In [1]:
```
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import accuracy_score,mean_absolute_error ,mean_squared_error
from sklearn.preprocessing import MinMaxScaler,StandardScaler
from sklearn.compose import ColumnTransformer
from sklearn.ensemble import RandomForestRegressor
import joblib
import matplotlib.pyplot as plt
```

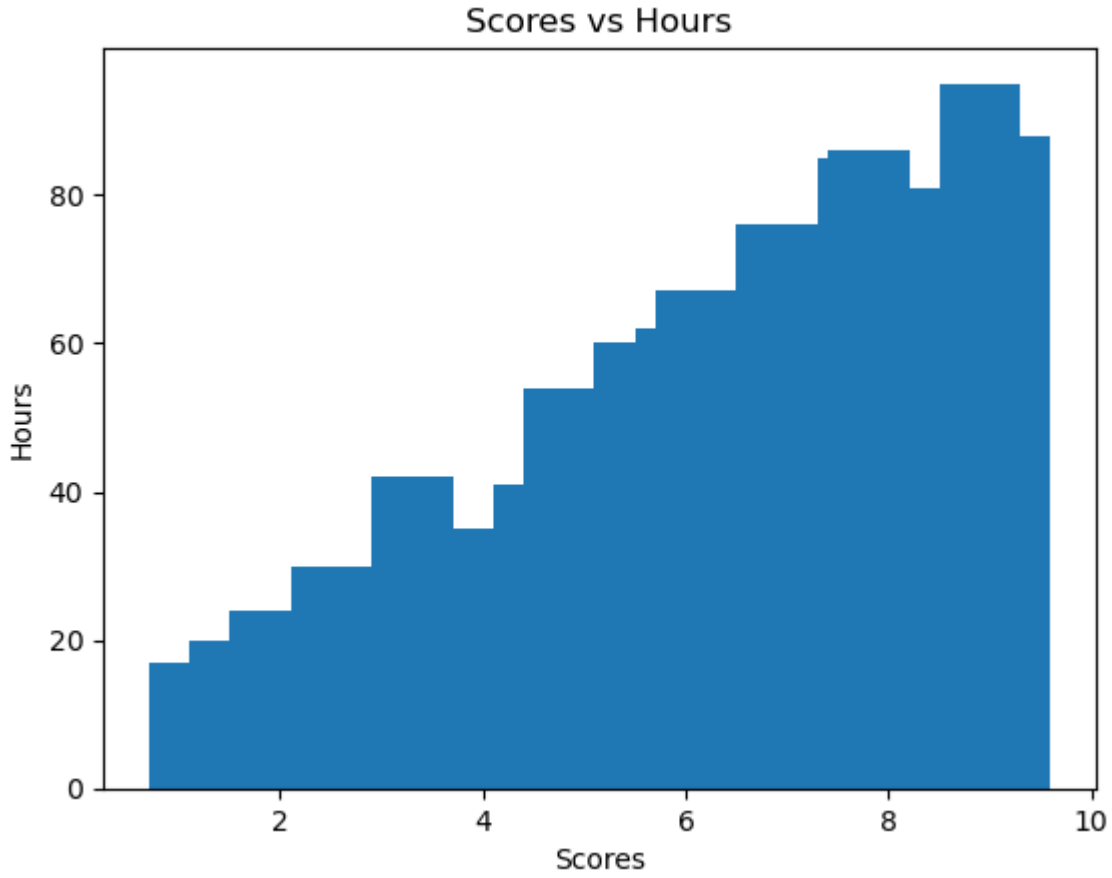
In [2]:
```
student_df = pd.read_csv("DataSets/student_scores.csv")
student_df
```

Out[2]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30
5	1.5	20
6	9.2	88
7	5.5	60
8	8.3	81
9	2.7	25
10	7.7	85
11	5.9	62
12	4.5	41
13	3.3	42
14	1.1	17
15	8.9	95
16	2.5	30
17	1.9	24
18	6.1	67
19	7.4	69
20	2.7	30
21	4.8	54
22	3.8	35
23	6.9	76
24	7.8	86

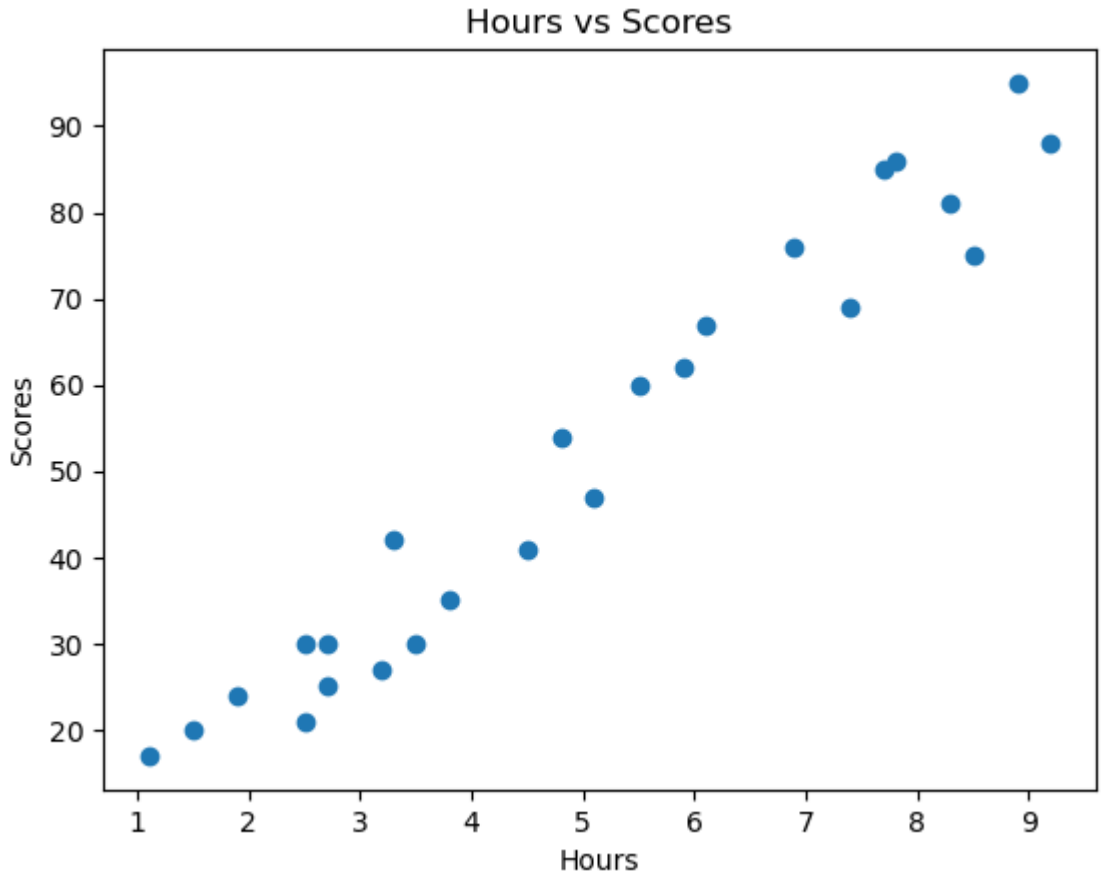
Some Visualization

In [3]:
```
scores = student_df["Scores"]
hours = student_df["Hours"]

# Create the bar plot
plt.bar( hours,scores)

# Set labels and title
plt.xlabel('Scores')
plt.ylabel('Hours')
plt.title('Scores vs Hours')

# Display the plot
plt.show()
```


Scores vs Hours
Hours
Scores
0
20
40
60
80
2
4
6
8
10

In [4]:
```
scores = student_df["Scores"]
hours = student_df["Hours"]

# Create the bar plot
plt.scatter(hours,scores);
plt.xlabel("Hours")
plt.ylabel("Scores")
plt.title("Hours vs Scores")
```

Out[4]:
```
Text(0.5, 1.0, 'Hours vs Scores')
```



In [ ]:

Model Training

In [5]:
```
x = np.array(student_df["Hours"]).reshape(-1,1)
y = student_df["Scores"]
```

In [6]:
```
# Splitting the Dara
x_train ,x_test ,y_train ,y_test = train_test_split(x,y,test_size=0.3, random_state=41)
```

In [7]:
```
model = LinearRegression()
model.fit(x_train ,y_train)
```

Out[7]:
```
LinearRegression()
```

In [8]:
```
model.score(x_test,y_test)
```

Out[8]:
```
0.9621346134566173
```

In [9]:
```
joblib.dump(model,"TrainedModels/StudentScore.pkl")
```

Out[9]:
```
['TrainedModels/StudentScore.pkl']
```

Load the Model to make Prediction

In [10]:
```
mod = joblib.load("TrainedModels/StudentScore.pkl")
```

In [11]:
```
y_pred = mod.predict(x_test)

pd.DataFrame({"y_test": y_test,"y_pred":y_pred})
```

