In [17]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

In [18]:
```
df = pd.read_csv('Final.csv')
df.head()
```

Out[18]:

	Item_Identifier	Item_Weight	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Establishment_Year	Item_Outlet_Sales	Outl
0	FDA15	9.30	0.922960	Dairy	249.8092	OUT049	1999	3735.1380	
1	DRC01	5.92	1.003057	Soft Drinks	48.2692	OUT018	2009	443.4228	
2	FDN15	17.50	0.831990	Meat	141.6180	OUT049	1999	2097.2700	
3	FDX07	19.20	0.750000	Fruits and Vegetables	182.0950	OUT010	1998	732.3800	
4	NCD19	8.93	0.666667	Household	53.8614	OUT013	1987	994.7052	

5 rows × 30 columns

In [19]:
```
remove_cols = [
    'Item_Identifier',
    'Item_Type',
    'Outlet_Identifier',
    'Outlet_Establishment_Year'
]
df = df.drop(remove_cols,axis =1)
df.head()
```

Out[19]:

	Item_Weight	Item_Visibility	Item_MRP	Item_Outlet_Sales	Outlet_Years	Item_Fat_Content_1	Item_Fat_Content_2	Outlet_Location_Type_
0	9.30	0.922960	249.8092	3735.1380	14	False	False	Fals
1	5.92	1.003057	48.2692	443.4228	4	False	True	Fals
2	17.50	0.831990	141.6180	2097.2700	14	False	False	Fals
3	19.20	0.750000	182.0950	732.3800	15	False	True	Fals
4	8.93	0.666667	53.8614	994.7052	26	True	False	Fals

5 rows × 26 columns

In [20]:
```
df.shape
```

Out[20]: (8519, 26)

In [21]:
```
y = df.Item_Outlet_Sales.values
X = df.drop('Item_Outlet_Sales',axis = 1)
```

In [22]:
```
print(X.shape,y.shape)
```

(8519, 25) (8519,)

In [23]:
```
from sklearn.tree import DecisionTreeRegressor
DT = DecisionTreeRegressor()
```

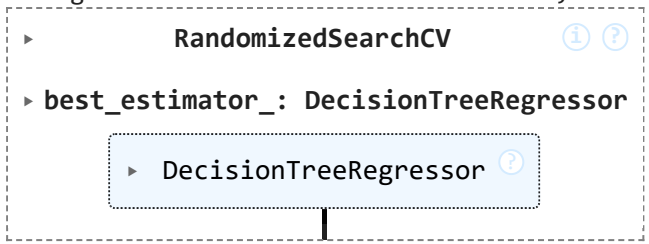
In [24]:
```
param = {
    'max_depth':[6,9,12,15],
    'min_samples_leaf':[10,50,100,150]
}
```

In [25]:
```
from sklearn.metrics import mean_squared_error,make_scorer
from sklearn.model_selection import RandomizedSearchCV
random_search=RandomizedSearchCV(DT,param_distributions=param,n_iter=5,scoring=make_scorer(mean_squared_error),n_jobs=-1,cv=5,
```

In [26]:
```
random_search.fit(X,y)
```

```
Fitting 5 folds for each of 5 candidates, totalling 25 fits
```

Out[26]:



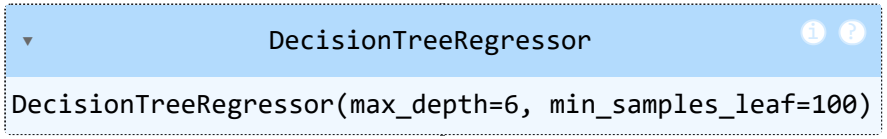
In [27]:
```
means = random_search.cv_results_['mean_test_score']
params = random_search.cv_results_['params']
for mean, param in zip(means, params):
    print("%f with: %r" % (mean, param))
    if mean == min(means):
        print('Best parameters with the minimum Mean Square Error are:',param)
```

```
1252675.785923 with: {'min_samples_leaf': 50, 'max_depth': 12}
1234150.713856 with: {'min_samples_leaf': 100, 'max_depth': 15}
1238998.459008 with: {'min_samples_leaf': 10, 'max_depth': 6}
1242736.894774 with: {'min_samples_leaf': 50, 'max_depth': 9}
1233420.301400 with: {'min_samples_leaf': 100, 'max_depth': 9}
Best parameters with the minimum Mean Square Error are: {'min_samples_leaf': 100, 'max_depth': 9}
```

In [28]:
```
DT = DecisionTreeRegressor(min_samples_leaf=100, max_depth=6)
```

In [29]:
```
DT.fit(X,y)
```

Out[29]:



In [30]:
```
y_pred = DT.predict(X)
```

In [31]:
```
from sklearn.metrics import r2_score,mean_squared_error,mean_absolute_error

score = r2_score(y,y_pred)
print("Score:",score)
```

```
print("MAE : %.4g" % np.sqrt(mean_absolute_error(y,y_pred)))
print("RMSE : %.4g" % np.sqrt(mean_squared_error(y,y_pred)))
```

```
Score: 0.5953232575231238
MAE : 27.6
RMSE : 1086
```

In [32]:
```
from sklearn.metrics import mean_squared_error,make_scorer,mean_absolute_error
from sklearn.model_selection import cross_val_score
cv_score = cross_val_score(DT,X, y, cv=20, scoring = make_scorer(mean_squared_error))
cv_score = np.sqrt(np.abs(cv_score))
print("\nModel Report")
print("MAE : %.4g" % np.sqrt(mean_absolute_error(y,y_pred)))
print("RMSE : %.4g" % np.sqrt(mean_squared_error(y,y_pred)))
print("CV Score : Mean - %.4g | Std - %.4g | Min - %.4g | Max - %.4g" % (np.mean(cv_score),np.std(cv_score),np.min(cv_score),n
```

```
Model Report
MAE : 27.6
RMSE : 1086
CV Score : Mean - 1097 | Std - 45.76 | Min - 1032 | Max - 1211
```