Importing the Dependencies

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

Data Collection and Processing

```
# loading the data from csv file to Pandas DataFrame
big_mart_data = pd.read_csv('/content/Train.csv')
# first 5 rows of the dataframe
big_mart_data.head()
```

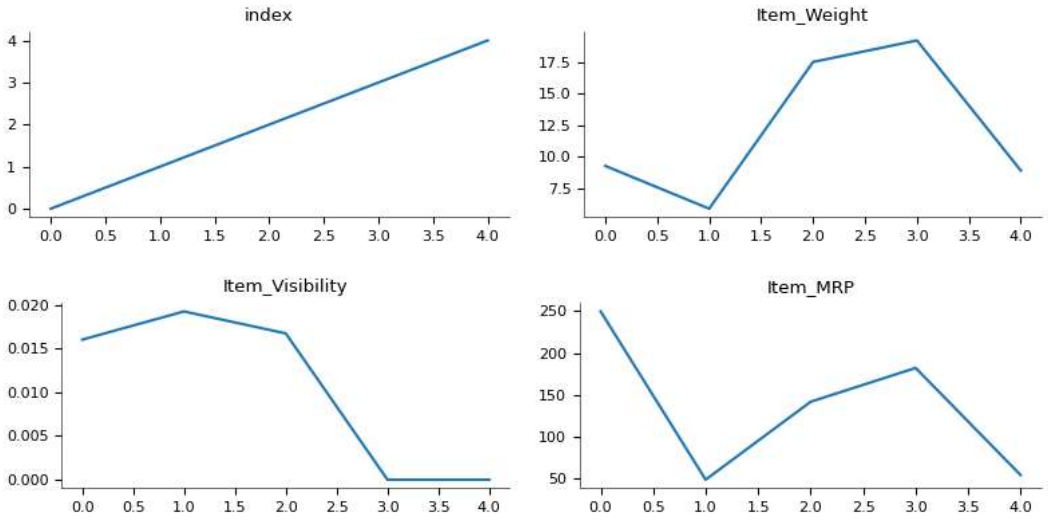
1 to 5 of 5 entries Filter

index	Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Establishment_Year	Outlet_Size	Outlet_I
0	FDA15	9.3	Low Fat	0.016047301	Dairy	249.8092	OUT049	1999	Medium	Tier 1
1	DRC01	5.92	Regular	0.019278216	Soft Drinks	48.2692	OUT018	2009	Medium	Tier 3
2	FDN15	17.5	Low Fat	0.016760075	Meat	141.618	OUT049	1999	Medium	Tier 1
3	FDX07	19.2	Regular	0.0	Fruits and Vegetables	182.095	OUT010	1998	NaN	Tier 3
4	NCD19	8.93	Low Fat	0.0	Household	53.8614	OUT013	1987	High	Tier 3

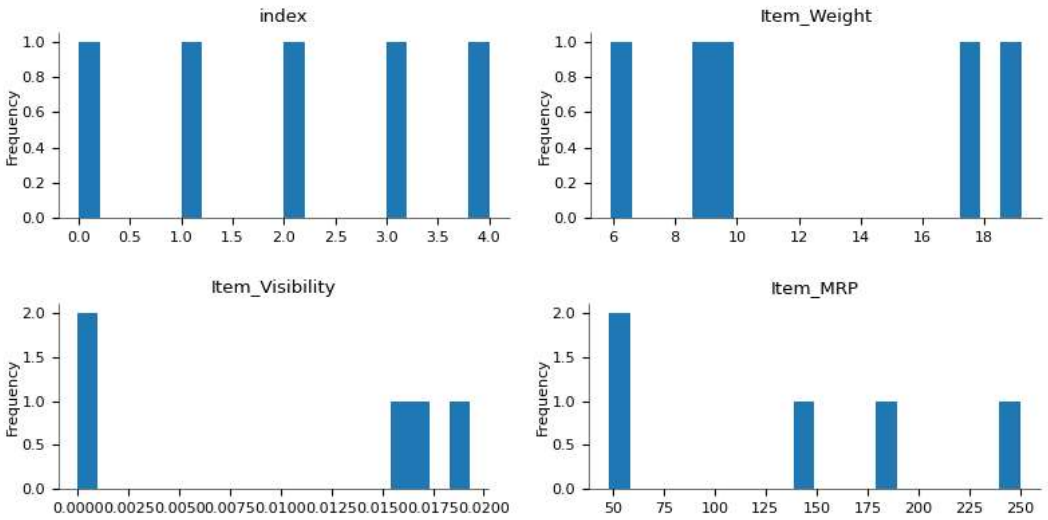
Show 25 per page

Like what you see? Visit the data table notebook to learn more about interactive tables.

