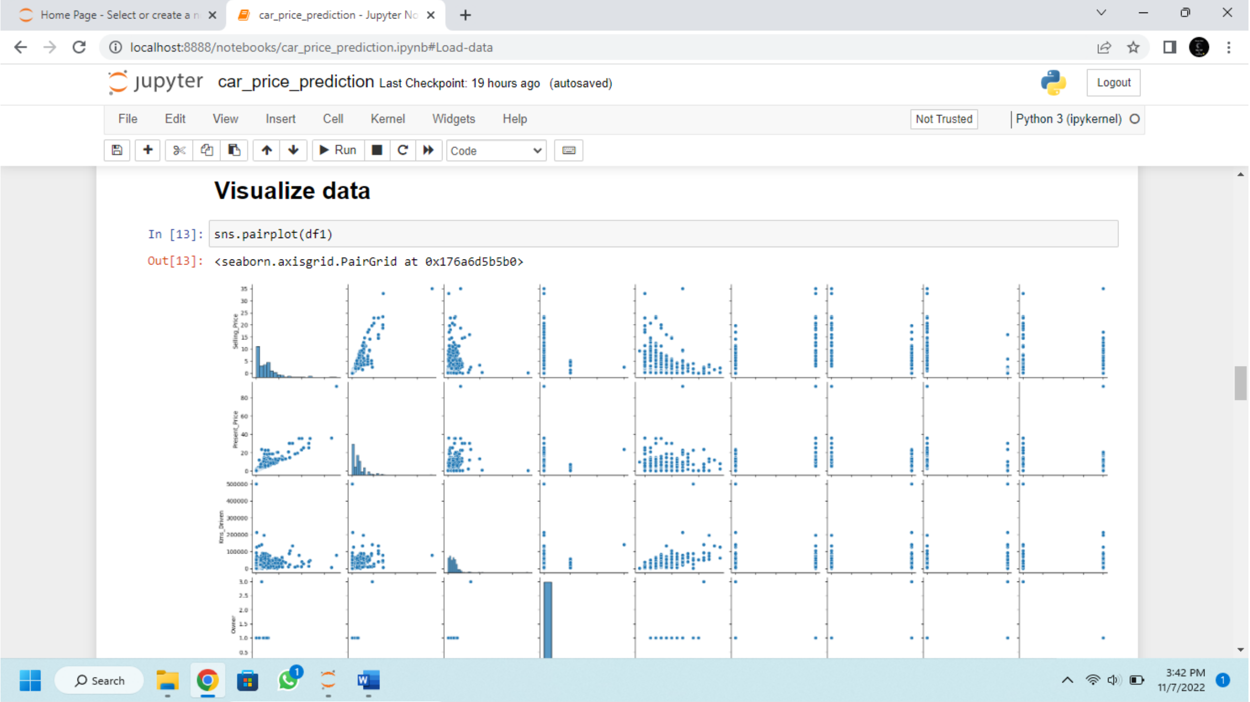
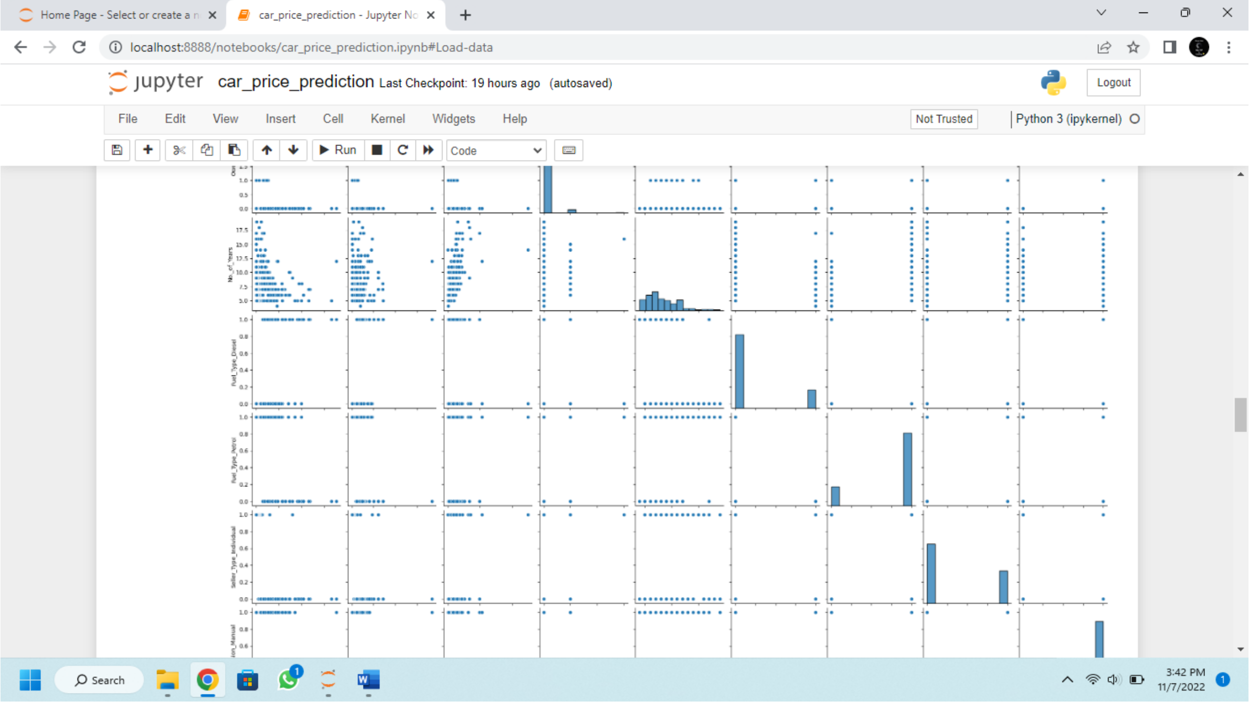
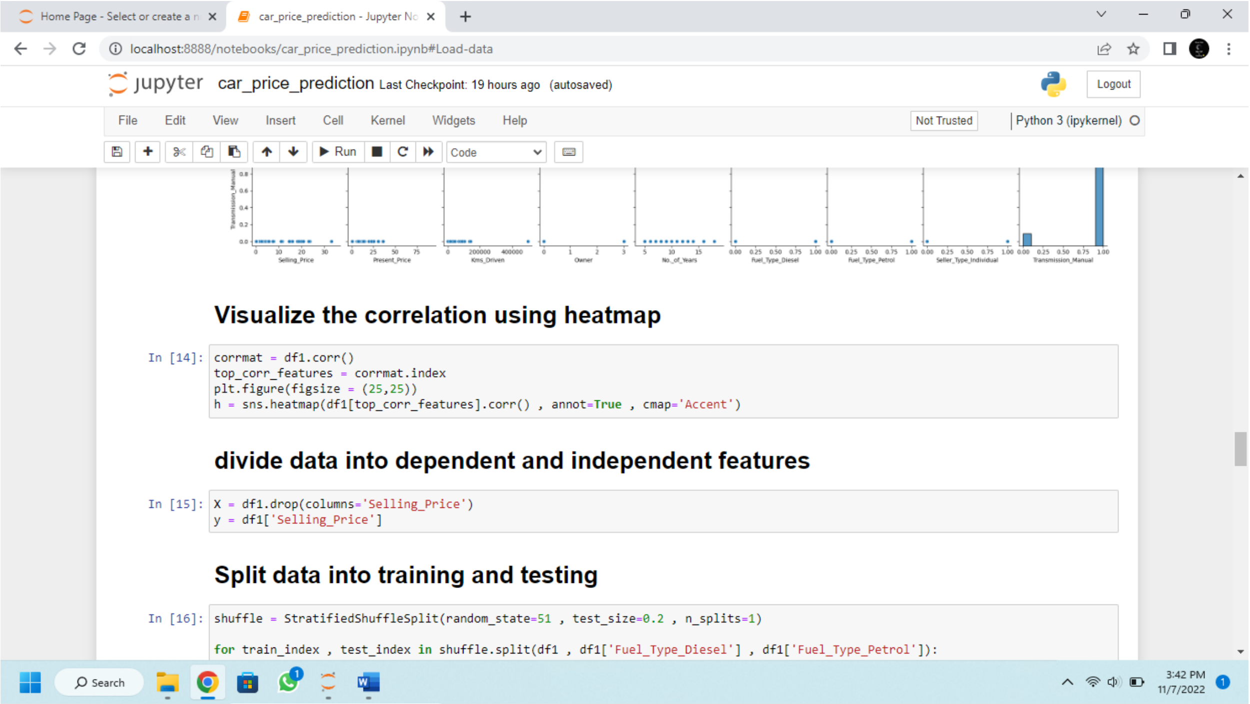
Model Building,Testing the Model,Model Evaluation


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter
car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Selling_Price
Present_Price
Kms_Driven
Owner
Search
3:42 PM
11/7/2022

Visualize data

```
In [13]: sns.pairplot(df1)

Out[13]: <seaborn.axisgrid.PairGrid at 0x176a6d5b5b0>
```


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter
car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Not Trusted
Python 3 (ipykernel)
Run
Code
No_of_Years
Fuel_Type_Diesel
Fuel_Type_Petrol
Seller_Type_Individual
Search
3:42 PM
11/7/2022



Visualize the correlation using heatmap

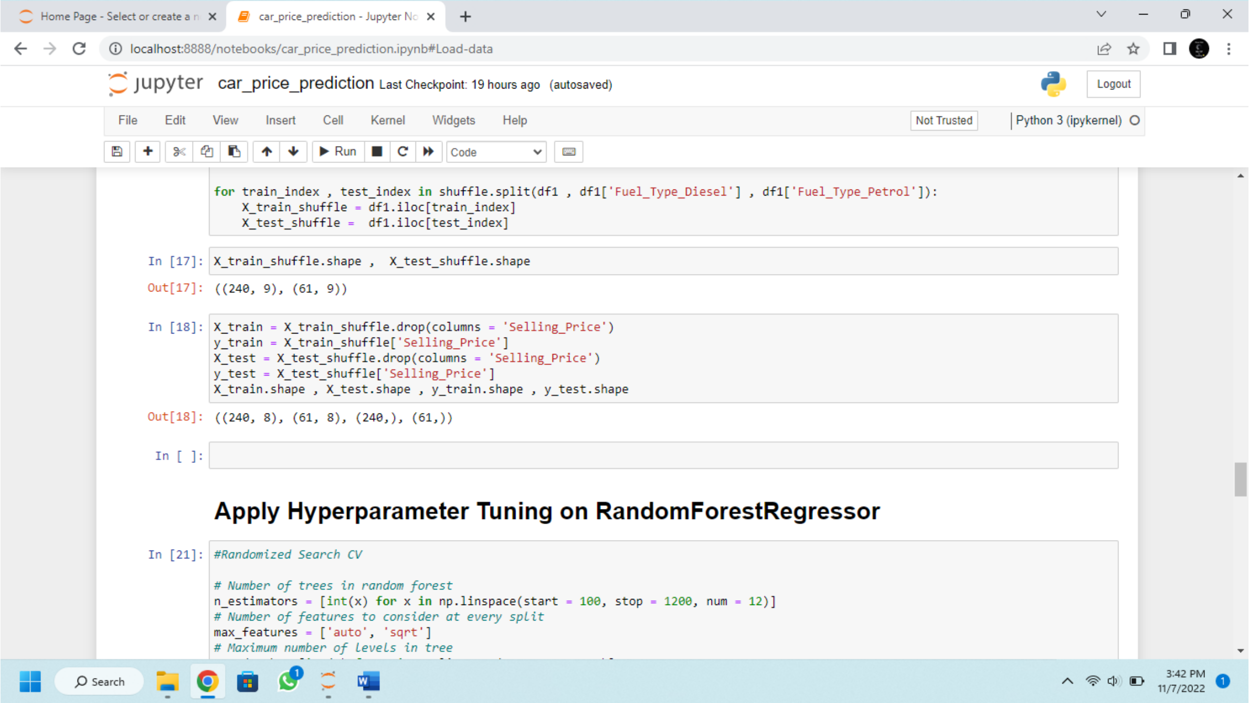
```
In [14]: corrmat = df1.corr()
         top_corr_features = corrmat.index
         plt.figure(figsize = (25,25))
         h = sns.heatmap(df1[top_corr_features].corr() , annot=True , cmap='Accent')
```

divide data into dependent and independent features

```
In [15]: X = df1.drop(columns='Selling_Price')
         y = df1['Selling_Price']
```

