In [2]:
```
import numpy as np
import seaborn as sns
import pandas as pd
import matplotlib.pyplot as plt
```

In [3]:
```
import datetime as dt
```

In [4]:
```
df=pd.read_csv(r"C:\Users\SIYA\Downloads\argoid.csv")
```

In [5]:
```
df
```

Out[5]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
0	278166	6355745	Sat Feb 02 12:50:00 IST 2019	465549	FAMILY ALBUM WHITE PICTURE FRAME	6	11.73	United Kingdom
1	337701	6283376	Wed Dec 26 09:06:00 IST 2018	482370	LONDON BUS COFFEE MUG	3	3.52	United Kingdom
2	267099	6385599	Fri Feb 15 09:45:00 IST 2019	490728	SET 12 COLOUR PENCILS DOLLY GIRL	72	0.90	France
3	380478	6044973	Fri Jun 22 07:14:00 IST 2018	459186	UNION JACK FLAG LUGGAGE TAG	3	1.73	United Kingdom
4	-1	6143225	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom
...	...	...	...	...	...	...	...	...
1083813	313131	6040298	Mon Jun 18 09:18:00 IST 2018	437976	DENIM PATCH PURSE PINK BUTTERFLY	30	2.28	EIRE
1083814	295743	6387117	Sat Feb 16 09:14:00 IST 2019	484113	RECYCLED ACAPULCO MAT PINK	6	11.39	United Kingdom
1083815	-1	6361817	Tue Feb 05 05:26:00 IST 2019	497595	DOILY THANK YOU CARD	15	1.15	United Kingdom
1083816	324765	5945500	Fri Mar 23 06:26:00 IST 2018	470883	REGENCY CAKESTAND 3 TIER	48	15.12	United Kingdom
1083817	351645	6118145	Tue Aug 21 08:21:00 IST 2018	471849	HEART OF WICKER SMALL	9	2.28	United Kingdom

1083818 rows × 8 columns

In [6]:
```
df.head()
```

Out[6]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
0	278166	6355745	Sat Feb 02 12:50:00 IST 2019	465549	FAMILY ALBUM WHITE PICTURE FRAME	6	11.73	United Kingdom
1	337701	6283376	Wed Dec 26 09:06:00 IST 2018	482370	LONDON BUS COFFEE MUG	3	3.52	United Kingdom
2	267099	6385599	Fri Feb 15 09:45:00 IST 2019	490728	SET 12 COLOUR PENCILS DOLLY GIRL	72	0.90	France
3	380478	6044973	Fri Jun 22 07:14:00 IST 2018	459186	UNION JACK FLAG LUGGAGE TAG	3	1.73	United Kingdom
4	-1	6143225	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom

In [7]:
```
df.shape
```

Out[7]:
```
(1083818, 8)
```

In [8]:
```
df['TransactionId'].value_counts()
```

Out[8]:
```
6309435    2228
6393409    1498
6396412    1462
6388019    1442
6143225    1410
           ... 
6044852       2
6118552       2
6006044       2
6105825       2
6060780       2
Name: TransactionId, Length: 25900, dtype: int64
```

```
In [9]: df['UserId'].value_counts()
```

```
Out[9]: -1         270160
         374661     15966
         313131     11806
         296016     10256
         267708      9284
                    ...
         348159         2
         322749         2
         275835         2
         356013         2
         364287         2
        Name: UserId, Length: 4373, dtype: int64
```

```
In [10]: trans_1=df.loc[df['TransactionId']==6143225]
```

```
In [11]: print(trans_1)
```

```
         UserId  TransactionId              TransactionTime  ItemCode  \
4            -1        6143225  Mon Sep 10 11:58:00 IST 2018   1733592
7            -1        6143225  Mon Sep 10 11:58:00 IST 2018    447867
505          -1        6143225  Mon Sep 10 11:58:00 IST 2018    472542
1018         -1        6143225  Mon Sep 10 11:58:00 IST 2018    460614
3822         -1        6143225  Mon Sep 10 11:58:00 IST 2018    475923
...         ...            ...                          ...       ...
1080509      -1        6143225  Mon Sep 10 11:58:00 IST 2018    435267
1080852      -1        6143225  Mon Sep 10 11:58:00 IST 2018    468069
1083197      -1        6143225  Mon Sep 10 11:58:00 IST 2018    456729
1083278      -1        6143225  Mon Sep 10 11:58:00 IST 2018    476637
1083454      -1        6143225  Mon Sep 10 11:58:00 IST 2018    445137

                          ItemDescription  NumberOfItemsPurchased  \
4                      WASHROOM METAL SIGN                       3
7                      SKULLS WRITING SET                      120
505             PICNIC BASKET WICKER SMALL                       3
1018                    SKULL SHOULDER BAG                     129
3822           JUMBO BAG DOLLY GIRL DESIGN                      60
...                                    ...                     ...
1080509             LUNCH BAG  BLACK SKULL.                      6
1080852  HANGING METAL CHICKEN DECORATION                        6
1083197       LARGE RED RETROSPOT WINDMILL                       6
1083278    GREEN REGENCY TEACUP AND SAUCER                      18
1083454      MULTICOLOUR  CONFETTI IN TUBE                      30

         CostPerItem         Country
4               3.40  United Kingdom
7               1.15  United Kingdom
505            14.90  United Kingdom
1018            2.25  United Kingdom
3822            3.40  United Kingdom
...              ...             ...
1080509         5.70  United Kingdom
1080852         1.73  United Kingdom
1083197         5.70  United Kingdom
1083278         8.00  United Kingdom
1083454         1.15  United Kingdom

[1410 rows x 8 columns]
```

```
In [12]: user_1= df.loc[df['UserId']==-1]
```

In [13]:
```
print(user_1)
```

```
         UserId  TransactionId              TransactionTime  ItemCode  \
4            -1        6143225  Mon Sep 10 11:58:00 IST 2018   1733592   
7            -1        6143225  Mon Sep 10 11:58:00 IST 2018    447867   
13           -1        6058140  Mon Jul 02 07:33:00 IST 2018    435225   
17           -1        6288843  Sun Dec 30 12:58:00 IST 2018    489594   
23           -1        6388019  Sat Feb 16 13:24:00 IST 2019    490329   
...         ...            ...                          ...       ...   
1083798      -1        6079524  Sun Jul 22 11:09:00 IST 2018   1787772   
1083801      -1        6212338  Sun Nov 11 06:39:00 IST 2018    446166   
1083804      -1        6272057  Wed Dec 19 11:09:00 IST 2018    458031   
1083810      -1        6106650  Sun Aug 12 11:53:00 IST 2018    446040   
1083815      -1        6361817  Tue Feb 05 05:26:00 IST 2019    497595   

                      ItemDescription  NumberOfItemsPurchased  CostPerItem  \
4                   WASHROOM METAL SIGN                       3         3.40   
7                   SKULLS WRITING SET                      120         1.15   
13             LUNCH BAG RED RETROSPOT                       60         6.85   
17         VINTAGE CHRISTMAS TABLECLOTH                       3        34.45   
23          ROLL WRAP VINTAGE CHRISTMAS                      30         3.40   
...                               ...                     ...          ...   
1083798  CHARLIE + LOLA BISCUITS TINS                         3        11.45   
1083801        RED RETROSPOT BIG BOWL                         3         5.70   
1083804       HANGING HEART WITH BELL                        24         1.15   
1083810            BLUE POLKADOT CUP                          6         2.25   
1083815          DOILY THANK YOU CARD                        15         1.15   

                Country  
4        United Kingdom  
7        United Kingdom  
13       United Kingdom  
17       United Kingdom  
23       United Kingdom  
...                 ...  
1083798  United Kingdom  
1083801  United Kingdom  
1083804  United Kingdom  
1083810  United Kingdom  
1083815  United Kingdom  

[270160 rows x 8 columns]
```

In [14]:
```
user_1
```

Out[14]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
4	-1	6143225	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom
7	-1	6143225	Mon Sep 10 11:58:00 IST 2018	447867	SKULLS WRITING SET	120	1.15	United Kingdom
13	-1	6058140	Mon Jul 02 07:33:00 IST 2018	435225	LUNCH BAG RED RETROSPOT	60	6.85	United Kingdom
17	-1	6288843	Sun Dec 30 12:58:00 IST 2018	489594	VINTAGE CHRISTMAS TABLECLOTH	3	34.45	United Kingdom
23	-1	6388019	Sat Feb 16 13:24:00 IST 2019	490329	ROLL WRAP VINTAGE CHRISTMAS	30	3.40	United Kingdom
...	...	...	...	...	...	...	...	...
1083798	-1	6079524	Sun Jul 22 11:09:00 IST 2018	1787772	CHARLIE + LOLA BISCUITS TINS	3	11.45	United Kingdom
1083801	-1	6212338	Sun Nov 11 06:39:00 IST 2018	446166	RED RETROSPOT BIG BOWL	3	5.70	United Kingdom
1083804	-1	6272057	Wed Dec 19 11:09:00 IST 2018	458031	HANGING HEART WITH BELL	24	1.15	United Kingdom
1083810	-1	6106650	Sun Aug 12 11:53:00 IST 2018	446040	BLUE POLKADOT CUP	6	2.25	United Kingdom
1083815	-1	6361817	Tue Feb 05 05:26:00 IST 2019	497595	DOILY THANK YOU CARD	15	1.15	United Kingdom

270160 rows × 8 columns

In [15]:
```
tran=df.TransactionId.unique()
```

In [16]:
```
tran.shape
```

Out[16]:
```
(25900,)
```

In [17]:
```
df1=df.set_index(['UserId', 'TransactionId'])
```

In [18]:
```
df1
```

Out[18]:

		TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
UserId	**TransactionId**						
278166	**6355745**	Sat Feb 02 12:50:00 IST 2019	465549	FAMILY ALBUM WHITE PICTURE FRAME	6	11.73	United Kingdom
337701	**6283376**	Wed Dec 26 09:06:00 IST 2018	482370	LONDON BUS COFFEE MUG	3	3.52	United Kingdom
267099	**6385599**	Fri Feb 15 09:45:00 IST 2019	490728	SET 12 COLOUR PENCILS DOLLY GIRL	72	0.90	France
380478	**6044973**	Fri Jun 22 07:14:00 IST 2018	459186	UNION JACK FLAG LUGGAGE TAG	3	1.73	United Kingdom
-1	**6143225**	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom
...	**...**	...	...	...	...	...	...
313131	**6040298**	Mon Jun 18 09:18:00 IST 2018	437976	DENIM PATCH PURSE PINK BUTTERFLY	30	2.28	EIRE
295743	**6387117**	Sat Feb 16 09:14:00 IST 2019	484113	RECYCLED ACAPULCO MAT PINK	6	11.39	United Kingdom
-1	**6361817**	Tue Feb 05 05:26:00 IST 2019	497595	DOILY THANK YOU CARD	15	1.15	United Kingdom
324765	**5945500**	Fri Mar 23 06:26:00 IST 2018	470883	REGENCY CAKESTAND 3 TIER	48	15.12	United Kingdom
351645	**6118145**	Tue Aug 21 08:21:00 IST 2018	471849	HEART OF WICKER SMALL	9	2.28	United Kingdom

1083818 rows × 6 columns

In [19]:
```
df1.index
```

Out[19]:
```
MultiIndex([(278166, 6355745),
            (337701, 6283376),
            (267099, 6385599),
            (380478, 6044973),
            (    -1, 6143225),
            (285957, 6307136),
            (345954, 6162981),
            (    -1, 6143225),
            (339822, 6255403),
            (328440, 6387425),
            ...
            (355488, 6160286),
            (321531, 6037493),
            (    -1, 6106650),
            (352191, 5973242),
            (261681, 6153092),
            (313131, 6040298),
            (295743, 6387117),
            (    -1, 6361817),
            (324765, 5945500),
            (351645, 6118145)],
           names=['UserId', 'TransactionId'], length=1083818)
```

In [20]:
```
df2=pd.pivot_table(df, index=['TransactionId','UserId'], aggfunc='count')
```

```
In [21]: df2
```

Out[21]:

		CostPerItem	Country	ItemCode	ItemDescription	NumberOfItemsPurchased	TransactionTime
TransactionId	**UserId**						
5900015	**374850**	14	14	14	14	14	14
5900026	**374850**	4	4	4	4	4	4
5900037	**273987**	24	24	24	24	24	24
5900048	**273987**	8	8	8	8	8	8
5900059	**273987**	2	2	2	2	2	2
...	**...**	...	...	...	...	...	...
6397413	**289317**	4	4	4	4	4	4
6397424	**289317**	4	4	4	4	4	4
6397435	**331884**	42	42	42	42	42	42
6397446	**275373**	8	8	8	8	8	8
6397457	**266280**	30	30	30	30	30	30

25900 rows × 6 columns

```
In [22]: df.UserId.unique().shape
```

```
Out[22]: (4373,)
```

```
In [23]: gk = df.groupby('TransactionId')
```

```
In [24]: gk.first()
```

Out[24]:

	UserId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
TransactionId							
5900015	374850	Mon Feb 12 04:26:00 IST 2018	477792	SET 7 BABUSHKA NESTING BOXES	6	10.56	United Kingdom
5900026	374850	Mon Feb 12 04:28:00 IST 2018	475272	HAND WARMER RED POLKA DOT	18	2.56	United Kingdom
5900037	273987	Mon Feb 12 04:34:00 IST 2018	1011927	DOORMAT NEW ENGLAND	12	10.98	United Kingdom
5900048	273987	Mon Feb 12 04:34:00 IST 2018	481194	BLUE COAT RACK PARIS FASHION	9	6.84	United Kingdom
5900059	273987	Mon Feb 12 04:35:00 IST 2018	456876	BATH BUILDING BLOCK WORD	9	8.22	United Kingdom
...	...	...	...	...	...	...	...
6397413	289317	Wed Feb 20 08:23:00 IST 2019	1785798	6 CHOCOLATE LOVE HEART T-LIGHTS	108	2.56	United Kingdom
6397424	289317	Wed Feb 20 08:25:00 IST 2019	437472	RED FLOCK LOVE HEART PHOTO FRAME	216	1.00	United Kingdom
6397435	331884	Wed Feb 20 08:31:00 IST 2019	470358	MAGNETS PACK OF 4 SWALLOWS	36	0.54	United Kingdom
6397446	275373	Wed Feb 20 08:49:00 IST 2019	463281	LARGE CAKE STAND HANGING STRAWBERY	24	4.08	United Kingdom
6397457	266280	Wed Feb 20 08:50:00 IST 2019	474873	PACK OF 20 SPACEBOY NAPKINS	36	1.18	France

25900 rows × 7 columns

In [25]:
```
gk.get_group(6143225)
```

Out[25]:

	UserId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
4	-1	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom
7	-1	Mon Sep 10 11:58:00 IST 2018	447867	SKULLS WRITING SET	120	1.15	United Kingdom
505	-1	Mon Sep 10 11:58:00 IST 2018	472542	PICNIC BASKET WICKER SMALL	3	14.90	United Kingdom
1018	-1	Mon Sep 10 11:58:00 IST 2018	460614	SKULL SHOULDER BAG	129	2.25	United Kingdom
3822	-1	Mon Sep 10 11:58:00 IST 2018	475923	JUMBO BAG DOLLY GIRL DESIGN	60	3.40	United Kingdom
...	...	...	...	...	...	...	...
1080509	-1	Mon Sep 10 11:58:00 IST 2018	435267	LUNCH BAG BLACK SKULL.	6	5.70	United Kingdom
1080852	-1	Mon Sep 10 11:58:00 IST 2018	468069	HANGING METAL CHICKEN DECORATION	6	1.73	United Kingdom
1083197	-1	Mon Sep 10 11:58:00 IST 2018	456729	LARGE RED RETROSPOT WINDMILL	6	5.70	United Kingdom
1083278	-1	Mon Sep 10 11:58:00 IST 2018	476637	GREEN REGENCY TEACUP AND SAUCER	18	8.00	United Kingdom
1083454	-1	Mon Sep 10 11:58:00 IST 2018	445137	MULTICOLOUR CONFETTI IN TUBE	30	1.15	United Kingdom

1410 rows × 7 columns

In [26]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1083818 entries, 0 to 1083817
Data columns (total 8 columns):
 #   Column                  Non-Null Count    Dtype  
---  ------                  --------------    -----  
 0   UserId                  1083818 non-null  int64  
 1   TransactionId           1083818 non-null  int64  
 2   TransactionTime         1083818 non-null  object 
 3   ItemCode                1083818 non-null  int64  
 4   ItemDescription         1080910 non-null  object 
 5   NumberOfItemsPurchased  1083818 non-null  int64  
 6   CostPerItem             1083818 non-null  float64
 7   Country                 1083818 non-null  object 
dtypes: float64(1), int64(4), object(3)
memory usage: 66.2+ MB
```

In [27]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1083818 entries, 0 to 1083817
Data columns (total 8 columns):
 #   Column                  Non-Null Count    Dtype  
---  ------                  --------------    -----  
 0   UserId                  1083818 non-null  int64  
 1   TransactionId           1083818 non-null  int64  
 2   TransactionTime         1083818 non-null  object 
 3   ItemCode                1083818 non-null  int64  
 4   ItemDescription         1080910 non-null  object 
 5   NumberOfItemsPurchased  1083818 non-null  int64  
 6   CostPerItem             1083818 non-null  float64
 7   Country                 1083818 non-null  object 
dtypes: float64(1), int64(4), object(3)
memory usage: 66.2+ MB
```

In [28]:
```
df.describe()
```

Out[28]:

	UserId	TransactionId	ItemCode	NumberOfItemsPurchased	CostPerItem
count	1.083818e+06	1.083818e+06	1.083818e+06	1.083818e+06	1.083818e+06
mean	2.410162e+05	6.159417e+06	6.582687e+05	2.865675e+01	9.498798e+00
std	1.423364e+05	1.476341e+05	4.526314e+05	6.542432e+02	2.308139e+03
min	-1.000000e+00	5.900015e+06	-1.000000e+00	-2.429850e+05	-1.526564e+04
25%	2.593920e+05	6.026856e+06	4.609080e+05	3.000000e+00	1.730000e+00
50%	3.020220e+05	6.166611e+06	4.752930e+05	9.000000e+00	2.880000e+00
75%	3.413550e+05	6.289569e+06	4.889430e+05	3.000000e+01	5.700000e+00
max	3.840270e+05	6.397457e+06	1.894494e+06	2.429850e+05	1.696285e+06

In [29]:
```
df.describe(include=np.object)
```

Out[29]:

	TransactionTime	ItemDescription	Country
count	1083818	1080910	1083818
unique	23260	4223	38
top	Sat Jan 12 10:41:00 IST 2019	WHITE HANGING HEART T-LIGHT HOLDER	United Kingdom
freq	2228	4738	990956

In [30]:
```
trans_id=df[df['UserId']==-1]['TransactionId']
```

In [31]:
```
trans_id
```

Out[31]:
```
4          6143225
7          6143225
13         6058140
17         6288843
23         6388019
            ...   
1083798    6079524
1083801    6212338
1083804    6272057
1083810    6106650
1083815    6361817
Name: TransactionId, Length: 270160, dtype: int64
```

In [32]:
```
trans_id=df[df['UserId']==-1]['TransactionId'].unique()
```

In [33]:
```
trans_id.shape
```

Out[33]:
```
(3710,)
```

In [34]:
```
count=11
for i in trans_id:
    df.loc[df.TransactionId==i,'UserId']=count
    count+=1
```

In [35]:
```
df
```

Out[35]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
0	278166	6355745	Sat Feb 02 12:50:00 IST 2019	465549	FAMILY ALBUM WHITE PICTURE FRAME	6	11.73	United Kingdom
1	337701	6283376	Wed Dec 26 09:06:00 IST 2018	482370	LONDON BUS COFFEE MUG	3	3.52	United Kingdom
2	267099	6385599	Fri Feb 15 09:45:00 IST 2019	490728	SET 12 COLOUR PENCILS DOLLY GIRL	72	0.90	France
3	380478	6044973	Fri Jun 22 07:14:00 IST 2018	459186	UNION JACK FLAG LUGGAGE TAG	3	1.73	United Kingdom
4	11	6143225	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom
...	...	...	...	...	...	...	...	...
1083813	313131	6040298	Mon Jun 18 09:18:00 IST 2018	437976	DENIM PATCH PURSE PINK BUTTERFLY	30	2.28	EIRE
1083814	295743	6387117	Sat Feb 16 09:14:00 IST 2019	484113	RECYCLED ACAPULCO MAT PINK	6	11.39	United Kingdom
1083815	221	6361817	Tue Feb 05 05:26:00 IST 2019	497595	DOILY THANK YOU CARD	15	1.15	United Kingdom
1083816	324765	5945500	Fri Mar 23 06:26:00 IST 2018	470883	REGENCY CAKESTAND 3 TIER	48	15.12	United Kingdom
1083817	351645	6118145	Tue Aug 21 08:21:00 IST 2018	471849	HEART OF WICKER SMALL	9	2.28	United Kingdom

1083818 rows × 8 columns

In [36]:

```
df[df['CostPerItem']==0]
```

Out[36]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
148	45	6108674	Tue Aug 14 07:12:00 IST 2018	1780905	wet damaged	-288	0.0	United Kingdom
151	47	5914040	Fri Feb 18 11:31:00 IST 2028	445872	STRAWBERRY CERAMIC TRINKET BOX	3	0.0	United Kingdom
322	80	6314803	Mon Jan 14 11:15:00 IST 2019	495159	NaN	9	0.0	United Kingdom
432	102	6173783	Sun Oct 07 07:52:00 IST 2018	1428	ebay	-30	0.0	United Kingdom
668	144	6268713	Tue Dec 18 11:16:00 IST 2018	1890294	check	-36	0.0	United Kingdom
...	...	...	...	...	...	...	...	...
1082487	2909	6349893	Wed Jan 30 08:31:00 IST 2019	997563	found	198	0.0	United Kingdom
1083038	3621	6123590	Sun Aug 26 06:37:00 IST 2018	483105	printing smudges/thrown away	-28800	0.0	United Kingdom
1083099	2812	6357483	Sun Feb 03 08:09:00 IST 2019	490308	check	15	0.0	United Kingdom
1083738	1790	6332865	Tue Jan 22 13:58:00 IST 2019	1528842	check	-108	0.0	United Kingdom
1083739	3672	6167942	Mon Oct 01 09:37:00 IST 2018	337029	NaN	-93	0.0	United Kingdom

5030 rows × 8 columns

In [37]:

```
df[df['NumberOfItemsPurchased']<0]
```

Out[37]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
69	300909	6015757	Tue May 29 14:14:00 IST 2018	466452	FOUR HOOK WHITE LOVEBIRDS	-3	2.90	United Kingdom
135	319683	6036228	Sat Jun 16 08:28:00 IST 2018	470883	REGENCY CAKESTAND 3 TIER	-24	17.60	United Kingdom
148	45	6108674	Tue Aug 14 07:12:00 IST 2018	1780905	wet damaged	-288	0.00	United Kingdom
329	321531	5925150	Sat Feb 24 11:05:00 IST 2018	446418	VICTORIAN SEWING BOX LARGE	-3	15.12	United Kingdom
330	260715	6165940	Sun Sep 30 08:26:00 IST 2018	488061	TREASURE TIN GYMKHANA DESIGN	-3	2.88	Australia
...	...	...	...	...	...	...	...	...
1083663	331485	6108982	Tue Aug 14 10:15:00 IST 2018	486255	KNICKERBOCKERGLORY MAGNET ASSORTED	-3	1.15	United Kingdom
1083719	315693	6146283	Fri Sep 14 07:54:00 IST 2018	448644	PEACE SMALL WOOD LETTERS	-3	9.32	United Kingdom
1083738	1790	6332865	Tue Jan 22 13:58:00 IST 2019	1528842	check	-108	0.00	United Kingdom
1083739	3672	6167942	Mon Oct 01 09:37:00 IST 2018	337029	NaN	-93	0.00	United Kingdom
1083743	309960	5988543	Wed May 02 10:36:00 IST 2018	469644	GLASS JAR DIGESTIVE BISCUITS	-18	4.08	United Kingdom

21248 rows × 8 columns

In [38]:
```
df[df['ItemCode']<0]
```

Out[38]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
154	266301	5970085	Sat Apr 14 11:36:00 IST 2018	-1	POSTAGE	9	24.84	France
251	266028	5969843	Sat Apr 14 09:27:00 IST 2018	-1	POSTAGE	21	24.84	Germany
993	287574	6190756	Sun Oct 21 10:27:00 IST 2018	-1	Discount	-3	88.32	United Kingdom
1261	264243	6153851	Wed Sep 19 08:22:00 IST 2018	-1	POSTAGE	6	24.84	France
1293	243	6026130	Wed Jun 06 11:50:00 IST 2018	-1	DOTCOM POSTAGE	3	304.58	United Kingdom
...	...	...	...	...	...	...	...	...
1083208	765	6079282	Sun Jul 22 11:04:00 IST 2018	-1	DOTCOM POSTAGE	3	223.40	United Kingdom
1083250	138	6084782	Wed Jul 25 11:53:00 IST 2018	-1	DOTCOM POSTAGE	3	210.03	United Kingdom
1083503	3245	6167238	Mon Oct 01 07:42:00 IST 2018	-1	Manual	3	622.96	United Kingdom
1083581	260715	6035271	Wed Jun 13 10:28:00 IST 2018	-1	POSTAGE	3	483.00	Australia
1083780	259392	5998652	Sun May 13 11:52:00 IST 2018	-1	Manual	3	386.47	Norway

5592 rows × 8 columns

In [39]:
```
item=df[df['ItemCode']==-1]['ItemDescription'].unique()
```

In [40]:
```
item
```

Out[40]:
```
array(['POSTAGE', 'Discount', 'DOTCOM POSTAGE', 'AMAZON FEE', 'Manual',
       'SAMPLES', 'GIRLS PARTY BAG', 'Bank Charges', 'BOYS PARTY BAG',
       'Adjust bad debt', 'CRUK Commission', 'PADS TO MATCH ALL CUSHIONS',
       nan], dtype=object)
```

In [41]:
```
item1=df[df['ItemDescription']=='POSTAGE']['ItemCode']
```

In [42]:
```
item1
```

Out[42]:
```
154        -1
251        -1
1261       -1
1773       -1
2700       -1
           ..
1081642    -1
1081982    -1
1082314    -1
1083108    -1
1083581    -1
Name: ItemCode, Length: 2504, dtype: int64
```

In [43]:
```
count=10000000
for i in item:
    df.loc[df.ItemDescription==i,'ItemCode']=count
    count+=1
```

In [44]:
```
df.dropna(subset = ["ItemDescription"], inplace=True)
```

In [45]:
```
nan_value = float("NaN")

df.replace(-15265.64, nan_value, inplace=True)

df.dropna(subset = ["CostPerItem"], inplace=True)
```

In [46]:
```
df.describe()
```

Out[46]:

	UserId	TransactionId	ItemCode	NumberOfItemsPurchased	CostPerItem
count	1.080906e+06	1.080906e+06	1.080906e+06	1.080906e+06	1.080906e+06
mean	2.417558e+05	6.159571e+06	7.091274e+05	2.880948e+01	9.580880e+00
std	1.418230e+05	1.476643e+05	8.060646e+05	6.540237e+02	2.311059e+03
min	1.100000e+01	5.900015e+06	4.200000e+01	-2.429850e+05	0.000000e+00
25%	2.597070e+05	6.026878e+06	4.615170e+05	3.000000e+00	1.730000e+00
50%	3.021900e+05	6.167150e+06	4.755870e+05	9.000000e+00	2.880000e+00
75%	3.414810e+05	6.290064e+06	4.891530e+05	3.000000e+01	5.700000e+00
max	3.840270e+05	6.397457e+06	1.000001e+07	2.429850e+05	1.696285e+06

In [47]:
```
nan_value = float("NaN")

df.replace(0, nan_value, inplace=True)

df.dropna(subset = ["CostPerItem"], inplace=True)
```

In [48]:
```
df
```

Out[48]:

	UserId	TransactionId	TransactionTime	ItemCode	ItemDescription	NumberOfItemsPurchased	CostPerItem	Country
0	278166	6355745	Sat Feb 02 12:50:00 IST 2019	465549	FAMILY ALBUM WHITE PICTURE FRAME	6	11.73	United Kingdom
1	337701	6283376	Wed Dec 26 09:06:00 IST 2018	482370	LONDON BUS COFFEE MUG	3	3.52	United Kingdom
2	267099	6385599	Fri Feb 15 09:45:00 IST 2019	490728	SET 12 COLOUR PENCILS DOLLY GIRL	72	0.90	France
3	380478	6044973	Fri Jun 22 07:14:00 IST 2018	459186	UNION JACK FLAG LUGGAGE TAG	3	1.73	United Kingdom
4	11	6143225	Mon Sep 10 11:58:00 IST 2018	1733592	WASHROOM METAL SIGN	3	3.40	United Kingdom
...	...	...	...	...	...	...	...	...
1083813	313131	6040298	Mon Jun 18 09:18:00 IST 2018	437976	DENIM PATCH PURSE PINK BUTTERFLY	30	2.28	EIRE
1083814	295743	6387117	Sat Feb 16 09:14:00 IST 2019	484113	RECYCLED ACAPULCO MAT PINK	6	11.39	United Kingdom
1083815	221	6361817	Tue Feb 05 05:26:00 IST 2019	497595	DOILY THANK YOU CARD	15	1.15	United Kingdom
1083816	324765	5945500	Fri Mar 23 06:26:00 IST 2018	470883	REGENCY CAKESTAND 3 TIER	48	15.12	United Kingdom
1083817	351645	6118145	Tue Aug 21 08:21:00 IST 2018	471849	HEART OF WICKER SMALL	9	2.28	United Kingdom