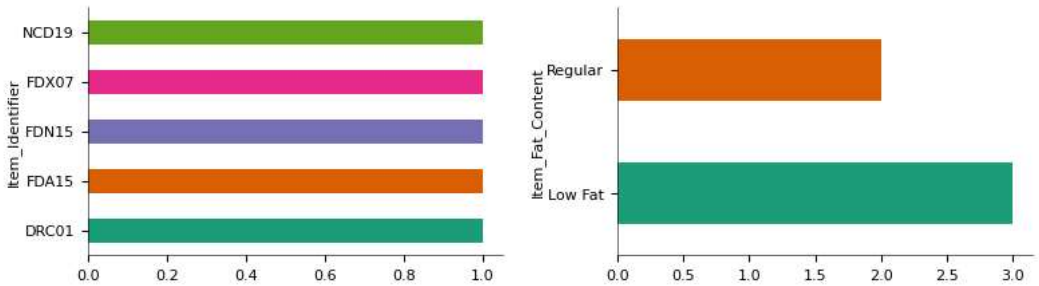
Values

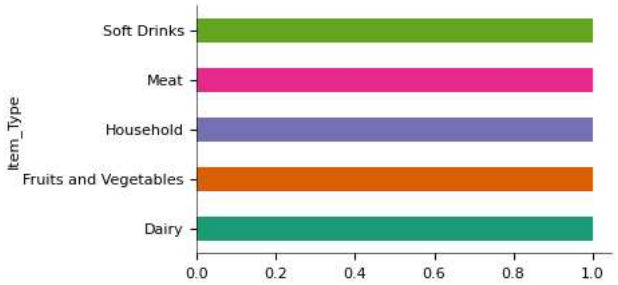


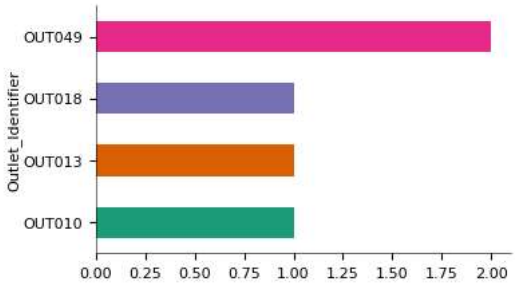
Distributions



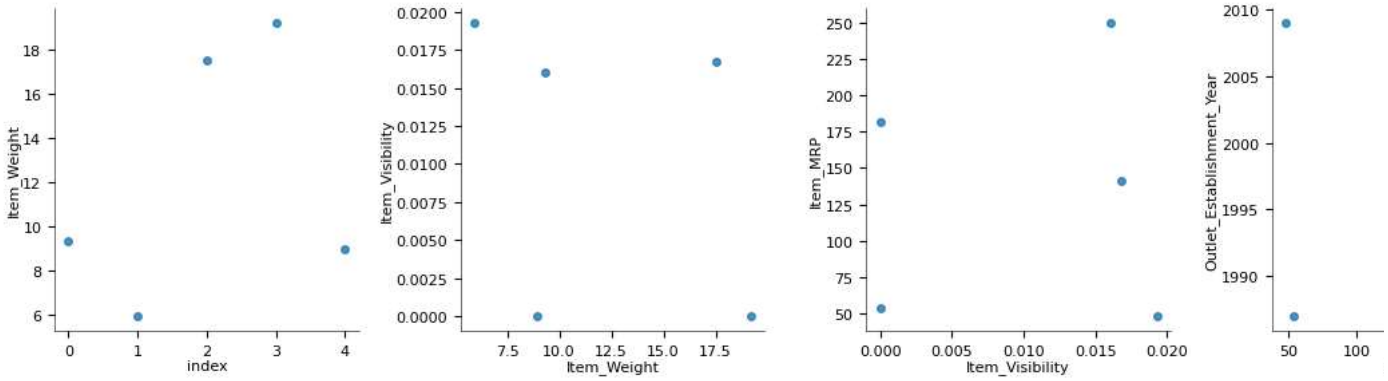
Categorical distributions



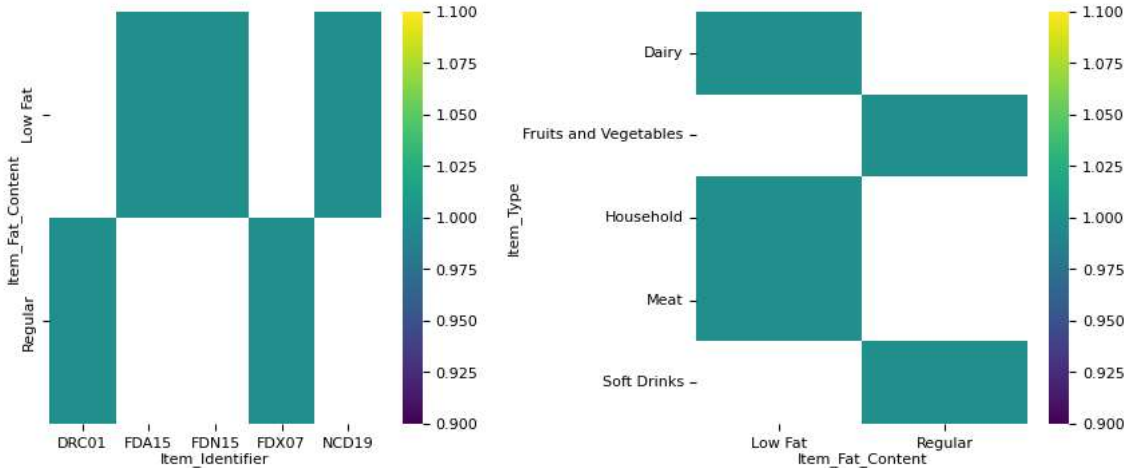


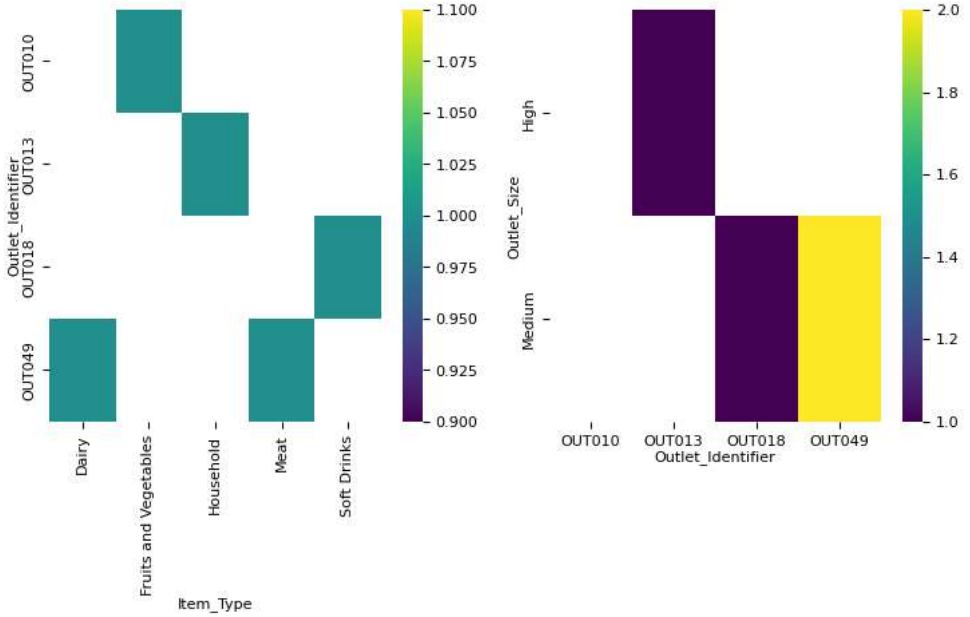


2-d distributions



2-d categorical distributions





Faceted distributions


```
# number of data points & number of features
big_mart_data.shape
```

```
(8523, 12)
```

```
# getting some information about thye dataset
big_mart_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
```

index

Categorical Features:

- Item_Identifier
- Item_Fat_Content
- Item_Type
- Outlet_Identifier
- Outlet_Size
- Outlet_Location_Type
- Outlet_Type

index

```
# checking for missing values
big_mart_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
```

Handling Missing Values

Mean --> average

Mode --> more repeated value

```
# mean value of "Item_Weight" column
big_mart_data['Item_Weight'].mean()
```

```
12.857645184135976
```

```
# filling the missing values in "Item_weight column" with "Mean" value
big_mart_data['Item_Weight'].fillna(big_mart_data['Item_Weight'].mean(), inplace=True)
```

```
# mode of "Outlet_Size" column
big_mart_data['Outlet_Size'].mode()
```

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

```
# filling the missing values in "Outlet_Size" column with Mode
mode_of_Outlet_size = big_mart_data.pivot_table(values='Outlet_Size', columns='Outlet_Type', aggfunc=(lambda x: x.mode()[0]))
```

```
print(mode_of_Outlet_size)
```

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

Outlet_Type Supermarket Type3
Outlet_Size            Medium
```

```
miss_values = big_mart_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
```

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

```
# checking for missing values
big_mart_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

```
big_mart_data.describe()
```

1 to 8 of 8 entries Filter

index	Item_Weight	Item_Visibility	Item_MRP	Outlet_Establishment_Year	Item_Outlet_Sales
count	8523.0	8523.0	8523.0	8523.0	8523.0
mean	12.857645184135976	0.06613202877895108	140.9927819781767	1997.8318667135984	2181.288913575032
std	4.226123724532989	0.05159782232113512	62.27506651219046	8.371760408092655	1706.499615733833
min	4.555	0.0	31.29	1985.0	33.29
25%	9.31	0.0269894775	93.8265	1987.0	834.2474
50%	12.857645184135976	0.053930934	143.0128	1999.0	1794.331
75%	16.0	0.0945852925	185.6437	2004.0	3101.2964
max	21.35	0.328390948	266.8884	2009.0	13086.9648

Show 25 per page

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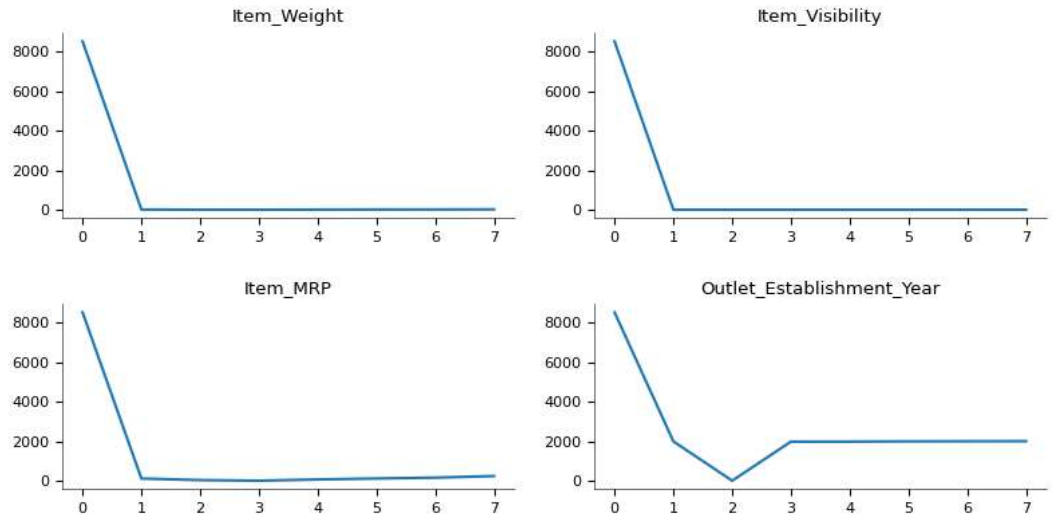
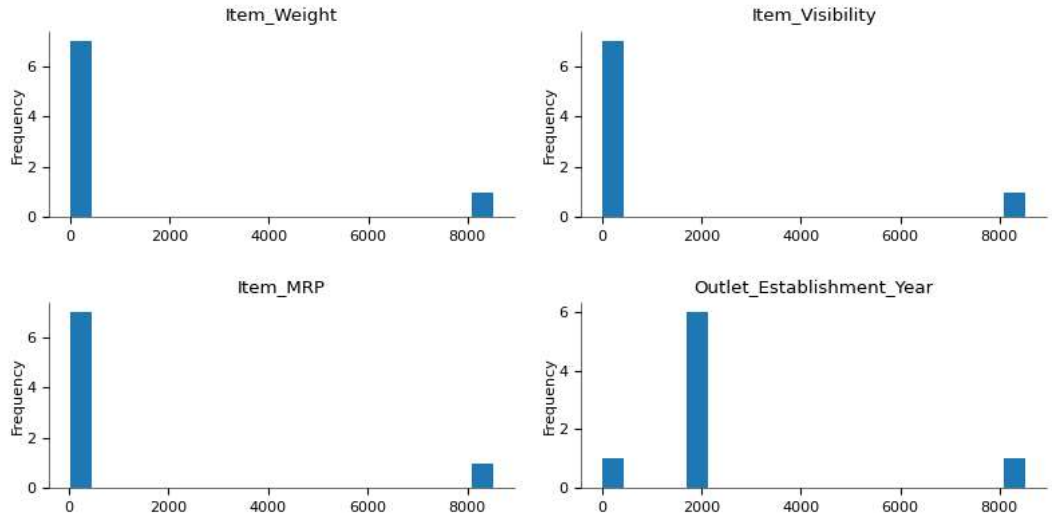
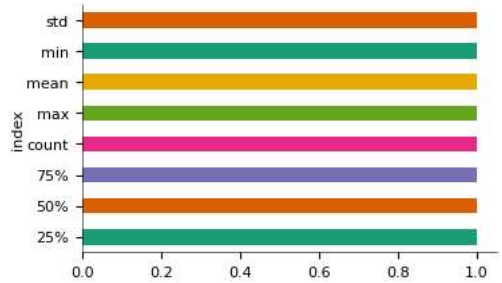
Values



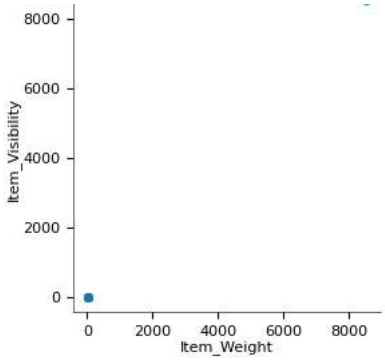
Distributions

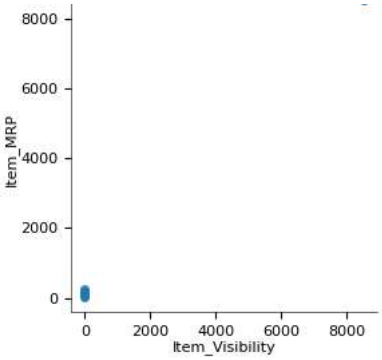


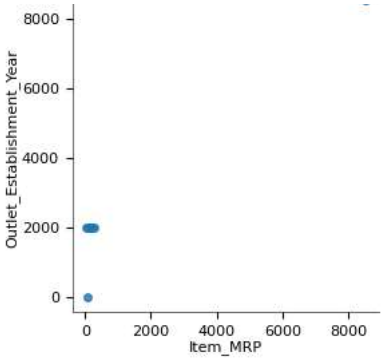
Categorical distributions

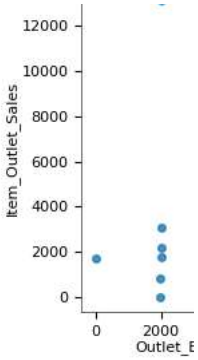


2-d distributions

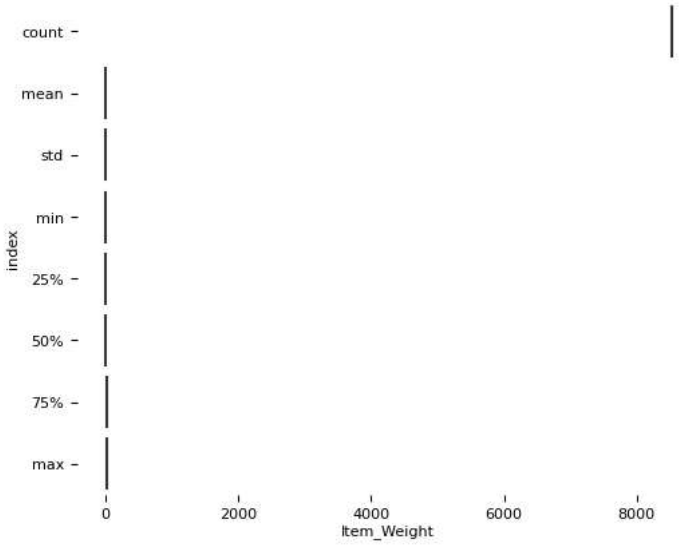








Faceted distributions



Numerical Features

```
sns.set()
# Item_Weight distribution
plt.figure(figsize=(6,6))
sns.distplot(big_mart_data['Item_Weight'])
plt.show()
```

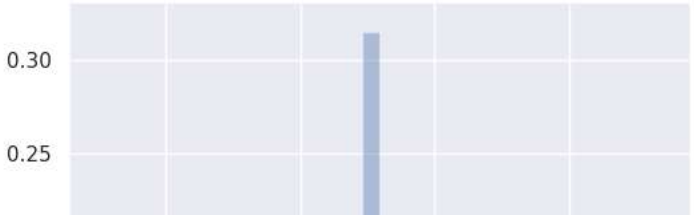
```
<ipython-input-16-ecfc9c03b9c8>:4: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(big_mart_data['Item_Weight'])
```




```
# Item Visibility distribution
plt.figure(figsize=(6,6))
sns.distplot(big_mart_data['Item_Visibility'])
plt.show()
```

```
<ipython-input-17-386044597ca3>:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

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https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(big_mart_data['Item_Visibility'])
```
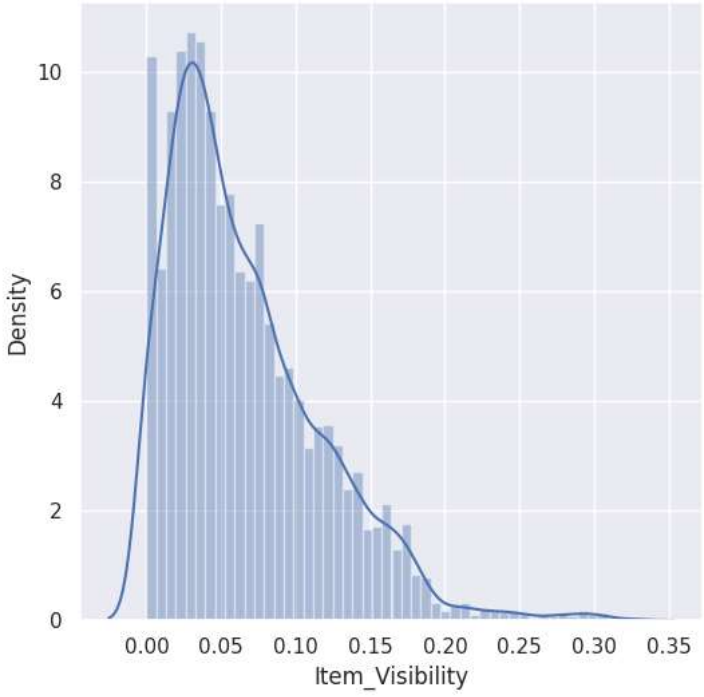
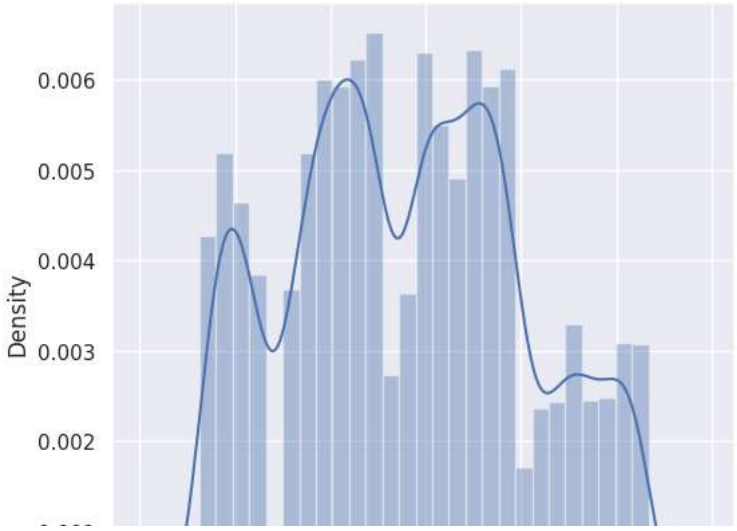



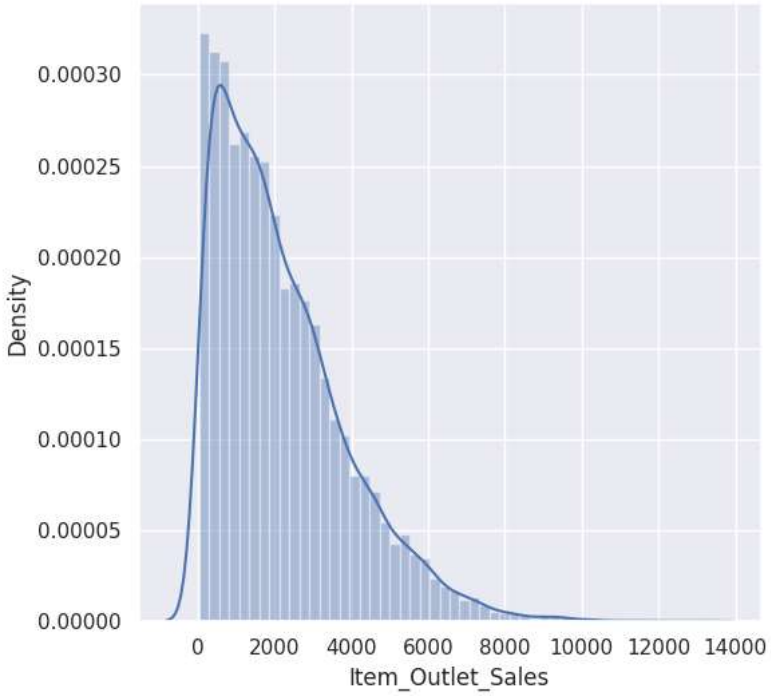

```
# Item MRP distribution
plt.figure(figsize=(6,6))
sns.distplot(big_mart_data['Item_MRP'])
plt.show()
```

```
<ipython-input-18-0b69bf4930c1>:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(big_mart_data['Item_MRP'])
```



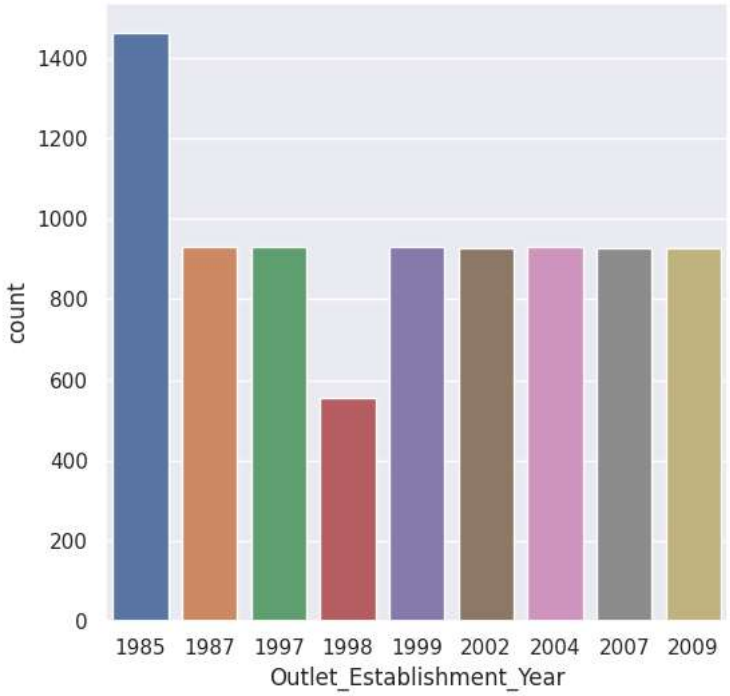

```
# Item_Outlet_Sales distribution
plt.figure(figsize=(6,6))
sns.distplot(big_mart_data['Item_Outlet_Sales'])
plt.show()
```

```
<ipython-input-19-dedd64409ff7>:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(big_mart_data['Item_Outlet_Sales'])
```



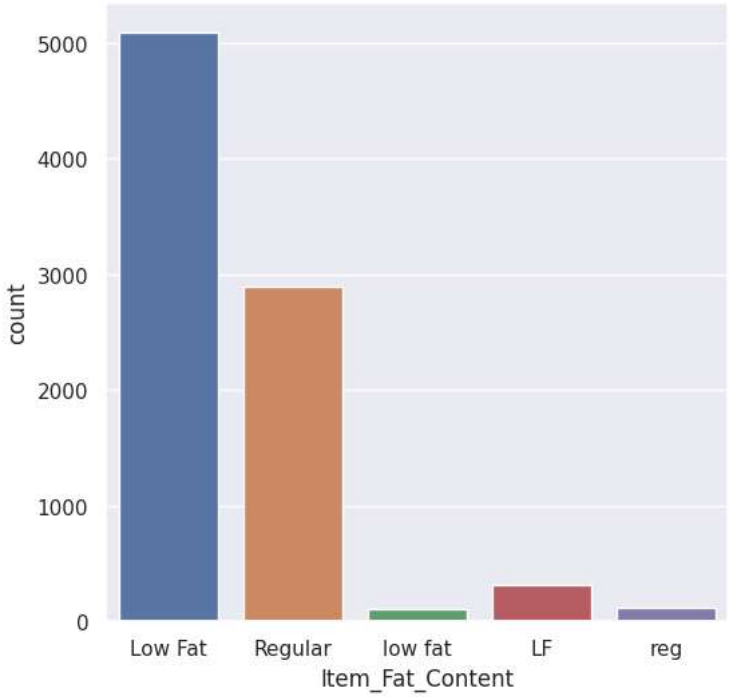

```
# Outlet_Establishment_Year column
```

```
# Outlet_Establishment_Year column
plt.figure(figsize=(6,6))
sns.countplot(x='Outlet_Establishment_Year', data=big_mart_data)
plt.show()
```

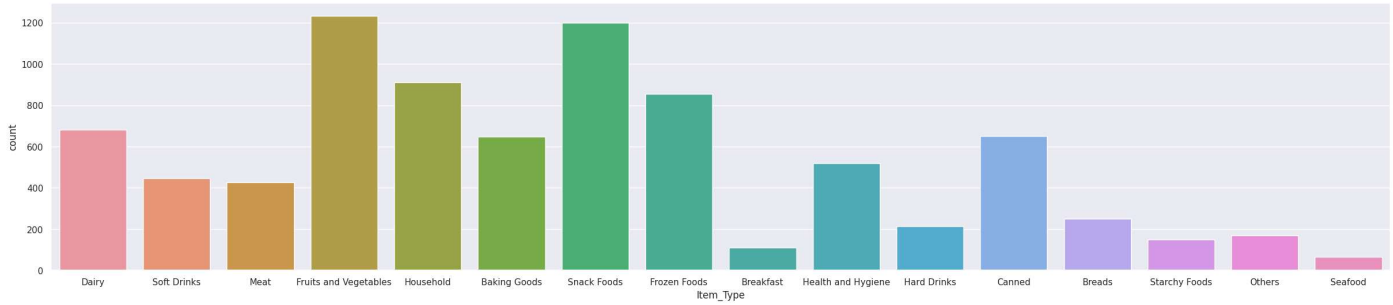


Categorical Features

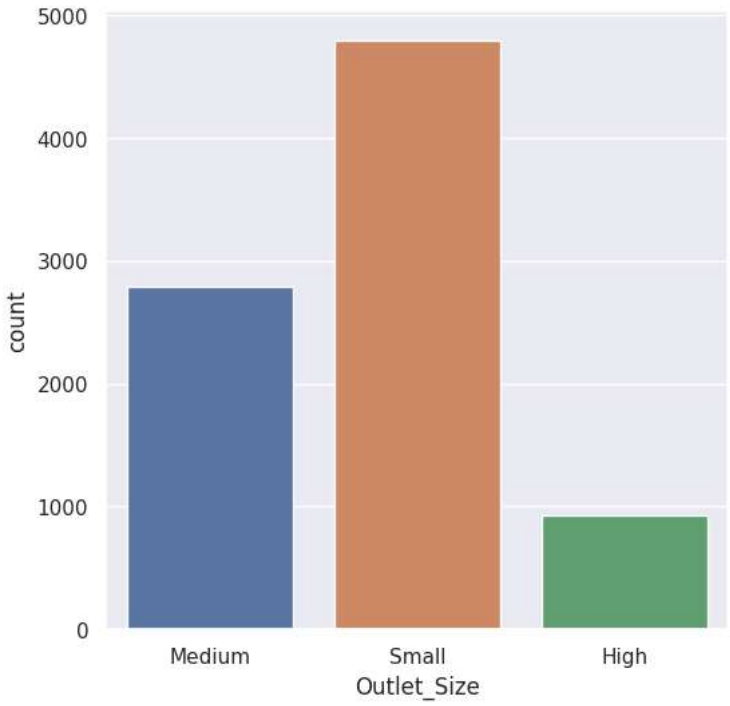
```
# Item_Fat_Content column
plt.figure(figsize=(6,6))
sns.countplot(x='Item_Fat_Content', data=big_mart_data)
plt.show()
```




```
# Item_Type column
plt.figure(figsize=(30,6))
sns.countplot(x='Item_Type', data=big_mart_data)
plt.show()
```




```
# Outlet_Size column
plt.figure(figsize=(6,6))
sns.countplot(x='Outlet_Size', data=big_mart_data)
plt.show()
```



