Import Dependencies

```
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
import seaborn as sns
from sklearn.preprocessing import LabelEncoder
from sklearn import metrics
from xgboost import XGBRegressor
import matplotlib.pyplot as plt
```

Data Collection and Preprocessing

```
data=pd.read_csv("Mart.csv")
data.head()
```

_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Establishme
Low Fat	0.016047	Dairy	249.8092	OUT049	
Regular	0.019278	Soft Drinks	48.2692	OUT018	
Low Fat	0.016760	Meat	141.6180	OUT049	
Regular	0.000000	Fruits and Vegetables	182.0950	OUT010	
Low Fat	0.000000	Household	53.8614	OUT013	

```
data.shape
```

```
(8523, 12)
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8523 entries, 0 to 8522
Data columns (total 12 columns):
 #   Column                     Non-Null Count  Dtype
---  ------                     --------------  -----
 0   Item_Identifier            8523 non-null   object
 1   Item_Weight                7060 non-null   float64
 2   Item_Fat_Content           8523 non-null   object
 3   Item_Visibility            8523 non-null   float64
 4   Item_Type                  8523 non-null   object
 5   Item_MRP                   8523 non-null   float64
 6   Outlet_Identifier          8523 non-null   object
 7   Outlet_Establishment_Year  8523 non-null   int64
 8   Outlet_Size                6113 non-null   object
 9   Outlet_Location_Type       8523 non-null   object
 10  Outlet_Type                8523 non-null   object
 11  Item_Outlet_Sales          8523 non-null   float64
dtypes: float64(4), int64(1), object(7)
memory usage: 799.2+ KB
```

```
data.describe()
```

	Item_Weight	Item_Visibility	Item_MRP	Outlet_Establishment_Year	Item_Outlet
count	7060.000000	8523.000000	8523.000000	8523.000000	8523.
mean	12.857645	0.066132	140.992782	1997.831867	2181.
std	4.643456	0.051598	62.275067	8.371760	1706.
min	4.555000	0.000000	31.290000	1985.000000	33.

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

```
Item_Identifier               0
Item_Weight                1463
Item_Fat_Content              0
Item_Visibility               0
Item_Type                     0
Item_MRP                      0
Outlet_Identifier             0
Outlet_Establishment_Year     0
Outlet_Size                2410
Outlet_Location_Type          0
Outlet_Type                   0
Item_Outlet_Sales             0
dtype: int64
```

Handle Missing Values Mean->Average Mode->More Repeated Values

```
data['Item_Weight'].mean()
```

```
12.857645184135976
```

```
data['Item_Weight'].fillna(data['Item_Weight'].mean(),inplace=True)
```

```
data['Outlet_Size'].mode()
```

```
0    Medium
Name: Outlet_Size, dtype: object
```

```
mode_outlet_size=data.pivot_table(values='Outlet_Size',columns='Outlet_Type',aggfunc=(lambda x:x.mode()[0]))
```

```
print(mode_outlet_size)
```

```
Outlet_Type Grocery Store Supermarket Type1 Supermarket Type2 Supermarket Type3
Outlet_Size         Small             Small            Medium            Medium
```

```
miss_values=data['Outlet_Size'].isnull()
```

```
print(miss_values)
```

```
0       False
1       False
2       False
3        True
4       False
        ...
8518    False
8519     True
8520    False
8521    False
8522    False
Name: Outlet_Size, Length: 8523, dtype: bool
```

```
data.loc[miss_values,'Outlet_Size']=data.loc[miss_values,'Outlet_Type'].apply(lambda x:mode_outlet_size[x])
```

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

```
Item_Identifier            0
Item_Weight                0
Item_Fat_Content           0
Item_Visibility            0
Item_Type                  0
```

```
Item_MRP                   0
Outlet_Identifier          0
Outlet_Establishment_Year  0
Outlet_Size                0
Outlet_Location_Type       0
Outlet_Type                0
Item_Outlet_Sales          0
dtype: int64
```