Out[11]:

	y_test	y_pred
5	20	14.990287
19	69	74.884076
14	17	10.929691
10	85	77.929523
7	60	55.596245
8	81	84.020416
17	24	19.050883
11	62	59.656841

In [12]:
```
mse = mean_squared_error(y_test,y_pred)
print(f"mean squared error is {mse}")
mae = mean_absolute_error(y_test,y_pred)
print(f"mean absolute error is {mae}")
```

```
mean squared error is 25.63250010321114
mean absolute error is 4.843877805244228
```

In [ ]:

In [ ]:

Task 2 Petrol Consumption

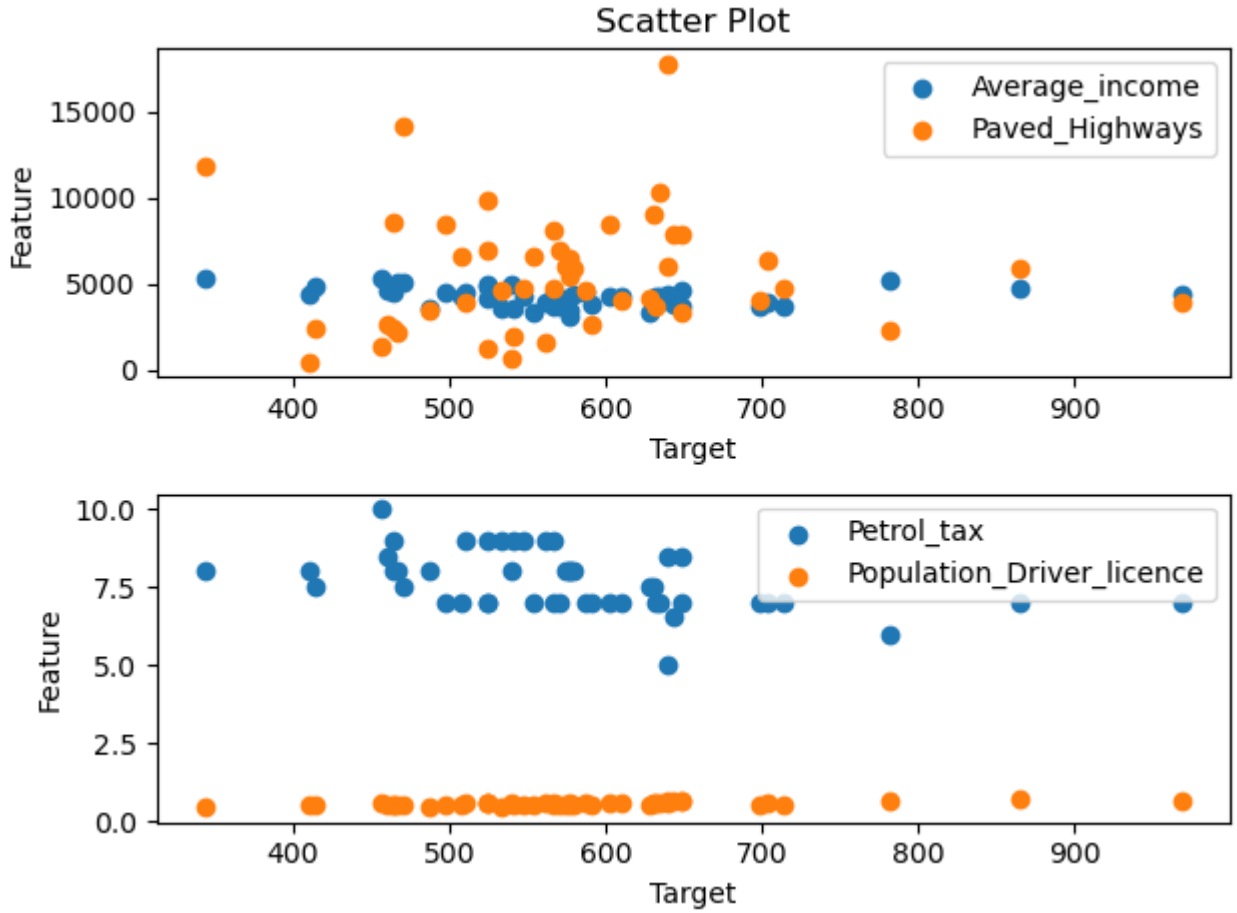
In [13]:
```
Petrol_df = pd.read_csv("DataSets/petrol_consumption.csv")
Petrol_df.head()
```