Data Pre-Processing

```
big_mart_data.head()
```

1 to 5 of 5 entries Filter

index	Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Establishment_Year	Outlet_Size	Outlet_I
0	FDA15	9.3	Low Fat	0.016047301	Dairy	249.8092	OUT049	1999	Medium	Tier 1
1	DRC01	5.92	Regular	0.019278216	Soft Drinks	48.2692	OUT018	2009	Medium	Tier 3
2	FDN15	17.5	Low Fat	0.016760075	Meat	141.618	OUT049	1999	Medium	Tier 1
3	FDX07	19.2	Regular	0.0	Fruits and Vegetables	182.095	OUT010	1998	Small	Tier 3
4	NCD19	8.93	Low Fat	0.0	Household	53.8614	OUT013	1987	High	Tier 3

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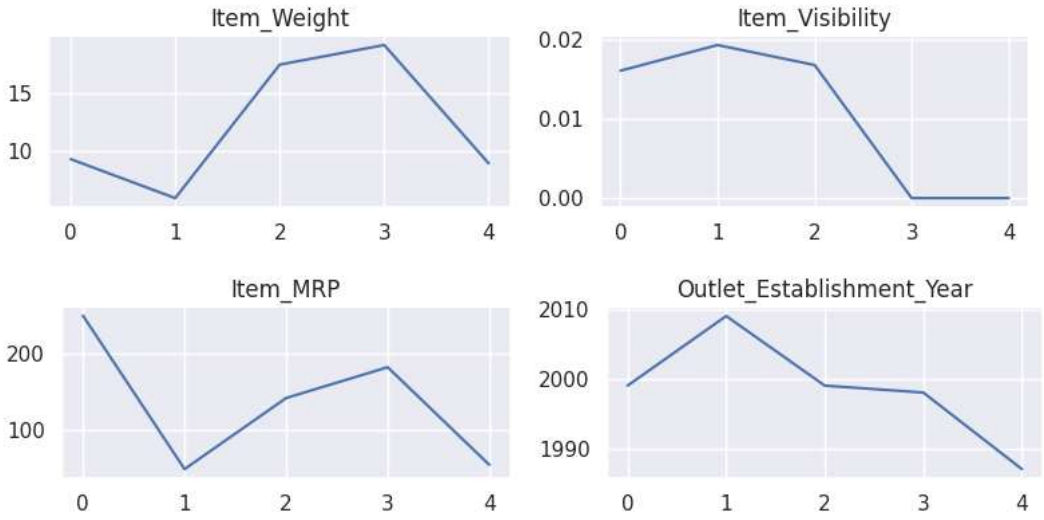
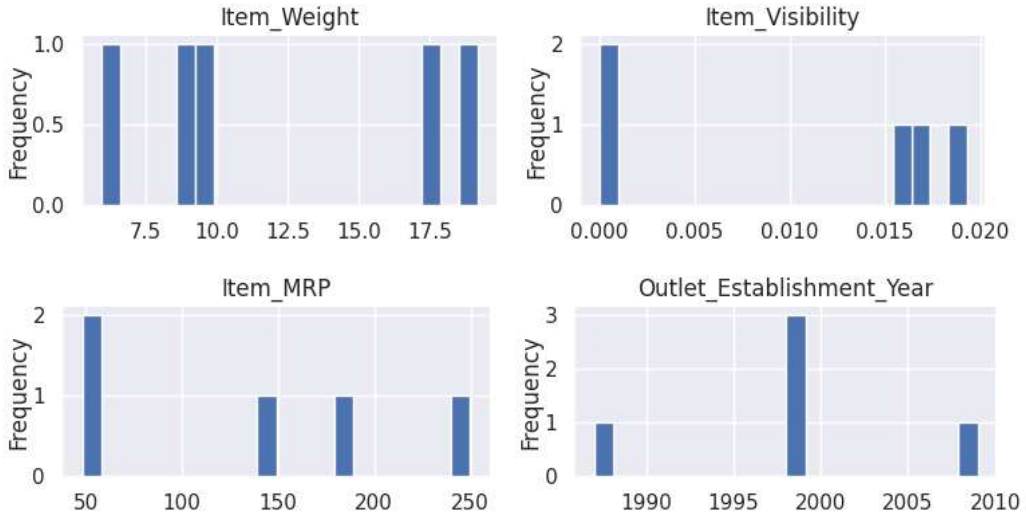
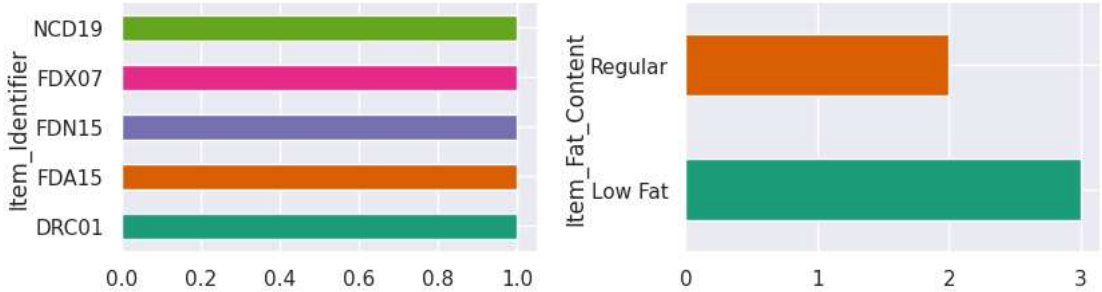
Values