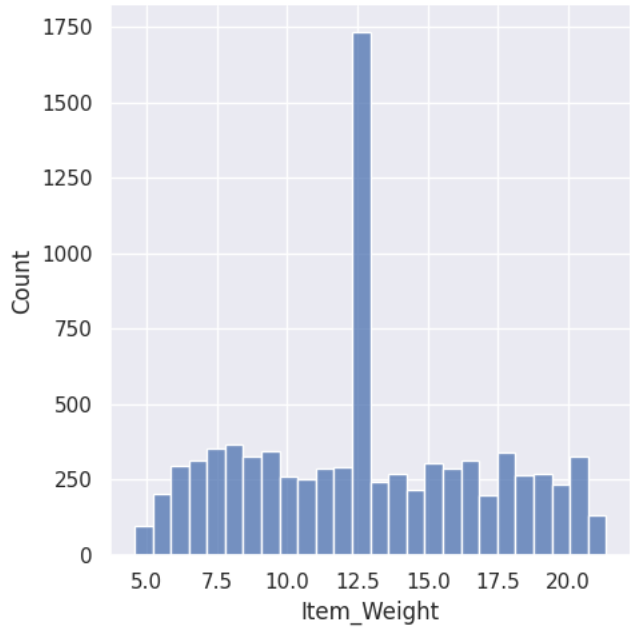
Data Analysis

```
data.describe()
```

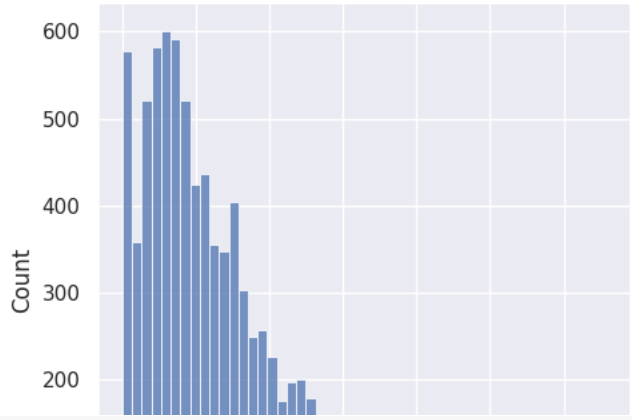
	Item_Weight	Item_Visibility	Item_MRP	Outlet_Establishment_Year	Item_Outlet
count	8523.000000	8523.000000	8523.000000	8523.000000	8523.
mean	12.857645	0.066132	140.992782	1997.831867	2181.
std	4.226124	0.051598	62.275067	8.371760	1706.
min	4.555000	0.000000	31.290000	1985.000000	33.
25%	9.310000	0.026989	93.826500	1987.000000	834.
50%	12.857645	0.053931	143.012800	1999.000000	1794.
75%	16.000000	0.094585	185.643700	2004.000000	3101.
max	21.350000	0.328391	266.888400	2009.000000	13086.

```
sns.set()
plt.figure(figsize=(6,6))
sns.displot(data['Item_Weight'])
plt.show()
```

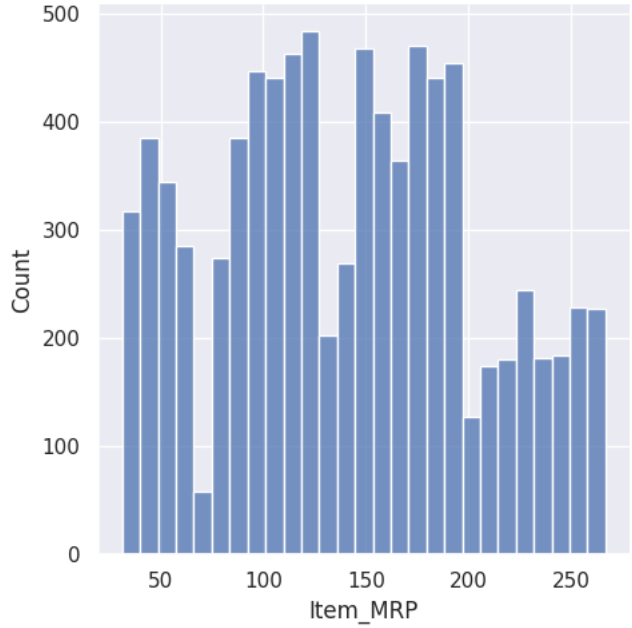
```
<Figure size 600x600 with 0 Axes>
```




```
sns.displot(data['Item_Visibility'])
plt.show()
```



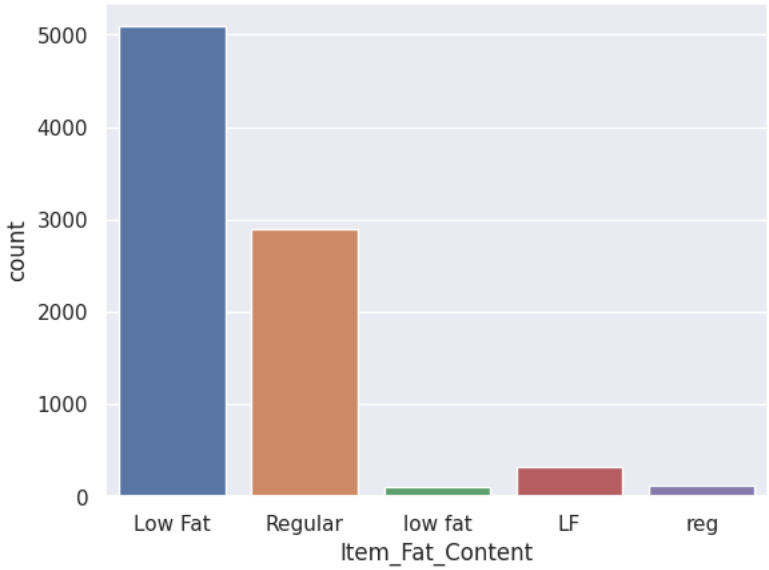

```
sns.displot(data['Item_MRP'])
plt.show()
```



