52.0  0.000000   
3            Bus   34.000000               31.0  0.000000   
4            Car   62.000000               55.0  1.000000   
..           ...         ...                ...       ...   
835          Car   23.000000               15.0  0.000000   
836   Motorcycle   52.000000               46.0  1.000000   
837          Car   43.153061               34.0  0.298469   
838          Car   25.000000               19.0  0.000000   
839   Motorcycle   29.000000               21.0  0.000000   

     Road_Light_Condition_Daylight  Road_Light_Condition_No Light  
0                            False                          False  
1                            False                          False  
2                            False                          False  
3                             True                          False  
4                            False                          False  
..                             ...                            ...  
835                           True                          False  
836                           True                          False  
837                          False                          False  
838                          False                          False  
839                          False                          False  

[825 rows x 15 columns]
```

```
from sklearn.preprocessing import LabelEncoder
encoder = LabelEncoder()
```

```
data["Road_Light_Condition"] = encoder.fit_transform(data["Road_Light_Condition"])


def performance_category(Speed_Limit):
    if Speed_Limit >= 10:
      return "High"
    elif Speed_Limit >= 5:
      return "Medium"
    else:
      return "Low"

data["Performance"] = data["Speed_Limit"].apply(performance_category)
print(data)
```

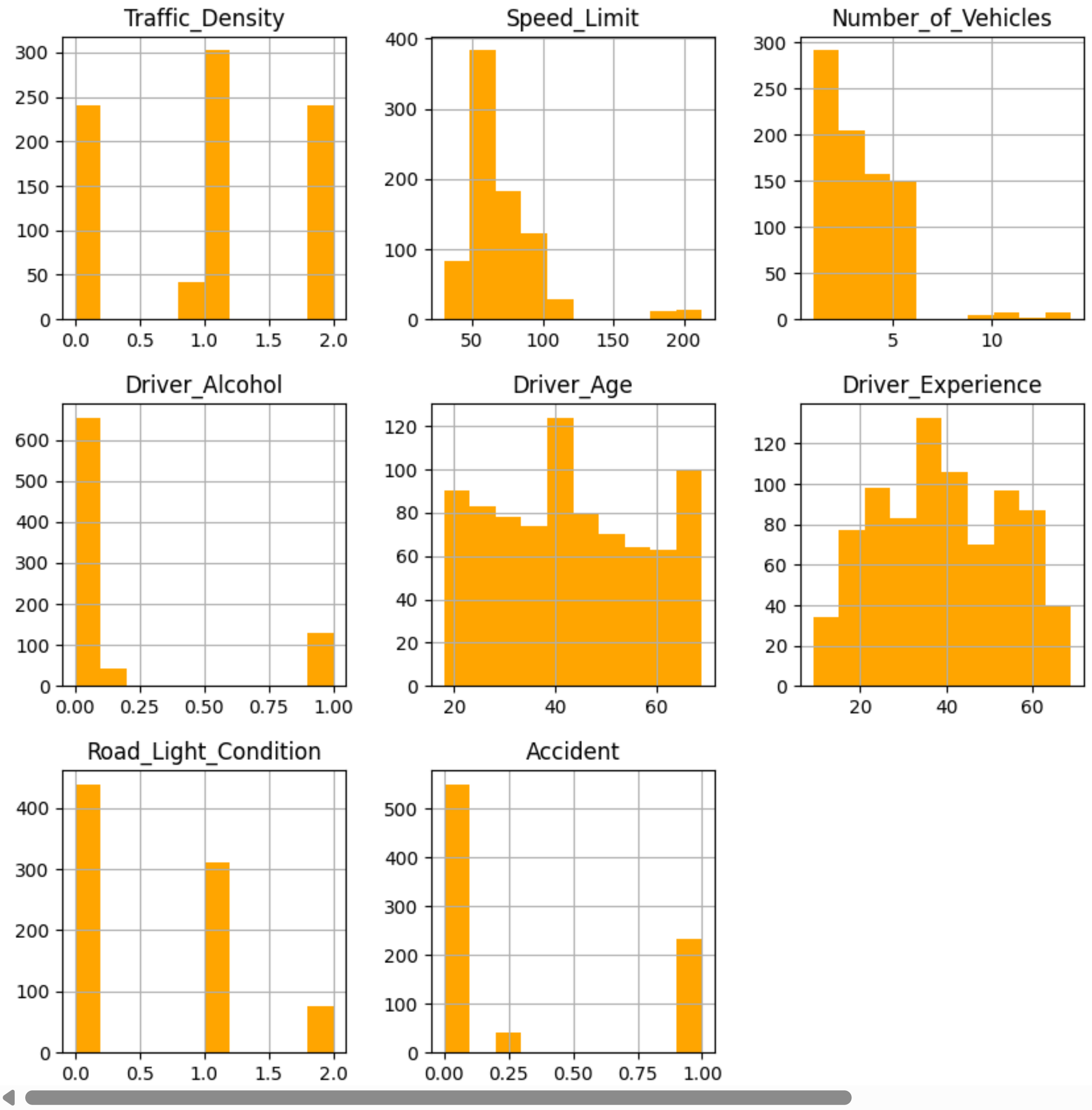
```
       Weather   Road_Type Time_of_Day  Traffic_Density  Speed_Limit  \
0     Rainy   City Road     Morning         1.000000        100.0
1     Clear  Rural Road       Night         0.998724        120.0
2     Rainy     Highway     Evening         1.000000         60.0
3     Clear   City Road   Afternoon         2.000000         60.0
4     Rainy     Highway     Morning         1.000000        195.0
..      ...         ...         ...              ...          ...
835   Clear     Highway       Night         2.000000         30.0
836   Rainy  Rural Road     Evening         2.000000         60.0
837   Foggy     Highway     Evening         0.998724         30.0
838   Foggy     Highway   Afternoon         2.000000         60.0
839   Clear     Highway   Afternoon         1.000000         60.0

     Number_of_Vehicles  Driver_Alcohol Accident_Severity      Road_Condition  \
0                   5.0             0.0               Low                 Wet
1                   3.0             0.0          Moderate                 Wet
2                   4.0             0.0               Low                 Icy
3                   3.0             0.0               Low  Under Construction
4                  11.0             0.0               Low                 Dry
..                  ...             ...               ...                 ...
835                 4.0             0.0               Low                 Dry
836                 4.0             0.0               Low                 Dry
837                 4.0             1.0              High                 Dry
838                 3.0             0.0               Low                 Dry
839                 4.0             0.0               Low                 Dry

    Vehicle_Type  Driver_Age  Driver_Experience  Road_Light_Condition  \
0            Car   51.000000               48.0                     0
1          Truck   49.000000               43.0                     0
2            Car   54.000000               52.0                     0
3            Bus   34.000000               31.0                     1
4            Car   62.000000               55.0                     0
..           ...         ...                ...                   ...
835          Car   23.000000               15.0                     1
836   Motorcycle   52.000000               46.0                     1
837          Car   43.153061               34.0                     0
838          Car   25.000000               19.0                     0
839   Motorcycle   29.000000               21.0                     0

     Accident Performance
0    0.000000        High
1    0.000000        High
2    0.000000        High
3    0.000000        High
4    1.000000        High
..        ...         ...
835  0.000000        High
836  1.000000        High
837  0.298469        High
838  0.000000        High
839  0.000000        High

[825 rows x 15 columns]
```

```
data
```

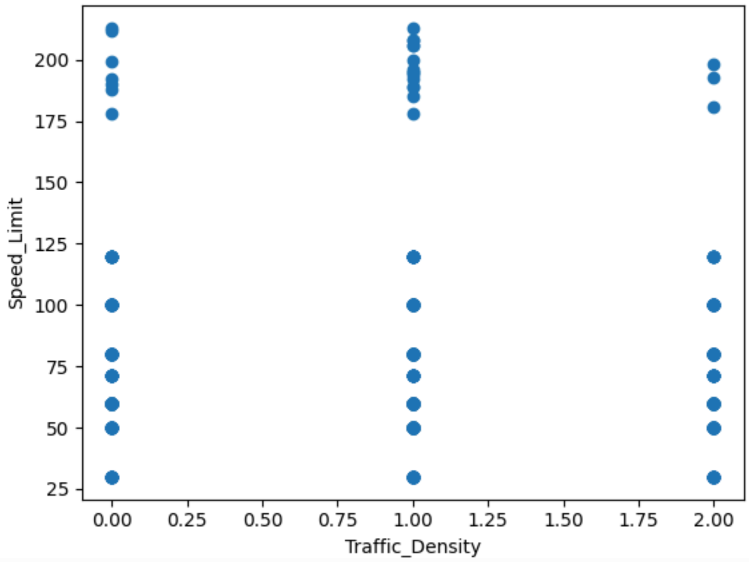
	Weather	Road_Type	Time_of_Day	Traffic_Density	Speed_Limit	Number_of_Vehicles	Driver_Alcohol	Accident_Severity	Road_Cond
0	Rainy	City Road	Morning	1.000000	100.0	5.0	0.0	Low	
1	Clear	Rural Road	Night	0.998724	120.0	3.0	0.0	Moderate	
2	Rainy	Highway	Evening	1.000000	60.0	4.0	0.0	Low	
3	Clear	City Road	Afternoon	2.000000	60.0	3.0	0.0	Low	Constr
4	Rainy	Highway	Morning	1.000000	195.0	11.0	0.0	Low	
...	...	...	...	...	...	...	...	...	
835	Clear	Highway	Night	2.000000	30.0	4.0	0.0	Low	
836	Rainy	Rural Road	Evening	2.000000	60.0	4.0	0.0	Low	
837	Foggy	Highway	Evening	0.998724	30.0	4.0	1.0	High	
838	Foggy	Highway	Afternoon	2.000000	60.0	3.0	0.0	Low	
839	Clear	Highway	Afternoon	1.000000	60.0	4.0	0.0	Low	

825 rows × 15 columns

```
#univariate analysis
data.hist(figsize=(10,10), color="Orange")
plt.show()
```



```
#scatter chart
plt.scatter(data["Traffic_Density"], data["Speed_Limit"])
plt.xlabel("Traffic_Density")
plt.ylabel("Speed_Limit")
plt.show()
```



```
from sklearn.preprocessing import LabelEncoder
encoder = LabelEncoder()
data["Road_Light_Condition"] = encoder.fit_transform(data["Road_Light_Condition"])
```

```
from sklearn.preprocessing import LabelEncoder
encoder = LabelEncoder()
data["Accident"] = encoder.fit_transform(data["Accident"])
data["Accident_Severity"]=encoder.fit_transform(data["Accident_Severity"])
data["Road_Condition"]=encoder.fit_transform(data["Road_Condition"])
data["Vehicle_Type"]=encoder.fit_transform(data["Vehicle_Type"])
data["Driver_Alcohol"]=encoder.fit_transform(data["Driver_Alcohol"])
data["Road_Type"]=encoder.fit_transform(data["Road_Type"])
data["Time_of_Day"]=encoder.fit_transform(data["Time_of_Day"])
data["Weather"]=encoder.fit_transform(data["Weather"])
data["Performance"]=encoder.fit_transform(data["Performance"])
```

```
#model building
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
```

```
#random forest
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, classification_report
```

```
#select target data
X = data.drop("Accident", axis=1)
y = data["Accident"]
```

```
x_test,x_train,y_test,y_train = train_test_split(X,y,test_size=0.2,random_state=42)
```

```
#logistic regression
model = LogisticRegression()
model.fit(x_train,y_train)
```