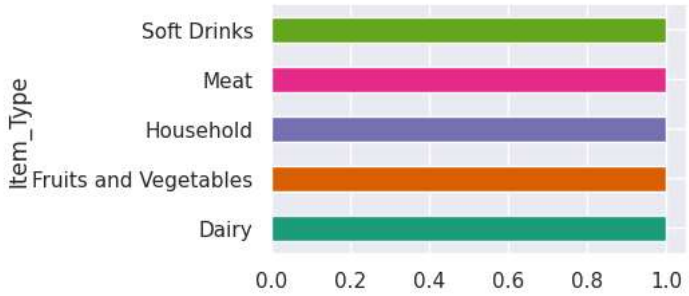


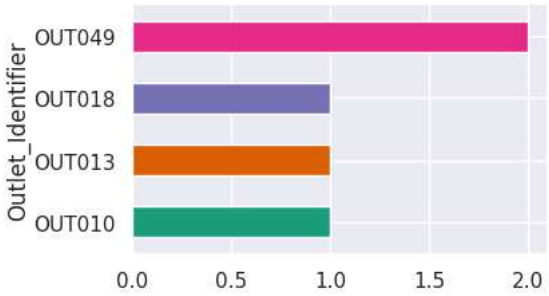
Distributions



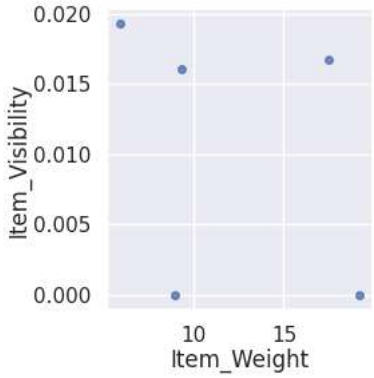
Categorical distributions

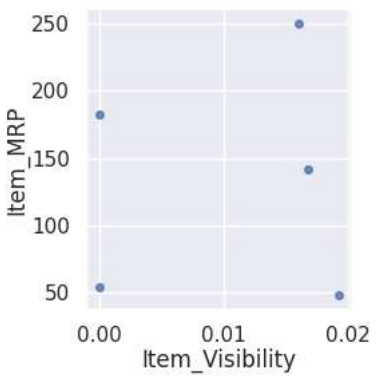


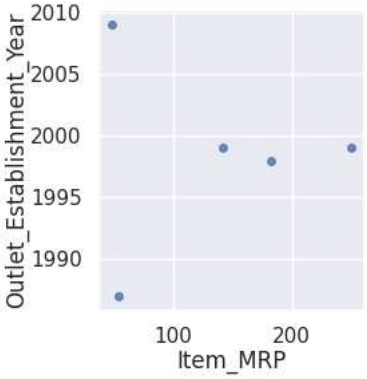


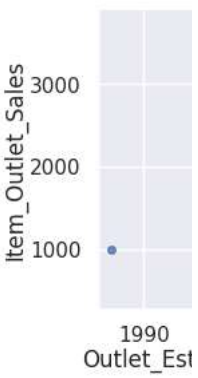


2-d distributions

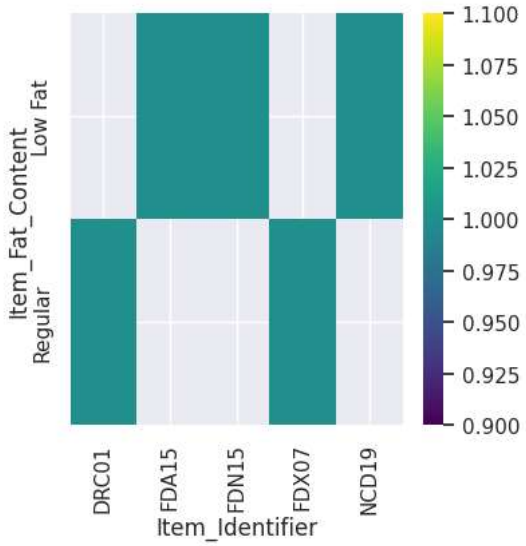


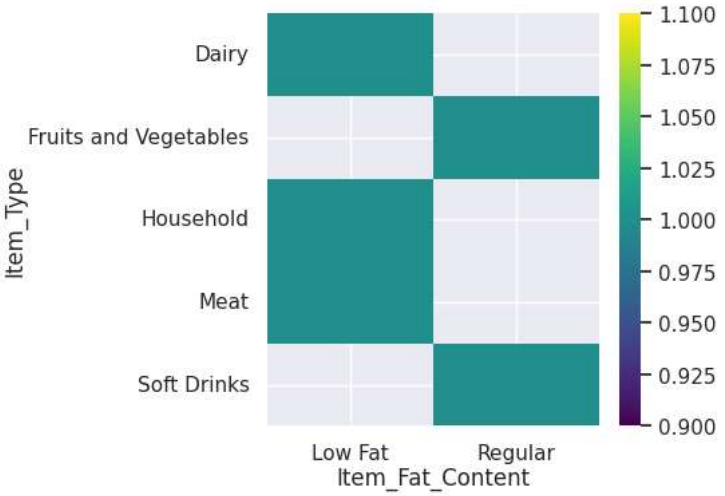


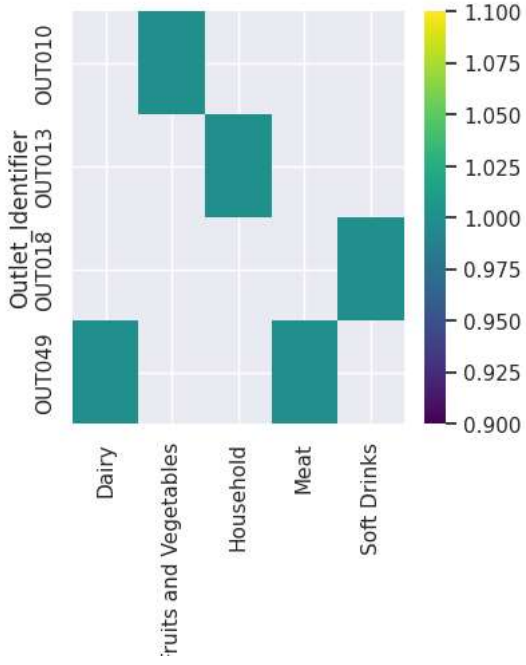


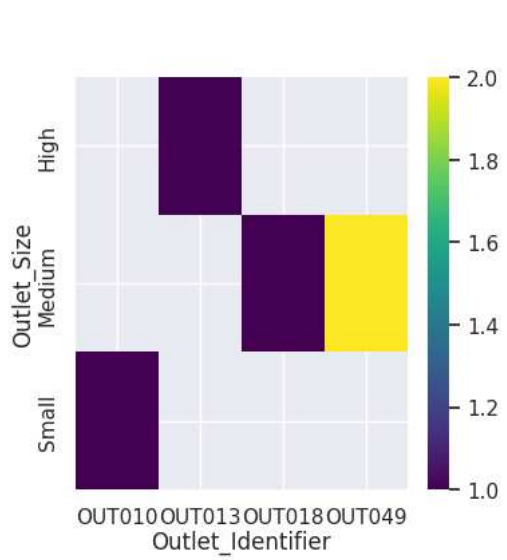


2-d categorical distributions

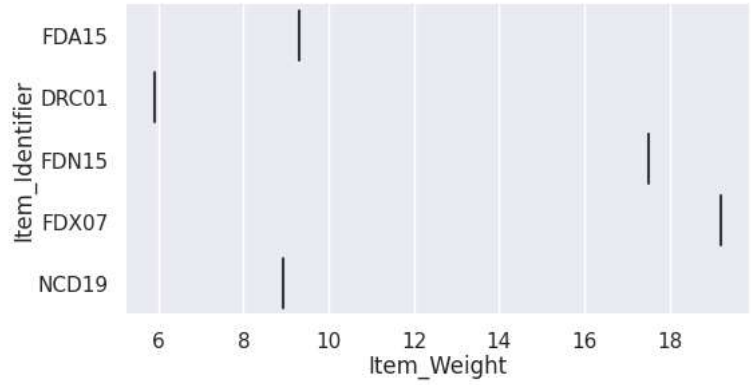


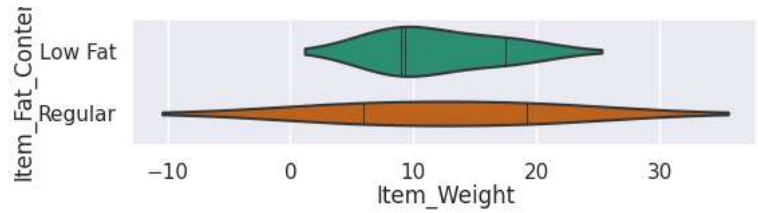


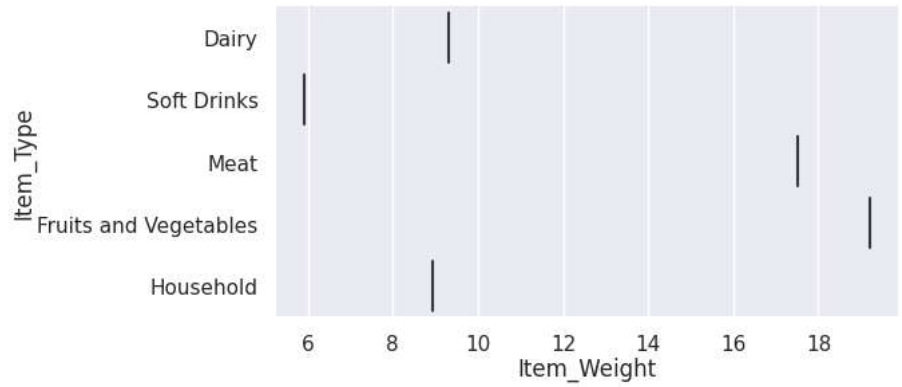


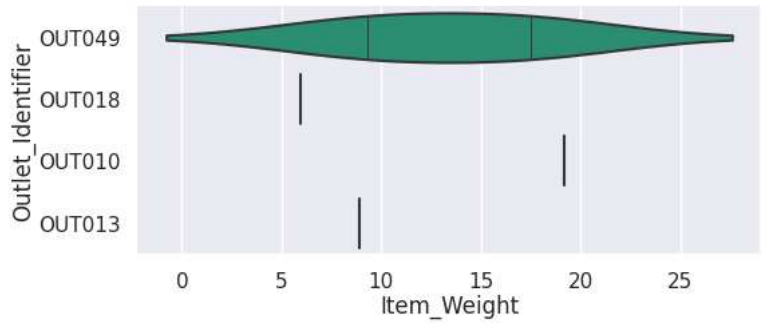


Faceted distributions

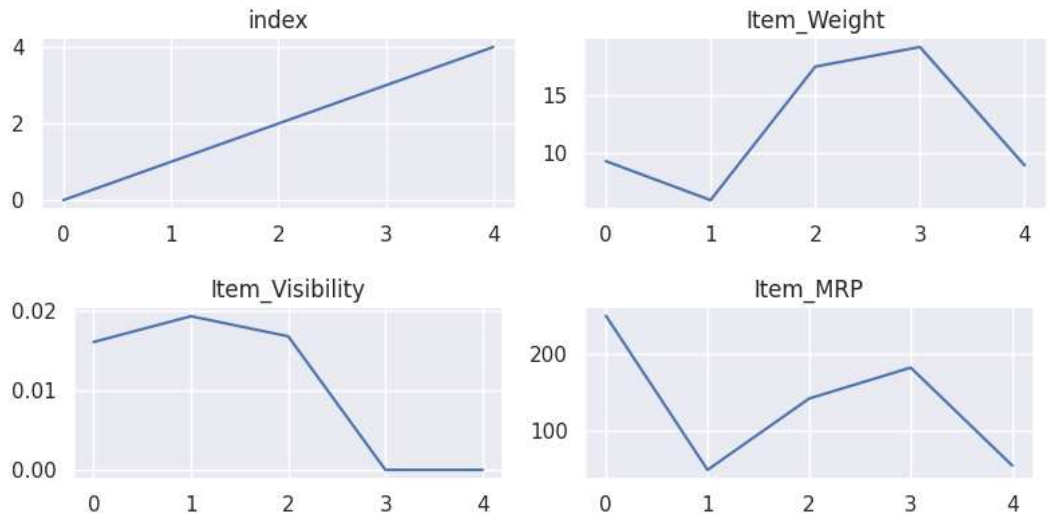




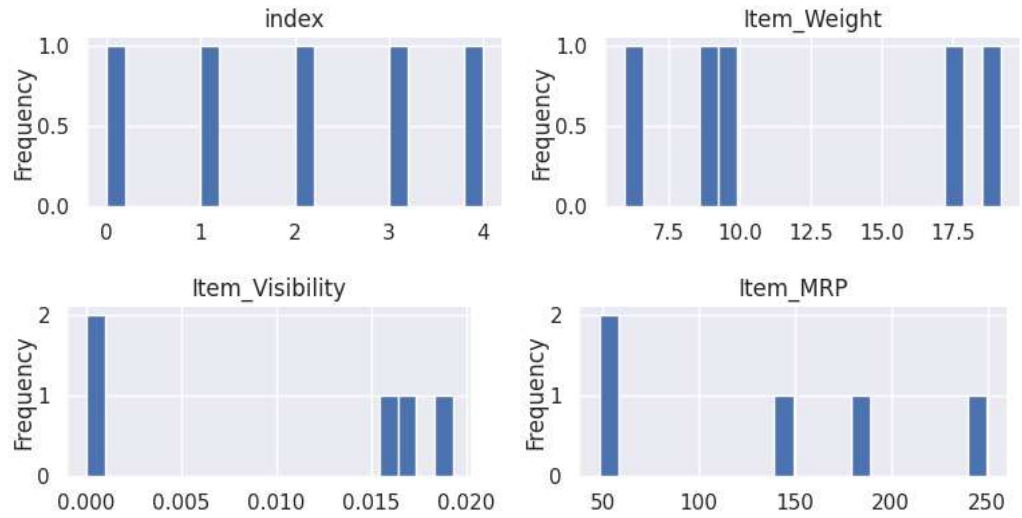




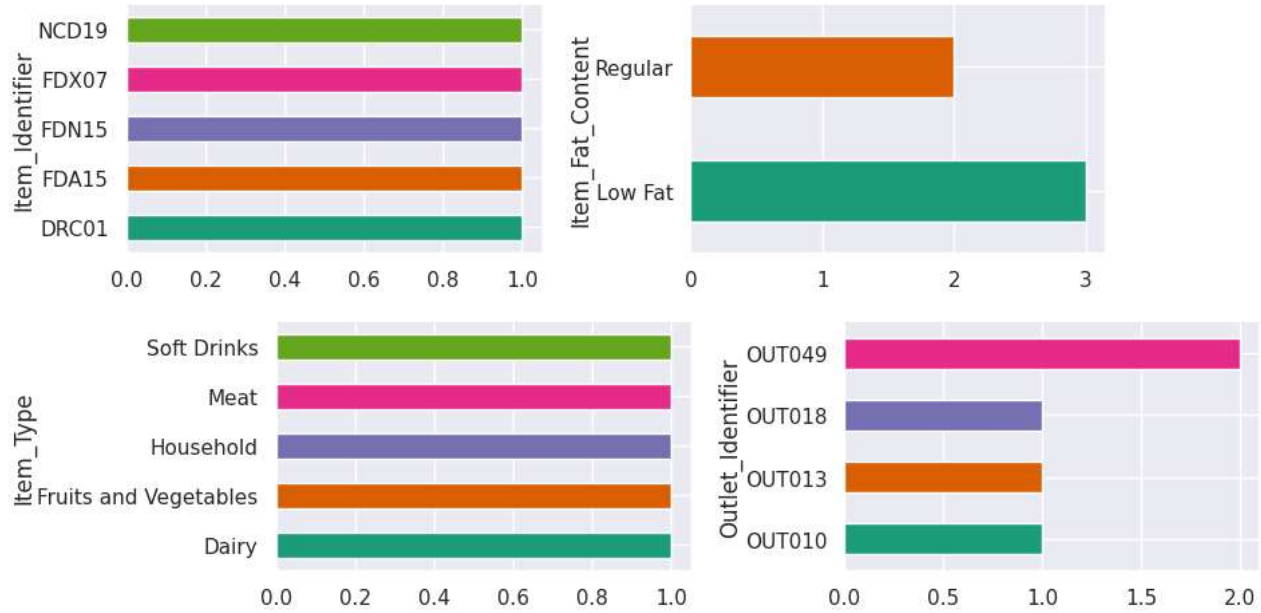
Values



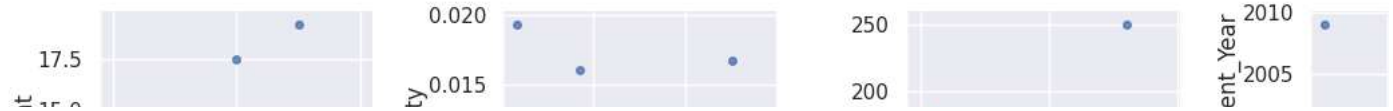
Distributions

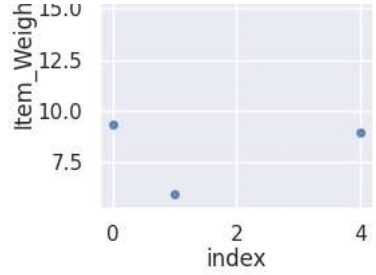


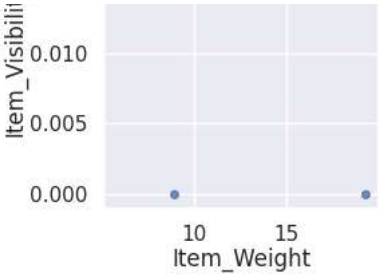
Categorical distributions

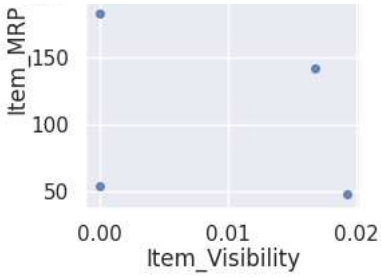


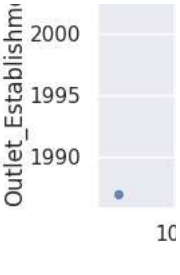
2-d distributions



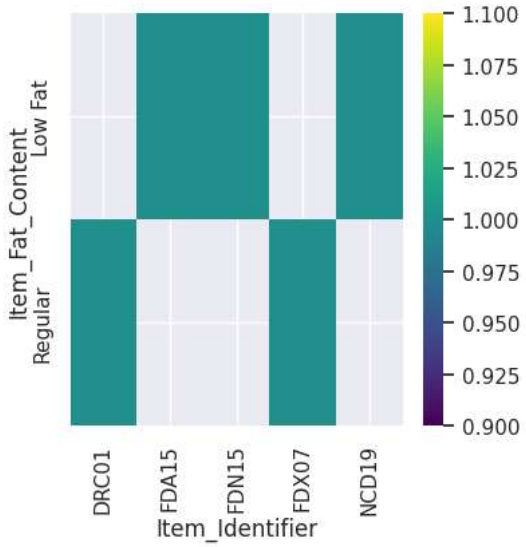


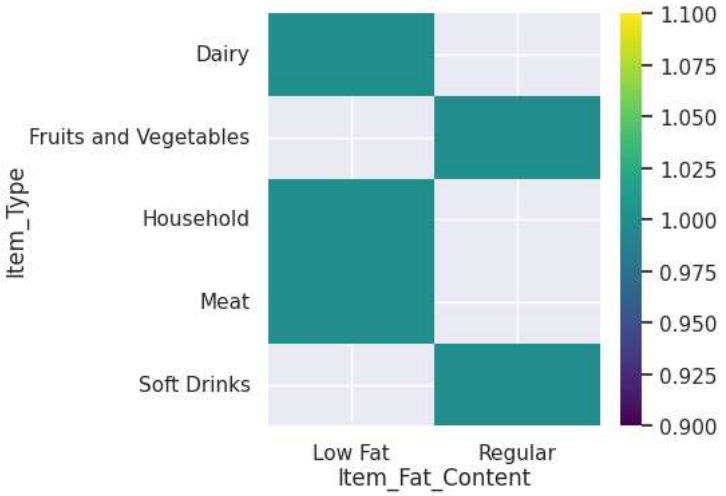


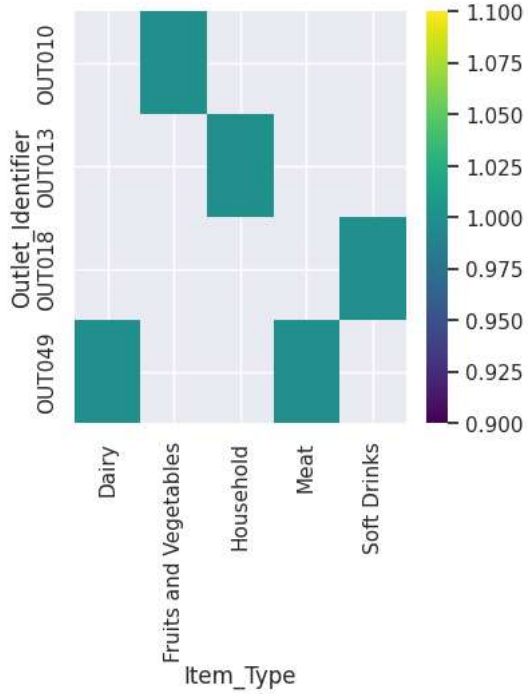


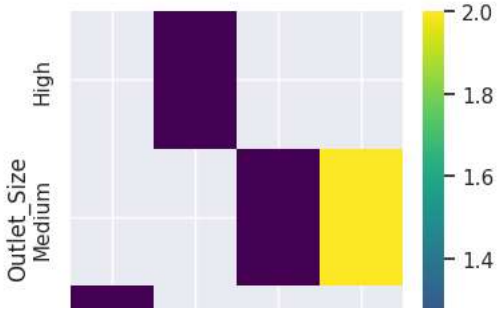


2-d categorical distributions










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

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

EDA15

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

DBC01

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

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

Label Encoding

```
encoder = LabelEncoder()


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


big_mart_data.head()
```

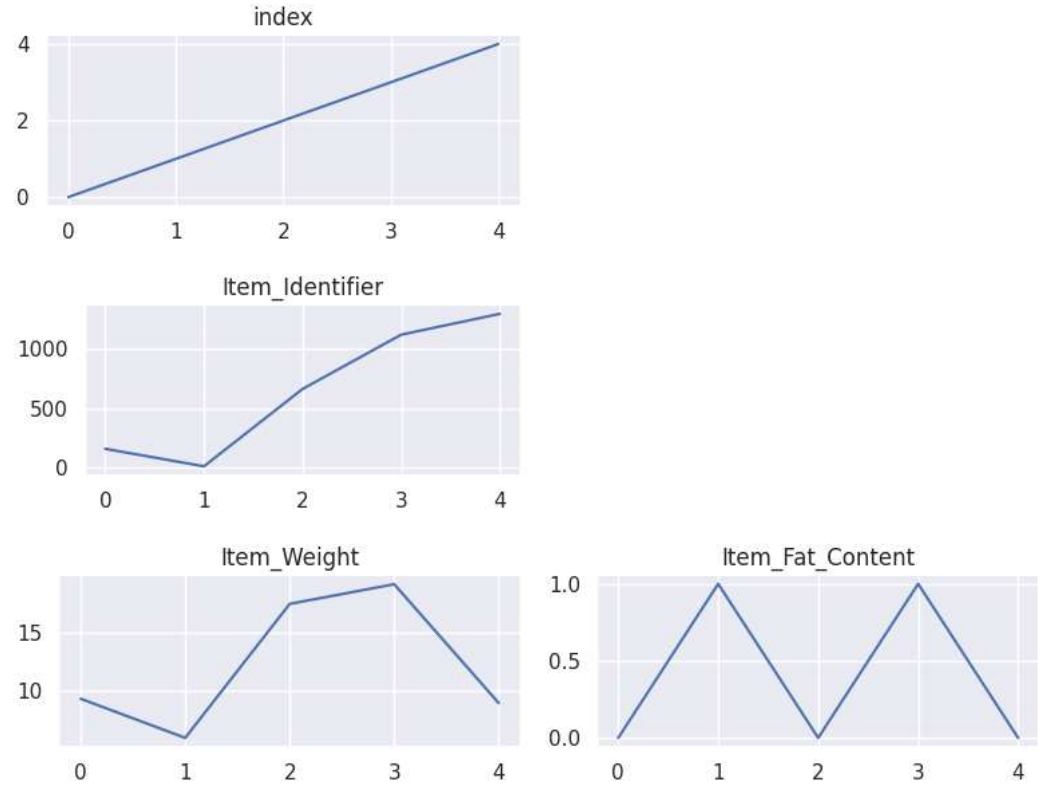
1 to 5 of 5 entries Filter

index	Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Es
0	156	9.3	0	0.016047301	4	249.8092	9	
1	8	5.92	1	0.019278216	14	48.2692	3	
2	662	17.5	0	0.016760075	10	141.618	9	
3	1121	19.2	1	0.0	6	182.095	0	