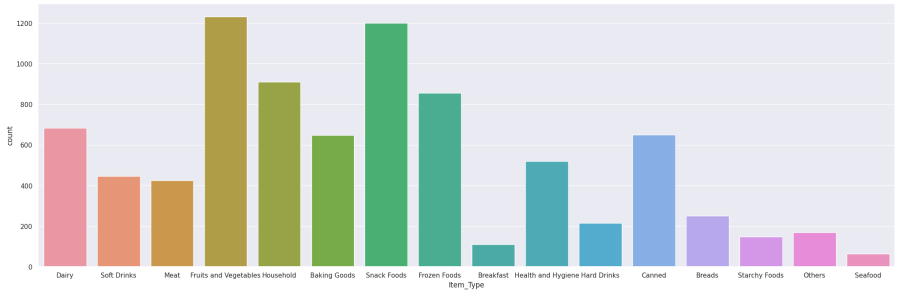

```
sns.displot(data['Item_Outlet_Sales'])
plt.show()
```

Categorical Features

```
sns.countplot(x='Item_Fat_Content',data=data)
plt.show()
```




```
plt.figure(figsize=(26,8))
sns.countplot(x='Item_Type',data=data)
plt.show()
```



Data Preprocessing

```
data.head()
```

	Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP
0	FDA15	9.30	Low Fat	0.016047	Dairy	249.8092
1	DRC01	5.92	Regular	0.019278	Soft Drinks	48.2692

```
data['Item_Fat_Content'].value_counts()
```

```
Low Fat    5089
Regular    2889
LF          316
reg         117
low fat     112
Name: Item_Fat_Content, dtype: int64
```

```
data.replace({'Item_Fat_Content':{'low fat':'Low Fat','LF':'Low Fat','reg':'Regular'}},inplace=True)
```

```
data['Item_Fat_Content'].value_counts()
```

```
Low Fat    5517
Regular    3006
Name: Item_Fat_Content, dtype: int64
```

Label Encoding

```
encoder=LabelEncoder()
data['Item_Identifier']=encoder.fit_transform(data['Item_Identifier'])
data['Item_Fat_Content']=encoder.fit_transform(data['Item_Fat_Content'])
data['Item_Type']=encoder.fit_transform(data['Item_Type'])
data['Outlet_Identifier']=encoder.fit_transform(data['Outlet_Identifier'])
data['Outlet_Size']=encoder.fit_transform(data['Outlet_Size'])
data['Outlet_Location_Type']=encoder.fit_transform(data['Outlet_Location_Type'])
data['Outlet_Type']=encoder.fit_transform(data['Outlet_Type'])
```

```
data.head()
```

:em_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outle
156	9.30	0	0.016047	4	249.8092	
8	5.92	1	0.019278	14	48.2692	
662	17.50	0	0.016760	10	141.6180	
1121	19.20	1	0.000000	6	182.0950	
1297	8.93	0	0.000000	9	53.8614	

Splitting Features and Target

```
features=data.drop(columns='Item_Outlet_Sales',axis=1)
label=data['Item_Outlet_Sales']
```

```
features.head()
```

Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier
9.30	0	0.016047	4	249.8092	9
5.92	1	0.019278	14	48.2692	3
17.50	0	0.016760	10	141.6180	9
19.20	1	0.000000	6	182.0950	0
8.93	0	0.000000	9	53.8614	1

```
label.head()
```

```
0    3735.1380
1     443.4228
2    2097.2700
3     732.3800
4     994.7052
Name: Item_Outlet_Sales, dtype: float64
```

```
features_train,features_test,label_train,label_test=train_test_split(features,label,test_size=0.2,random_state
```

```
print(features.shape,label.shape,features_train.shape,label_train.shape,features_test.shape,label_test.shape)
```

```
(8523, 11) (8523,) (6818, 11) (6818,) (1705, 11) (1705,)
```