```
/usr/local/lib/python3.11/dist-packages/sklearn/linear_model/_logistic.py:465: ConvergenceWarning: lbfgs failed to converge (status=
STOP: TOTAL NO. OF ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
▾ LogisticRegression ⓘ ?
LogisticRegression()
```

```
#prediction
y_pred = model.predict(x_test)
print("y_pred",y_pred)
```

```
y_pred [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 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 1 2 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 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 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 1 0 0 0 0 0 0 0 0 0 0 0 0
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 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
```

```
#random forest classifier
model = RandomForestClassifier()
model.fit(x_train,y_train)
```

```
▾ RandomForestClassifier ⓘ ?

RandomForestClassifier()
```

```
#prediction
y_pred_random = model.predict(x_test)
print("y_pred_random",y_pred_random)
```

```
y_pred_random [0 0 0 0 0 0 2 0 0 2 0 0 0 2 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 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0
 0 0 0 0 0 0 0 0 2 2 0 0 0 0 2 0 2 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 2 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
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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 2 0 0 0 0 0 0 0 0 0 0 0
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 2 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
 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0 0 0 0 0 2 2 0 0 0 0 0 2 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 0 0 0 0 0 0 0 0 0 0
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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 0
 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2
 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 2 0 0 0 0
 0 0 1 0 0 0 0 0 0 0 0 0 0 0 2 0 0 0 2 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 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 0]
```

```
#Evaluation logistic regression
accuracy = accuracy_score(y_test,y_pred)
print("accuracy",accuracy)
classification_rep = classification_report(y_test,y_pred)
print("classification_rep",classification_rep)
confusion_mat = confusion_matrix(y_test,y_pred)
print("confusion_mat",confusion_mat)
```

```
accuracy 0.6454545454545455
classification_rep               precision    recall  f1-score   support

           0       0.66      0.96      0.78       438
           1       0.06      0.03      0.04        37
           2       0.57      0.02      0.04       185

    accuracy                           0.65       660
   macro avg       0.43      0.34      0.29       660
weighted avg       0.60      0.65      0.53       660

confusion_mat [[421  14   3]
 [ 36   1   0]
 [178   3   4]]
```

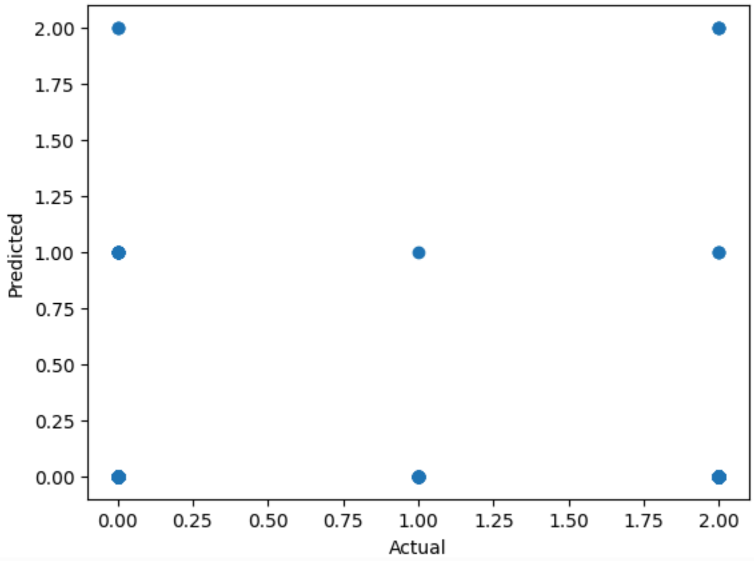
```
#evaluation random forest
accuracy_random = accuracy_score(y_test,y_pred_random)
print("accuracy_random",accuracy_random)
classification_rep_random = classification_report(y_test,y_pred_random)
print("classification_rep_random",classification_rep_random)
confusion_mat_random = confusion_matrix(y_test,y_pred_random)
print("confusion_mat_random",confusion_mat_random)
```

```
accuracy_random 0.646969696969697
classification_rep_random               precision    recall  f1-score   support

           0       0.67      0.95      0.78       438
           1       0.00      0.00      0.00        37
           2       0.29      0.05      0.08       185

    accuracy                           0.65       660
   macro avg       0.32      0.33      0.29       660
weighted avg       0.52      0.65      0.54       660

confusion_mat_random [[418   1  19]
 [ 34   0   3]
 [176   0   9]]
```

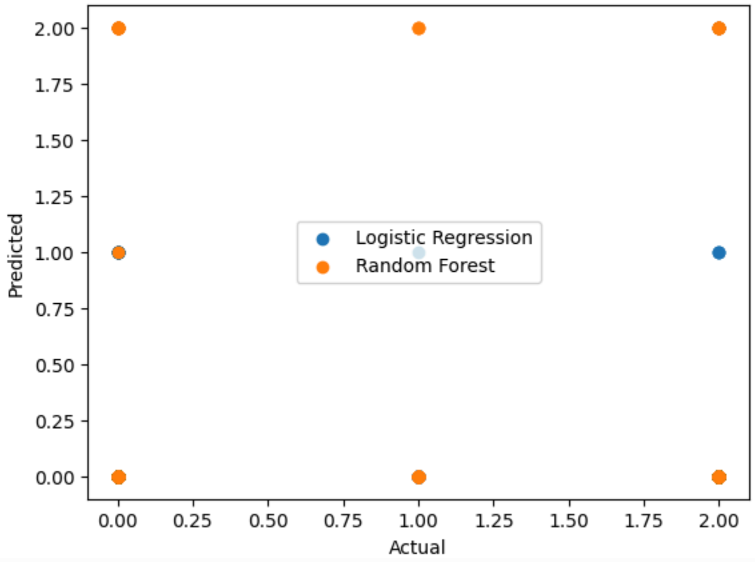
```
#prediction analysis
prediction_analysis = pd.DataFrame({"Actual":y_test,"Predicted":y_pred})
print(prediction_analysis)
```

```
     Actual  Predicted
239       0          0
701       0          0
655       2          0
345       0          0
302       2          0
..      ...        ...
71        2          0
106       0          0
272       0          0
441       0          0
102       0          0

[660 rows x 2 columns]
```

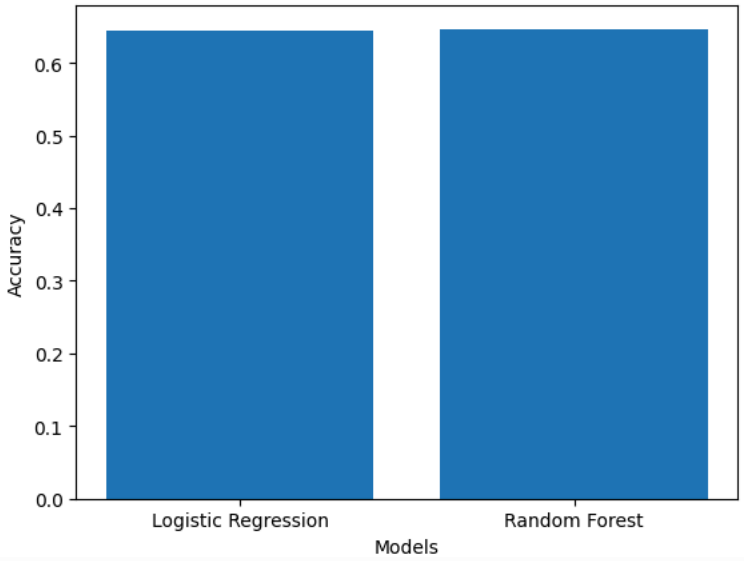
```
#visualization prediction and actual value
plt.scatter(y_test,y_pred)
plt.xlabel("Actual")
plt.ylabel("Predicted")
plt.show()
```



```
#visualization an two models
plt.scatter(y_test,y_pred,label="Logistic Regression")
plt.scatter(y_test,y_pred_random,label="Random Forest")
plt.xlabel("Actual")
plt.ylabel("Predicted")
plt.legend()
plt.show()
```



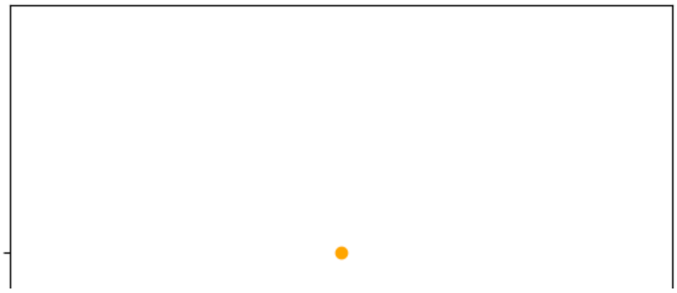
```
#visualization on evaluation two models
plt.bar(["Logistic Regression","Random Forest"],[accuracy,accuracy_random])
plt.xlabel("Models")
plt.ylabel("Accuracy")
plt.show()
```



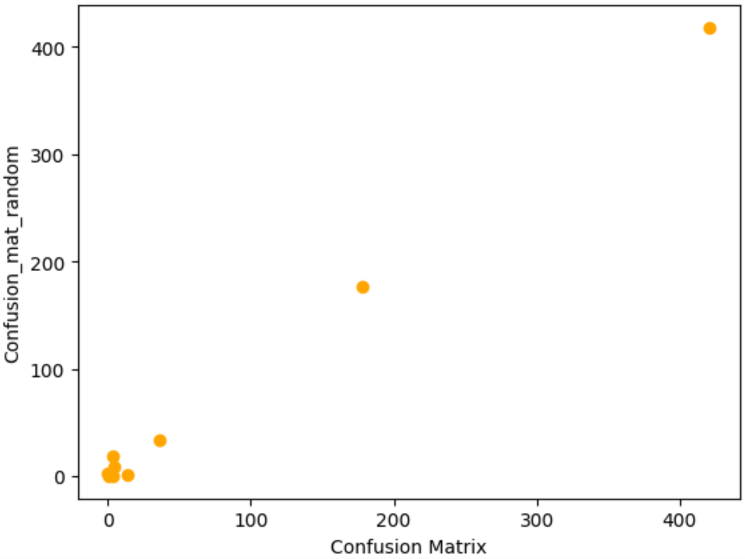
```
#chart classification report
plt.scatter(classification_rep,classification_rep_random,color="Orange")
plt.xlabel("Classification Report")
plt.ylabel("Classification _rep_random")
plt.show()
```

ion_rep_random

```
              precision    recall  f1-score   support

           0       0.67      0.95      0.78       438
           1       0.00      0.00      0.00        37
           2       0.29      0.05      0.08       185

    accuracy                           0.65       660
```



```
#confusion matrix chart
plt.scatter(confusion_mat,confusion_mat_random,color="Orange")
plt.xlabel("Confusion Matrix")
plt.ylabel("Confusion_mat_random")
plt.show()
```



```
on    recall  f1-score   support

66      0.96      0.78       438
.06      0.03      0.04        37
57      0.02      0.04       185

                  0.65       660
0.43      0.34      0.29       660
0.60      0.65      0.53       660

sification Report
```

```
#final output prediction
final_output = pd.DataFrame({"Actual":y_test,"Logistic Regression":y_pred,"Random Forest":y_pred_random})
print(final_output)
```

```
     Actual  Logistic Regression  Random Forest
239       0                    0              0
701       0                    0              0
655       2                    0              0
345       0                    0              0
302       2                    0              0
..      ...                  ...            ...
71        2                    0              0
106       0                    0              0
272       0                    0              2
441       0                    0              0
102       0                    0              0

[660 rows x 3 columns]
```

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