4	1297	8.93	0	0.0	9	53.8614	1	

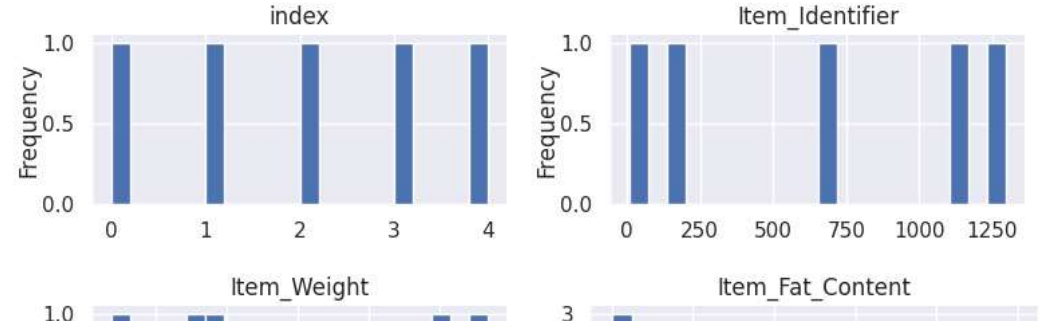
Show 25 per page

Like what you see? Visit the data table notebook to learn more about interactive tables.

Values



Distributions



Splitting features and Target

```
X = big_mart_data.drop(columns='Item_Outlet_Sales', axis=1)
Y = big_mart_data['Item_Outlet_Sales']
```

```
print(X)
```

```
      Item_Identifier  Item_Weight  Item_Fat_Content  Item_Visibility  \
0                 156        9.300                 0         0.016047
1                   8        5.920                 1         0.019278
2                 662       17.500                 0         0.016760
3                1121       19.200                 1         0.000000
4                1297        8.930                 0         0.000000
...               ...          ...               ...              ...
```

```
8518              370        6.865                0         0.056783
8519              897        8.380                1         0.046982
8520             1357       10.600                0         0.035186
8521              681        7.210                1         0.145221
8522               50       14.800                0         0.044878

      Item_Type  Item_MRP  Outlet_Identifier  Outlet_Establishment_Year  \
0             4  249.8092                  9                       1999
1            14   48.2692                  3                       2009
2            10  141.6180                  9                       1999
3             6  182.0950                  0                       1998
4             9   53.8614                  1                       1987
...         ...       ...                ...                        ...
8518         13  214.5218                  1                       1987
8519          0  108.1570                  7                       2002
8520          8   85.1224                  6                       2004
8521         13  103.1332                  3                       2009