Machine Learning Model Training

XGBoost Regressor

```
regressor=XGBRegressor()
```

```
regressor.fit(features_train,label_train)
```

```
XGBRegressor(base_score=None, booster=None, callbacks=None,
             colsample_bylevel=None, colsample_bynode=None,
             colsample_bytree=None, early_stopping_rounds=None,
             enable_categorical=False, eval_metric=None, feature_types=None,
             gamma=None, gpu_id=None, grow_policy=None, importance_type=None,
             interaction_constraints=None, learning_rate=None, max_bin=None,
             max_cat_threshold=None, max_cat_to_onehot=None,
             max_delta_step=None, max_depth=None, max_leaves=None,
             min_child_weight=None, missing=nan, monotone_constraints=None,
             n_estimators=100, n_jobs=None, num_parallel_tree=None,
             predictor=None, random_state=None, ...)
```

Evaluation

```
#training data predictions
train_predict=regressor.predict(features_train)
r2_train=metrics.r2_score(train_predict,label_train)
print('R Squared Value = ',r2_train)
```

```
R Squared Value =  0.813599695558012
```

```
#Test data predictions
test_predict=regressor.predict(features_test)
r2_test=metrics.r2_score(test_predict,label_test)
print('R Squared Value = ',r2_test)
```

```
R Squared Value =  0.21249740750834345
```

Application Phase

```
# Collect input from the user for various variables
Item_Identifier = input("\nPlease enter Item Identifier: ").strip()
Item_Weight = float(input("\nPlease enter Item Weight: "))
Item_Fat_Content = input("\nPlease enter Item Fat Content: ").strip()
Item_Visibility = float(input("\nPlease enter Item Visibility: "))
Item_Type = input("\nPlease enter Item Type: ").strip()
Item_MRP = float(input("\nPlease enter Item MRP: "))
Outlet_Identifier = input("\nPlease enter Outlet Identifier: ").strip()
Outlet_Establishment_Year = int(input("\nPlease enter Outlet Establishment Year: "))
Outlet_Size = input("\nPlease enter Outlet Size: ").strip()
Outlet_Location_Type = input("\nPlease enter Outlet Location Type: ").strip()
Outlet_Type = input("\nPlease enter Outlet Type: ").strip()
```

```
Please enter Item Identifier: NCDI9

Please enter Item Weight: 8.93

Please enter Item Fat Content: Low Fat

Please enter Item Visibility: 0.000

Please enter Item Type: Household

Please enter Item MRP: 53.86

Please enter Outlet Identifier: OUT013

Please enter Outlet Establishment Year: 1987

Please enter Outlet Size: High

Please enter Outlet Location Type: Tier 3

Please enter Outlet Type: Supermarket Type1
```

```
# Create a DataFrame from user input
user_input = pd.DataFrame({
    "Item_Identifier": [Item_Identifier],
    "Item_Weight": [Item_Weight],
    "Item_Fat_Content": [Item_Fat_Content],
    "Item_Visibility": [Item_Visibility],
    "Item_Type": [Item_Type],
    "Item_MRP": [Item_MRP],
    "Outlet_Identifier": [Outlet_Identifier],
    "Outlet_Establishment_Year": [Outlet_Establishment_Year],
    "Outlet_Size": [Outlet_Size],
    "Outlet_Location_Type": [Outlet_Location_Type],
    "Outlet_Type": [Outlet_Type]
})

print("\nUser Input Feature Vector:")
print("==========================\n")
user_input.head()
```

User Input Feature Vector:

Input Label Encoding

```
user_input['Item_Identifier']=encoder.fit_transform(user_input['Item_Identifier'])
user_input['Item_Fat_Content']=encoder.fit_transform(user_input['Item_Fat_Content'])
user_input['Item_Type']=encoder.fit_transform(user_input['Item_Type'])
user_input['Outlet_Identifier']=encoder.fit_transform(user_input['Outlet_Identifier'])
user_input['Outlet_Size']=encoder.fit_transform(user_input['Outlet_Size'])
user_input['Outlet_Location_Type']=encoder.fit_transform(user_input['Outlet_Location_Type'])
user_input['Outlet_Type']=encoder.fit_transform(user_input['Outlet_Type'])
```

```
user_input.head()
```

	Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP
0	0	8.93	0	0.0	0	53.86

```
Sales=regressor.predict(user_input)
from prettytable import PrettyTable
pretty_table = PrettyTable()
pretty_table.add_column("       <<<<<< Item Outlet Sales >>>>>       ",[Sales])
print(pretty_table)
```

```
+---------------------------------------------+
|       <<<<<< Item Outlet Sales >>>>>        |
+---------------------------------------------+
|                [780.9884]                   |
+---------------------------------------------+
```

Thanks For Reviewing this Document