Out[13]:

	Petrol_tax	Average_income	Paved_Highways	Population_Driver_licence(%)	Petrol_Consumption
0	9.0	3571	1976	0.525	541
1	9.0	4092	1250	0.572	524
2	9.0	3865	1586	0.580	561
3	7.5	4870	2351	0.529	414
4	8.0	4399	431	0.544	410

Visualization

In [14]:
```
target = Petrol_df['Petrol_Consumption']
Average_income = Petrol_df['Average_income']
Paved_Highways = Petrol_df['Paved_Highways']
Petrol_tax = Petrol_df['Petrol_tax']
Population_Driver_licence = Petrol_df['Population_Driver_licence(%)']

plt.subplot(2, 1, 1)
plt.scatter(target, Average_income, label='Average_income')
plt.scatter(target, Paved_Highways, label='Paved_Highways')
plt.xlabel('Target')
plt.ylabel('Feature')
plt.title('Scatter Plot')
plt.legend()

plt.subplot(2, 1, 2)
plt.scatter(target, Petrol_tax, label='Petrol_tax')
plt.scatter(target, Population_Driver_licence, label='Population_Driver_licence')
plt.xlabel('Target')
plt.ylabel('Feature')
plt.legend()

plt.tight_layout()  # Adjusts the spacing between subplots
plt.show()
```


Scatter Plot
Average_income
Paved_Highways
Feature
Target
15000
10000
5000
0
400
500
600
700
800
900
Petrol_tax
Population_Driver_licence
Feature
Target
10.0
7.5
5.0
2.5
0.0
400
500
600
700
800
900

In [ ]:

In [24]:
```
#Use Colums Transformer for MinMax Scalling
minmax =MinMaxScaler()


tranform_colums=["Petrol_tax","Average_income","Paved_Highways","Population_Driver_licence(%)"]

transformer =ColumnTransformer([("minmax",minmax,tranform_colums)])

data = transformer.fit_transform(Petrol_df)

data = pd.DataFrame(data,columns=["Petrol_tax","Average_income","Paved_Highways","Population_Driver_licence(%
data.head()
```

Out[24]:

	Petrol_tax	Average_income	Paved_Highways	Population_Driver_licence(%)
0	0.8	0.222905	0.089044	0.271062
1	0.8	0.451514	0.047202	0.443223
2	0.8	0.351909	0.066567	0.472527
3	0.5	0.792892	0.110656	0.285714
4	0.6	0.586222	0.000000	0.340659

In [16]:
```
x = data
y = Petrol_df["Petrol_Consumption"]
```

In [17]:
```
x_train ,x_test ,y_train ,y_test = train_test_split(x,y,test_size=0.3 ,random_state=52)
```

In [18]:
```
model1 = LinearRegression()
model1.fit(x_train ,y_train)
```

Out[18]:

▾ LinearRegression

LinearRegression()

In [19]:
```
model1.score(x_test,y_test)
```

Out[19]:
```
0.7812556015921516
```

In [20]:
```
joblib.dump(model1,"TrainedModels/PetrolComsumption.pkl")
```

Out[20]:
```
['TrainedModels/PetrolComsumption.pkl']
```

In [21]:
```
mod1 = joblib.load("TrainedModels/PetrolComsumption.pkl")
```

In [22]:
```
y_pred = mod1.predict(x_test)

pd.DataFrame({"y_test": y_test,"y_pred":y_pred})
```

Out[22]:

	y_test	y_pred
8	464	498.887986
3	414	488.882860
25	566	549.211935
44	782	675.788092
18	865	745.446171
26	577	597.792995
6	344	337.080999
9	498	547.265145
34	487	520.150864
17	714	594.451750
1	524	561.120649
30	571	570.485001
0	541	540.348735
38	648	714.693951
21	540	559.453224

In [23]:
```
mse = mean_squared_error(y_test, y_pred)
print(f"Mean Squared Error: {mse}")


mae = mean_absolute_error(y_test, y_pred)
print(f"Mean Absolute Error: {mae}")
```

```
Mean Squared Error: 3812.248209532195
Mean Absolute Error: 47.09566602370284
```

In [ ]:

In [ ]: