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Run Code

In [102]:
```
X=final_dataset.iloc[:,1:]
y=final_dataset.iloc[:,0]
```

In [137]:
```
X['Owner'].unique()
```

Out[137]:
```
array([0, 1, 3], dtype=int64)
```

In [103]:
```
X.head()
```

Out[103]:

	Present_Price	Kms_Driven	Owner	no_year	Fuel_Type_Diesel	Fuel_Type_Petrol	Seller_Type_Individual	Transmission_Manual
0	5.59	27000	0	6	0	1	0	1
1	9.54	43000	0	7	1	0	0	1
2	9.85	6900	0	3	0	1	0	1
3	4.15	5200	0	9	0	1	0	1
4	6.87	42450	0	6	1	0	0	1

In [104]:
```
y.head()
```

Out[104]:
```
0    3.35
1    4.75
2    7.25
3    2.85
4    4.60
Name: Selling_Price, dtype: float64
```

In [105]:
```
### Feature Importance

from sklearn.ensemble import ExtraTreesRegressor
import matplotlib.pyplot as plt
```

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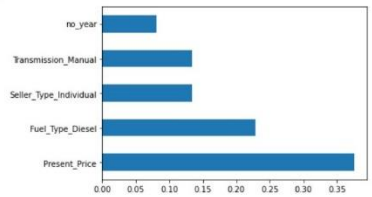
Run Code

Out[105]:
```
ExtraTreesRegressor()
```

In [106]:
```
print(model.feature_importances_)
```

```
[0.37587921 0.03735726 0.00097047 0.08064828 0.22844919 0.00780328
 0.13445871 0.13443361]
```

In [108]:
```
#plot graph of feature importances for better visualization
feat_importances = pd.Series(model.feature_importances_, index=X.columns)
feat_importances.nlargest(5).plot(kind='barh')
plt.show()
```



In [120]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=0)
```

In [109]:
```
from sklearn.ensemble import RandomForestRegressor
```

In [111]:
```
regressor=RandomForestRegressor()
```

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Run Code

In [112]:
```
n_estimators = [int(x) for x in np.linspace(start = 100, stop = 1200, num = 12)]
print(n_estimators)
```

```
[100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200]
```

In [113]:
```
from sklearn.model_selection import RandomizedSearchCV
```

In [115]:
```
#Randomized Search CVsam

# 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 [116]:
```
# 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_depth
': [5, 10, 15, 20, 25, 30], 'min_samples_split': [2, 5, 10, 15, 100], 'min_samples_leaf': [1, 2, 5, 10]}
```

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In [117]:
```
# Use the random grid to search for best hyperparameters
# First create the base model to tune
rf = RandomForestRegressor()
```

In [124]:
```
# Random search of parameters, using 3 fold cross validation,
# search across 100 different combinations
rf_random = RandomizedSearchCV(estimator = rf, param_distributions = random_grid,scoring='neg_mean_squared_error', n_iter = 10, 
```

In [125]:
```
rf_random.fit(X_train,y_train)
```

```
[CV]  n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15, total=   1.5s
[CV] n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15
[CV]  n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15, total=   1.6s
[CV] n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15
[CV]  n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15, total=   1.9s
[CV] n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15
[CV]  n_estimators=1100, min_samples_split=10, min_samples_leaf=2, max_features=sqrt, max_depth=15, total=   1.6s
[CV] n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15
[CV]  n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15, total=   0.4s
[CV] n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15
[CV]  n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15, total=   0.4s
[CV] n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15
[CV]  n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15, total=   0.4s
[CV] n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15
[CV]  n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15, total=   0.4s
[CV] n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15
[CV]  n_estimators=300, min_samples_split=100, min_samples_leaf=5, max_features=auto, max_depth=15, total=   0.4s
[CV] n_estimators=400, min_samples_split=5, min_samples_leaf=5, max_features=auto, max_depth=15
[CV]  n_estimators=400, min_samples_split=5, min_samples_leaf=5, max_features=auto, max_depth=15, total=   0.6s
```

In [126]:
```
rf_random.best_params_
```

Out[126]: {'n_estimators': 1000,

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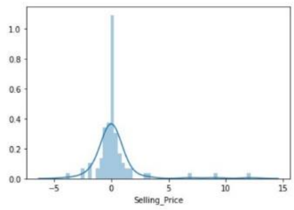
In [128]:
```
predictions=rf_random.predict(X_test)
```

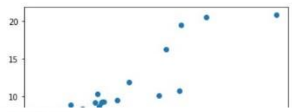
In [129]:
```
sns.distplot(y_test-predictions)
```

Out[129]: <matplotlib.axes._subplots.AxesSubplot at 0x2dbf66939c8>



In [131]:
```
plt.scatter(y_test,predictions)
```

Out[131]: <matplotlib.collections.PathCollection at 0x2dbf6610708>



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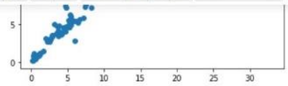

In [133]:
```
from sklearn import metrics
```

In [135]:
```
print('MAE:', metrics.mean_absolute_error(y_test, predictions))
print('MSE:', metrics.mean_squared_error(y_test, predictions))
print('RMSE:', np.sqrt(metrics.mean_squared_error(y_test, predictions)))
```

```
MAE: 0.8849978021977988
MSE: 3.9544237722813156
RMSE: 1.9885733007061408
```

In [136]:
```
import pickle
# open a file, where you ant to store the data
file = open('random_forest_regression_model.pkl', 'wb')

# dump information to that file
pickle.dump(rf_random, file)
```

In [ ]:

In [ ]: