In [158]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [128]:
```
df = pd.read_csv('train.csv')
```

In [129]:
```
df
```

Out[129]:

	Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outle
0	FDA15	9.300	Low Fat	0.016047	Dairy	249.8092	
1	DRC01	5.920	Regular	0.019278	Soft Drinks	48.2692	
2	FDN15	17.500	Low Fat	0.016760	Meat	141.6180	
3	FDX07	19.200	Regular	0.000000	Fruits and Vegetables	182.0950	
4	NCD19	8.930	Low Fat	0.000000	Household	53.8614	
...	...	...	...	...	...	...	
8518	FDF22	6.865	Low Fat	0.056783	Snack Foods	214.5218	
8519	FDS36	8.380	Regular	0.046982	Baking Goods	108.1570	
8520	NCJ29	10.600	Low Fat	0.035186	Health and Hygiene	85.1224	
8521	FDN46	7.210	Regular	0.145221	Snack Foods	103.1332	
8522	DRG01	14.800	Low Fat	0.044878	Soft Drinks	75.4670	

8523 rows × 12 columns

In [130]:
```
df.shape
```

Out[130]:
```
(8523, 12)
```

In [131]:
```
df = df.drop('Item_Identifier',axis=1)
df
```

Out[131]:

	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Out
0	9.300	Low Fat	0.016047	Dairy	249.8092	OUT049	
1	5.920	Regular	0.019278	Soft Drinks	48.2692	OUT018	
2	17.500	Low Fat	0.016760	Meat	141.6180	OUT049	
3	19.200	Regular	0.000000	Fruits and Vegetables	182.0950	OUT010	
4	8.930	Low Fat	0.000000	Household	53.8614	OUT013	
...	...	...	...	...	...	...	
8518	6.865	Low Fat	0.056783	Snack Foods	214.5218	OUT013	
8519	8.380	Regular	0.046982	Baking Goods	108.1570	OUT045	
8520	10.600	Low Fat	0.035186	Health and Hygiene	85.1224	OUT035	
8521	7.210	Regular	0.145221	Snack Foods	103.1332	OUT018	
8522	14.800	Low Fat	0.044878	Soft Drinks	75.4670	OUT046	

8523 rows × 11 columns

In [132]:
```
df['Item_Fat_Content'].unique()
```

Out[132]:
```
array(['Low Fat', 'Regular', 'low fat', 'LF', 'reg'], dtype=object)
```

In [133]:
```
df['Item_Fat_Content']  = df['Item_Fat_Content'].map({'Low Fat':0, 'Regular':1
, 'low fat':0, 'LF':0, 'reg':1})
```

In [134]:

```
df
```

Out[134]:

	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Out
0	9.300	0	0.016047	Dairy	249.8092	OUT049	
1	5.920	1	0.019278	Soft Drinks	48.2692	OUT018	
2	17.500	0	0.016760	Meat	141.6180	OUT049	
3	19.200	1	0.000000	Fruits and Vegetables	182.0950	OUT010	
4	8.930	0	0.000000	Household	53.8614	OUT013	
...	...	...	...	...	...	...	
8518	6.865	0	0.056783	Snack Foods	214.5218	OUT013	
8519	8.380	1	0.046982	Baking Goods	108.1570	OUT045	
8520	10.600	0	0.035186	Health and Hygiene	85.1224	OUT035	
8521	7.210	1	0.145221	Snack Foods	103.1332	OUT018	
8522	14.800	0	0.044878	Soft Drinks	75.4670	OUT046	

8523 rows × 11 columns

In [135]:

```
df['Item_Type'].unique()
```

Out[135]:

```
array(['Dairy', 'Soft Drinks', 'Meat', 'Fruits and Vegetables',
       'Household', 'Baking Goods', 'Snack Foods', 'Frozen Foods',
       'Breakfast', 'Health and Hygiene', 'Hard Drinks', 'Canned',
       'Breads', 'Starchy Foods', 'Others', 'Seafood'], dtype=object)
```

In [136]:

```
from sklearn import preprocessing
le = preprocessing.LabelEncoder()
le.fit(df['Item_Type'])
df['Item_Type'] = le.transform(df['Item_Type'])
```

In [137]:
```
df
```

Out[137]:

	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Out
0	9.300	0	0.016047	4	249.8092	OUT049	
1	5.920	1	0.019278	14	48.2692	OUT018	
2	17.500	0	0.016760	10	141.6180	OUT049	
3	19.200	1	0.000000	6	182.0950	OUT010	
4	8.930	0	0.000000	9	53.8614	OUT013	
...	...	...	...	...	...	...	
8518	6.865	0	0.056783	13	214.5218	OUT013	
8519	8.380	1	0.046982	0	108.1570	OUT045	
8520	10.600	0	0.035186	8	85.1224	OUT035	
8521	7.210	1	0.145221	13	103.1332	OUT018	
8522	14.800	0	0.044878	14	75.4670	OUT046	

8523 rows × 11 columns

In [138]:
```
df = df.drop('Outlet_Identifier',axis=1)
```

In [139]:
```
df
```

Out[139]:

	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Establishment_
0	9.300	0	0.016047	4	249.8092	
1	5.920	1	0.019278	14	48.2692	
2	17.500	0	0.016760	10	141.6180	
3	19.200	1	0.000000	6	182.0950	
4	8.930	0	0.000000	9	53.8614	
...	...	...	...	...	...	
8518	6.865	0	0.056783	13	214.5218	
8519	8.380	1	0.046982	0	108.1570	
8520	10.600	0	0.035186	8	85.1224	
8521	7.210	1	0.145221	13	103.1332	
8522	14.800	0	0.044878	14	75.4670	

8523 rows × 10 columns

In [140]:
```
df['Outlet_Location_Type'].unique()
```

Out[140]:
```
array(['Tier 1', 'Tier 3', 'Tier 2'], dtype=object)
```

In [141]:
```
df['Outlet_Location_Type'] = df['Outlet_Location_Type'].map({'Tier 1':1, 'Tier 
3':3, 'Tier 2':2})
```

In [142]:

```
df
```

Out[142]:

	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Establishment_
0	9.300	0	0.016047	4	249.8092	
1	5.920	1	0.019278	14	48.2692	
2	17.500	0	0.016760	10	141.6180	
3	19.200	1	0.000000	6	182.0950	
4	8.930	0	0.000000	9	53.8614	
...	...	...	...	...	...	
8518	6.865	0	0.056783	13	214.5218	
8519	8.380	1	0.046982	0	108.1570	
8520	10.600	0	0.035186	8	85.1224	
8521	7.210	1	0.145221	13	103.1332	
8522	14.800	0	0.044878	14	75.4670	

8523 rows × 10 columns

In [143]:

```
df.drop('Outlet_Type',axis=1,inplace=True)
```

In [144]:
```
df
```

Out[144]:

	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Establishment_
0	9.300	0	0.016047	4	249.8092	
1	5.920	1	0.019278	14	48.2692	
2	17.500	0	0.016760	10	141.6180	
3	19.200	1	0.000000	6	182.0950	
4	8.930	0	0.000000	9	53.8614	
...	...	...	...	...	...	
8518	6.865	0	0.056783	13	214.5218	
8519	8.380	1	0.046982	0	108.1570	
8520	10.600	0	0.035186	8	85.1224	
8521	7.210	1	0.145221	13	103.1332	
8522	14.800	0	0.044878	14	75.4670	

8523 rows × 9 columns

In [147]:
```
df.isnull().any()
```

Out[147]:
```
Item_Weight                   True
Item_Fat_Content             False
Item_Visibility              False
Item_Type                    False
Item_MRP                     False
Outlet_Establishment_Year    False
Outlet_Size                   True
Outlet_Location_Type         False
Item_Outlet_Sales            False
dtype: bool
```

In [149]:
```
df = df.drop('Outlet_Size',axis=1)
```

In [150]:
```
df.isnull().any()
```

Out[150]:
```
Item_Weight                   True
Item_Fat_Content             False
Item_Visibility              False
Item_Type                    False
Item_MRP                     False
Outlet_Establishment_Year    False
Outlet_Location_Type         False
Item_Outlet_Sales            False
dtype: bool
```

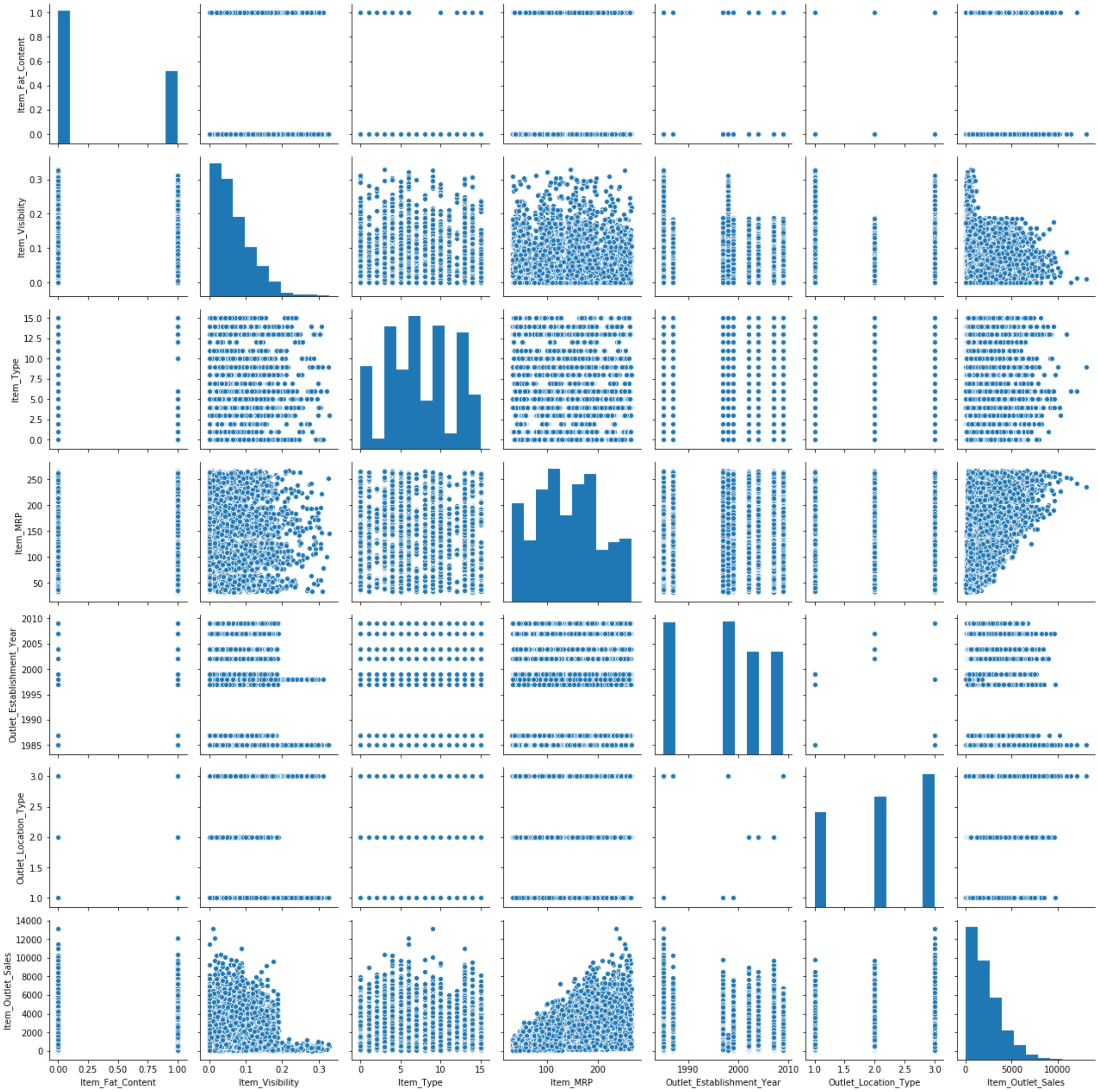
In [151]:
```
df = df.drop('Item_Weight',axis=1)
```

```
In [152]: df.isnull().any()
```

```
Out[152]: Item_Fat_Content             False
          Item_Visibility              False
          Item_Type                    False
          Item_MRP                     False
          Outlet_Establishment_Year    False
          Outlet_Location_Type         False
          Item_Outlet_Sales            False
          dtype: bool
```

```
In [163]: sns.pairplot(data=df)
```

```
Out[163]: <seaborn.axisgrid.PairGrid at 0x20f6341fa88>
```



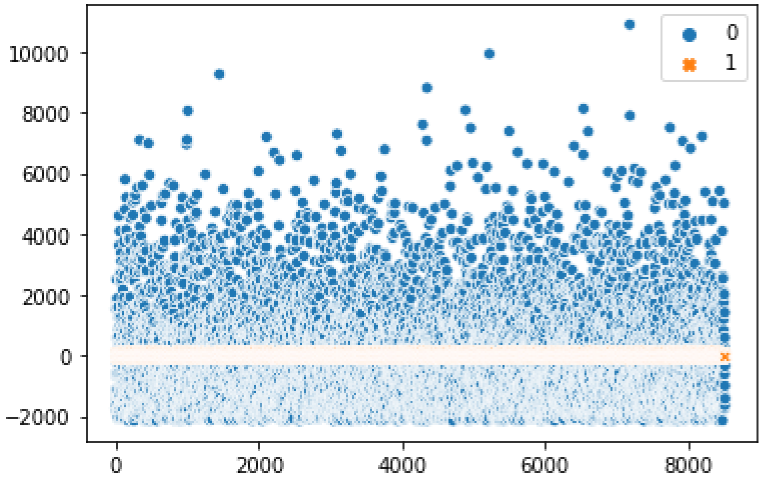
```
In [153]: from sklearn.decomposition import PCA
          pca = PCA(n_components=2)
          pca.fit(df)

Out[153]: PCA(copy=True, iterated_power='auto', n_components=2, random_state=None,
              svd_solver='auto', tol=0.0, whiten=False)
```

```
In [155]: pca_df = pca.transform(df)
```

```
In [157]: pca_df.shape

Out[157]: (8523, 2)
```

```
In [161]: pca_df

Out[161]: array([[ 1555.77017575,    76.5888815 ],
                 [-1739.41694562,   -56.5950726 ],
                 [  -83.98811695,     2.38166007],
                 ...,
                 [ -989.12246954,   -35.33412742],
                 [ -336.40629928,   -30.8060416 ],
                 [-1416.67246088,   -36.16077815]])
```

```
In [165]: sns.scatterplot(data=pca_df)

Out[165]: <matplotlib.axes._subplots.AxesSubplot at 0x20f668c2908>
```


10000
8000
6000
4000
2000
0
−2000
0
2000
4000
6000
8000
● 0
✖ 1