Split data into training and testing

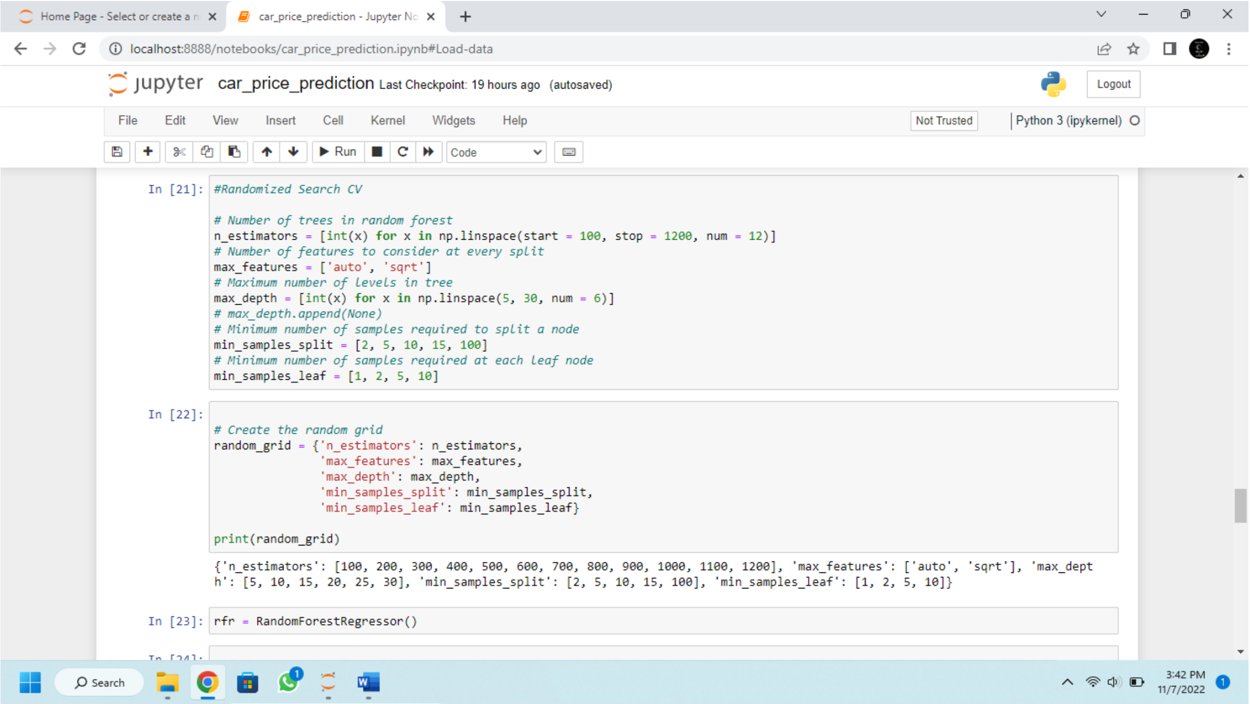
```
In [16]: shuffle = StratifiedShuffleSplit(random_state=51 , test_size=0.2 , n_splits=1)

         for train_index , test_index in shuffle.split(df1 , df1['Fuel_Type_Diesel'] , df1['Fuel_Type_Petrol']):
```


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Search
3:42 PM
11/7/2022

```
         for train_index , test_index in shuffle.split(df1 , df1['Fuel_Type_Diesel'] , df1['Fuel_Type_Petrol']):
             X_train_shuffle = df1.iloc[train_index]
             X_test_shuffle =  df1.iloc[test_index]

In [17]: X_train_shuffle.shape ,  X_test_shuffle.shape

Out[17]: ((240, 9), (61, 9))

In [18]: X_train = X_train_shuffle.drop(columns = 'Selling_Price')
         y_train = X_train_shuffle['Selling_Price']
         X_test = X_test_shuffle.drop(columns = 'Selling_Price')
         y_test = X_test_shuffle['Selling_Price']
         X_train.shape , X_test.shape , y_train.shape , y_test.shape

Out[18]: ((240, 8), (61, 8), (240,), (61,))

 In [ ]:
```

Apply Hyperparameter Tuning on RandomForestRegressor

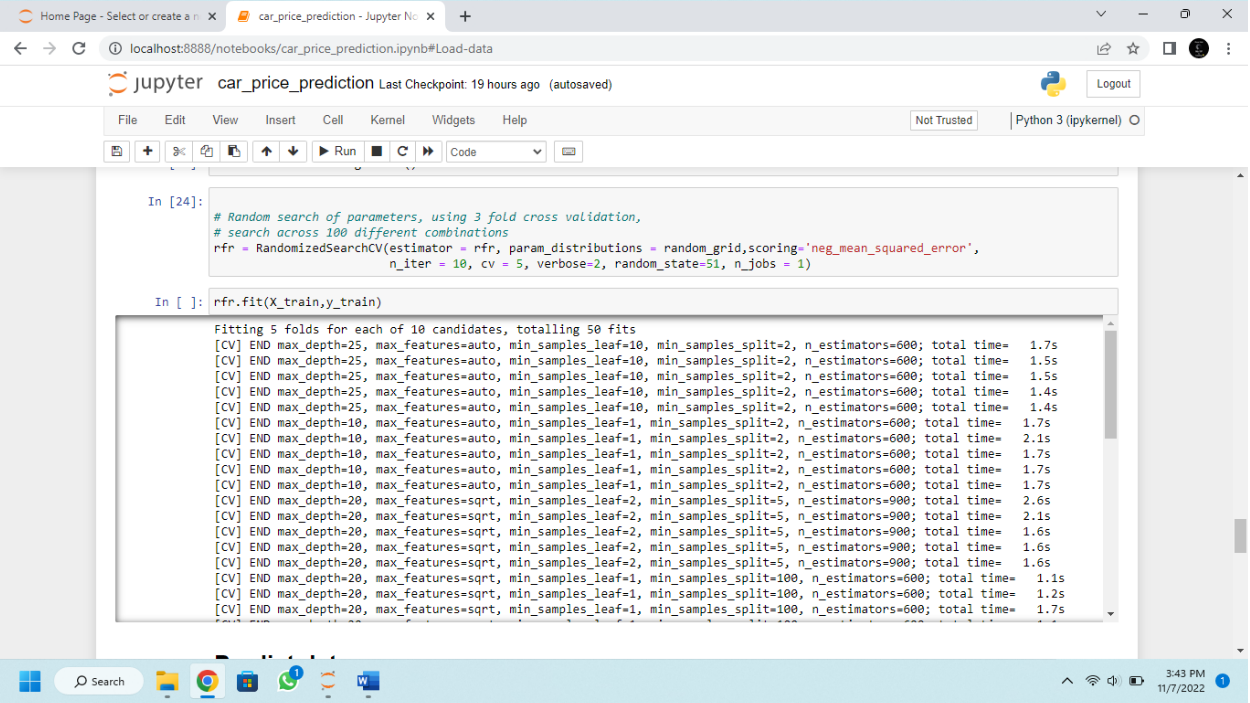
```
In [21]: #Randomized Search CV

         # Number of trees in random forest
         n_estimators = [int(x) for x in np.linspace(start = 100, stop = 1200, num = 12)]
         # Number of features to consider at every split
         max_features = ['auto', 'sqrt']
         # Maximum number of levels in tree
```


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Search
3:42 PM
11/7/2022

```
In [21]: #Randomized Search CV

         # Number of trees in random forest
         n_estimators = [int(x) for x in np.linspace(start = 100, stop = 1200, num = 12)]
         # Number of features to consider at every split
         max_features = ['auto', 'sqrt']
         # Maximum number of levels in tree
         max_depth = [int(x) for x in np.linspace(5, 30, num = 6)]
         # max_depth.append(None)
         # Minimum number of samples required to split a node
         min_samples_split = [2, 5, 10, 15, 100]
         # Minimum number of samples required at each leaf node
         min_samples_leaf = [1, 2, 5, 10]
```

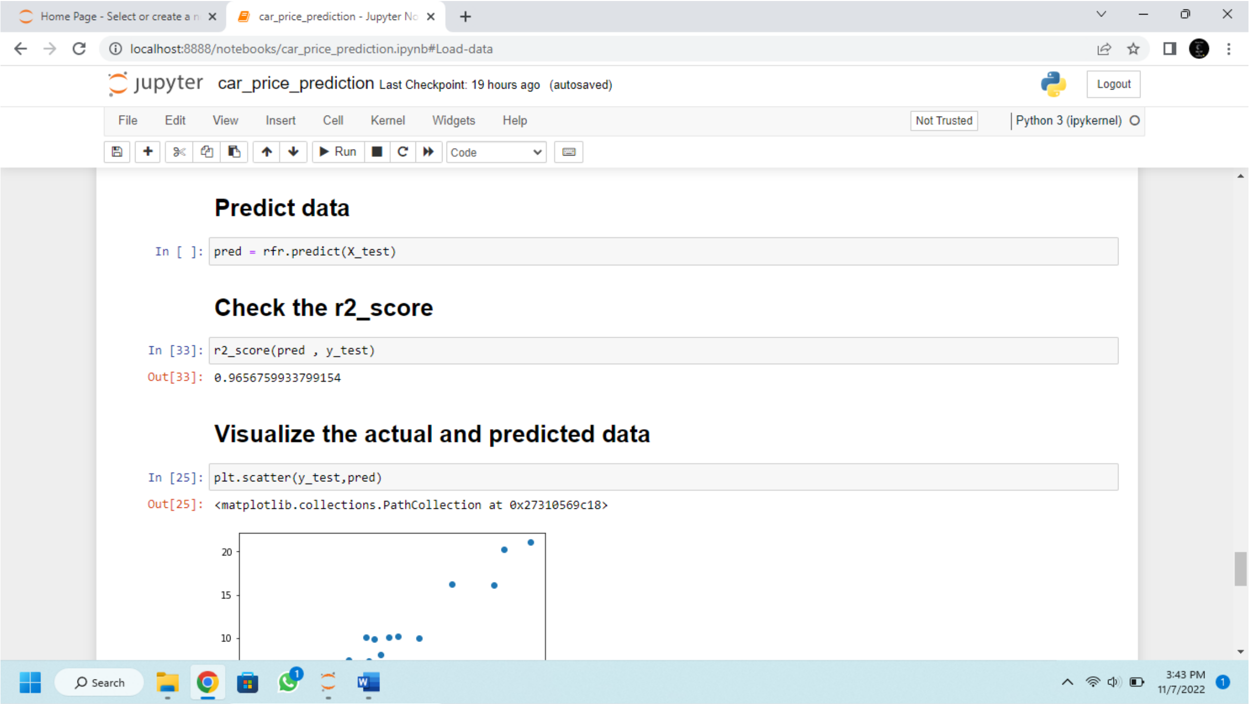
```
In [22]: # Create the random grid
         random_grid = {'n_estimators': n_estimators,
                        'max_features': max_features,
                        'max_depth': max_depth,
                        'min_samples_split': min_samples_split,
                        'min_samples_leaf': min_samples_leaf}

         print(random_grid)

         {'n_estimators': [100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200], 'max_features': ['auto', 'sqrt'], 'max_dept
         h': [5, 10, 15, 20, 25, 30], 'min_samples_split': [2, 5, 10, 15, 100], 'min_samples_leaf': [1, 2, 5, 10]}
```

```
In [23]: rfr = RandomForestRegressor()
```


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3 (ipykernel)
Run
Code
Search
3:43 PM
11/7/2022

```
In [24]: # Random search of parameters, using 3 fold cross validation,
         # search across 100 different combinations
         rfr = RandomizedSearchCV(estimator = rfr, param_distributions = random_grid,scoring='neg_mean_squared_error',
                                  n_iter = 10, cv = 5, verbose=2, random_state=51, n_jobs = 1)
```

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

        Fitting 5 folds for each of 10 candidates, totalling 50 fits
        [CV] END max_depth=25, max_features=auto, min_samples_leaf=10, min_samples_split=2, n_estimators=600; total time=   1.7s
        [CV] END max_depth=25, max_features=auto, min_samples_leaf=10, min_samples_split=2, n_estimators=600; total time=   1.5s
        [CV] END max_depth=25, max_features=auto, min_samples_leaf=10, min_samples_split=2, n_estimators=600; total time=   1.5s
        [CV] END max_depth=25, max_features=auto, min_samples_leaf=10, min_samples_split=2, n_estimators=600; total time=   1.4s
        [CV] END max_depth=25, max_features=auto, min_samples_leaf=10, min_samples_split=2, n_estimators=600; total time=   1.4s
        [CV] END max_depth=10, max_features=auto, min_samples_leaf=1, min_samples_split=2, n_estimators=600; total time=   1.7s
        [CV] END max_depth=10, max_features=auto, min_samples_leaf=1, min_samples_split=2, n_estimators=600; total time=   2.1s
        [CV] END max_depth=10, max_features=auto, min_samples_leaf=1, min_samples_split=2, n_estimators=600; total time=   1.7s
        [CV] END max_depth=10, max_features=auto, min_samples_leaf=1, min_samples_split=2, n_estimators=600; total time=   1.7s
        [CV] END max_depth=10, max_features=auto, min_samples_leaf=1, min_samples_split=2, n_estimators=600; total time=   1.7s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=2, min_samples_split=5, n_estimators=900; total time=   2.6s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=2, min_samples_split=5, n_estimators=900; total time=   2.1s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=2, min_samples_split=5, n_estimators=900; total time=   1.6s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=2, min_samples_split=5, n_estimators=900; total time=   1.6s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=2, min_samples_split=5, n_estimators=900; total time=   1.6s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=1, min_samples_split=100, n_estimators=600; total time=   1.1s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=1, min_samples_split=100, n_estimators=600; total time=   1.2s
        [CV] END max_depth=20, max_features=sqrt, min_samples_leaf=1, min_samples_split=100, n_estimators=600; total time=   1.7s
```


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Not Trusted
Python 3 (ipykernel)
Run
Code
20
15
10
Search
3:43 PM
11/7/2022

Predict data

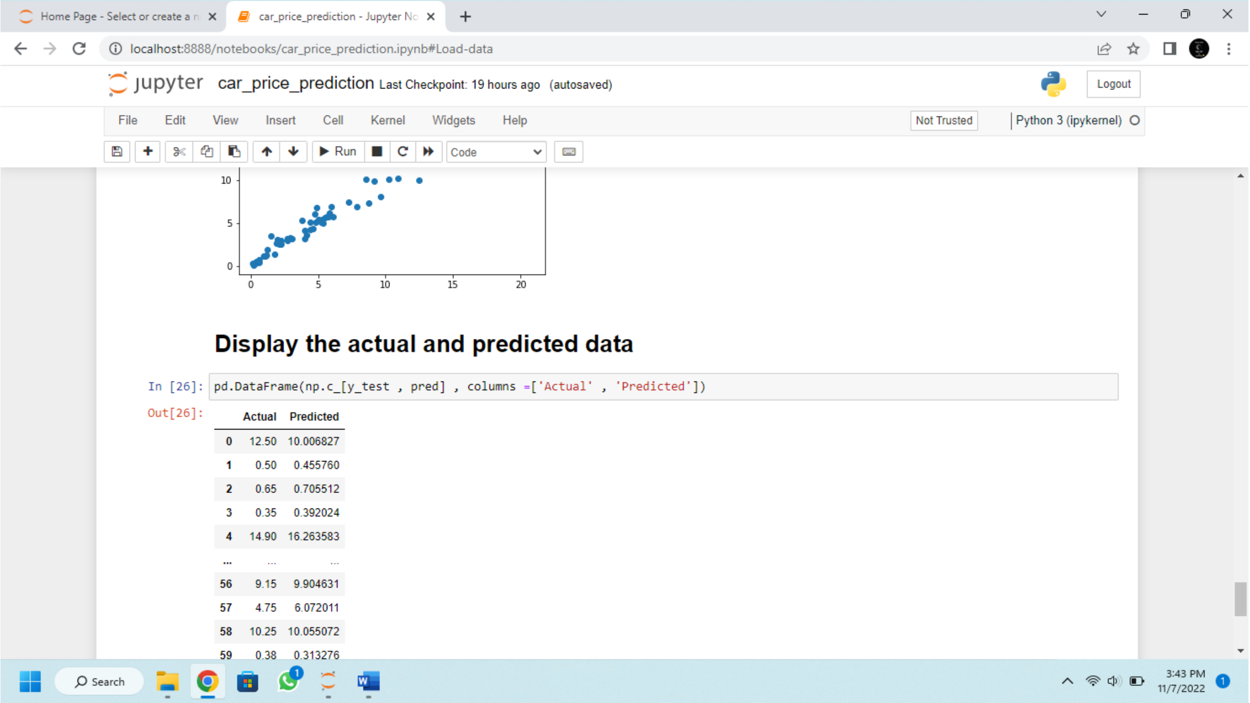
```
In [ ]: pred = rfr.predict(X_test)
```

Check the r2_score

```
In [33]: r2_score(pred , y_test)
Out[33]: 0.9656759933799154
```

Visualize the actual and predicted data

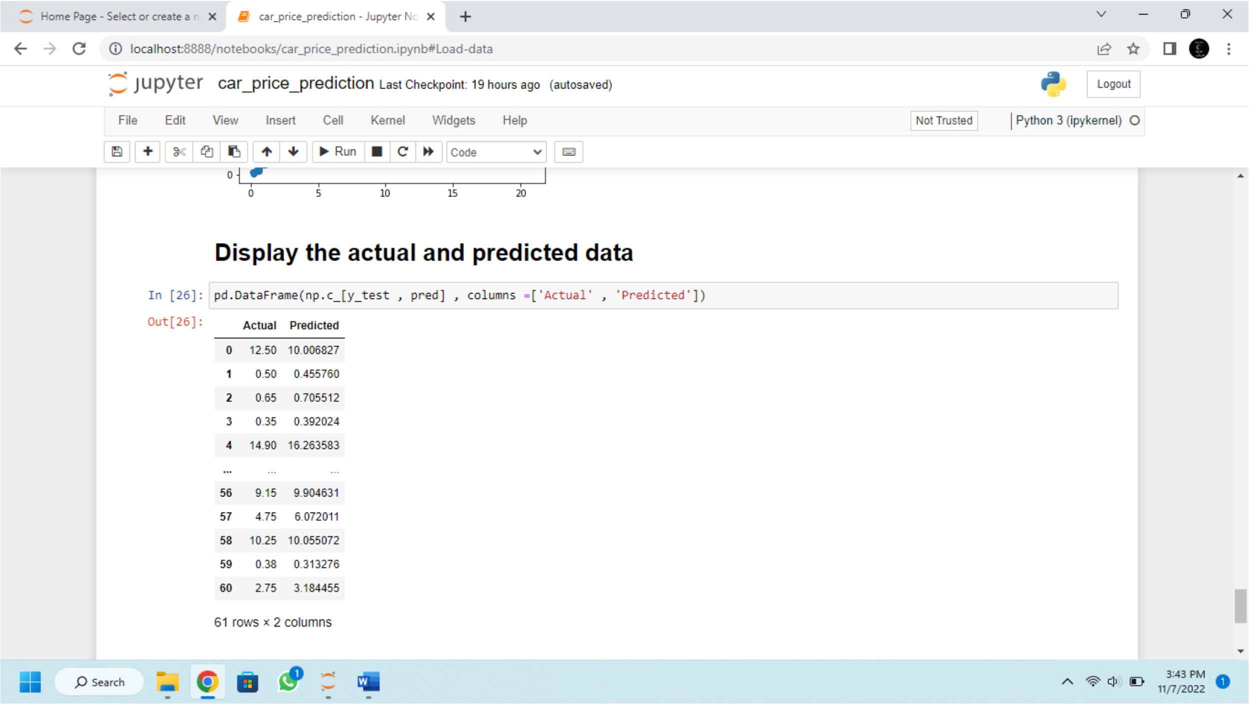
```
In [25]: plt.scatter(y_test,pred)
Out[25]: <matplotlib.collections.PathCollection at 0x27310569c18>
```


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Not Trusted
Python 3 (ipykernel)
Run
Code
10
5
0
0
5
10
15
20
Search
3:43 PM
11/7/2022

Display the actual and predicted data

```
In [26]: pd.DataFrame(np.c_[y_test , pred] , columns =['Actual' , 'Predicted'])
Out[26]:
```

	Actual	Predicted
0	12.50	10.006827
1	0.50	0.455760
2	0.65	0.705512
3	0.35	0.392024
4	14.90	16.263583
...	...	...
56	9.15	9.904631
57	4.75	6.072011
58	10.25	10.055072
59	0.38	0.313276


Home Page - Select or create a n
car_price_prediction - Jupyter No
localhost:8888/notebooks/car_price_prediction.ipynb#Load-data
jupyter
car_price_prediction Last Checkpoint: 19 hours ago (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Not Trusted
Python 3 (ipykernel)
Run
Code
0
0
5
10
15
20
Search
3:43 PM
11/7/2022

Display the actual and predicted data

```
In [26]: pd.DataFrame(np.c_[y_test , pred] , columns =['Actual' , 'Predicted'])
```

Out[26]:

	Actual	Predicted
0	12.50	10.006827
1	0.50	0.455760
2	0.65	0.705512
3	0.35	0.392024
4	14.90	16.263583
...	...	...
56	9.15	9.904631
57	4.75	6.072011
58	10.25	10.055072
59	0.38	0.313276
60	2.75	3.184455

61 rows × 2 columns