8522         14   75.4670                  8                       1997

      Outlet_Size  Outlet_Location_Type  Outlet_Type
0               1                     0            1
1               1                     2            2
2               1                     0            1
3               2                     2            0
4               0                     2            1
...           ...                   ...          ...
8518            0                     2            1
8519            2                     1            1
8520            2                     1            1
8521            1                     2            2
8522            2                     0            1

[8523 rows x 11 columns]
```

```
print(Y)
```

```
0       3735.1380
1        443.4228
2       2097.2700
3        732.3800
4        994.7052
          ...
8518    2778.3834
8519     549.2850
8520    1193.1136
8521    1845.5976
8522     765.6700
Name: Item_Outlet_Sales, Length: 8523, dtype: float64
```

Splitting the data into Training data & Testing Data

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_state=2)
```

```
print(X.shape, X_train.shape, X_test.shape)
```

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

Machine Learning Model Training

XGBoost Regressor

```
regressor = XGBRegressor()
```

```
regressor.fit(X_train, Y_train)
```

```
XGBRegressor
```

Evaluation

```
colsample_bytree=None, early_stopping_rounds=None,
```

```
# prediction on training data
training_data_prediction = regressor.predict(X_train)
```

```
max_cat_threshold=None, max_cat_to_onehot=None,
```

```
# R squared Value
r2_train = metrics.r2_score(Y_train, training_data_prediction)
print('R Squared value = ', r2_train)
```

```
R Squared value =  0.8639680373364909
```

```
# prediction on test data
test_data_prediction = regressor.predict(X_test)
# R squared Value
r2_test = metrics.r2_score(Y_test, test_data_prediction)
print('R Squared value = ', r2_test)
```

```
R Squared value =  0.5233136709735687
```