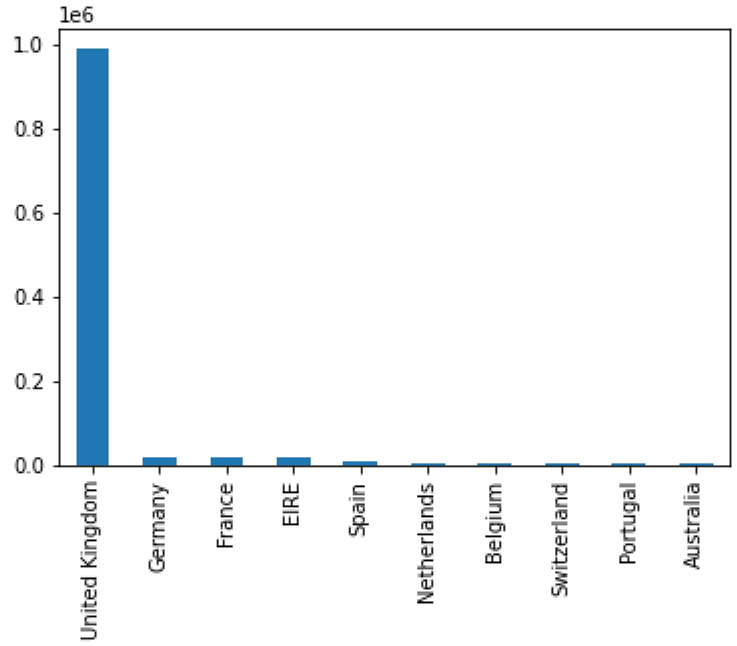
1078784 rows × 8 columns

In [49]:
```
df['Country'].value_counts()
```

Out[49]:
```
United Kingdom          985958
Germany                  18986
France                   17112
EIRE                     16384
Spain                     5064
Netherlands               4734
Belgium                   4138
Switzerland               4002
Portugal                  3038
Australia                 2512
Norway                    2170
Italy                     1606
Channel Islands           1516
Finland                   1390
Cyprus                    1244
Sweden                     924
Unspecified                892
Austria                    802
Denmark                    778
Japan                      716
Poland                     682
Israel                     594
USA                        582
Hong Kong                  576
Singapore                  458
Iceland                    364
Canada                     302
Greece                     292
Malta                      254
United Arab Emirates       136
European Community         122
RSA                        114
Lebanon                     90
Lithuania                   70
Brazil                      64
Czech Republic              60
Bahrain                     38
Saudi Arabia                20
Name: Country, dtype: int64
```

In [50]:
```
df.Country.value_counts()[:10].plot(kind='bar')
```

Out[50]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2a043941940>
```



In [51]:
```
uk_data=df[df.Country=='United Kingdom']
```

In [52]:
```
uk_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 985958 entries, 0 to 1083817
Data columns (total 8 columns):
 #   Column                 Non-Null Count   Dtype  
---  ------                 --------------   -----  
 0   UserId                 985958 non-null  int64  
 1   TransactionId          985958 non-null  int64  
 2   TransactionTime        985958 non-null  object 
 3   ItemCode               985958 non-null  int64  
 4   ItemDescription        985958 non-null  object 
 5   NumberOfItemsPurchased 985958 non-null  int64  
 6   CostPerItem            985958 non-null  float64
 7   Country                985958 non-null  object 
dtypes: float64(1), int64(4), object(3)
memory usage: 67.7+ MB
```

In [53]:
```
uk_data.describe()
```

Out[53]:

	UserId	TransactionId	ItemCode	NumberOfItemsPurchased	CostPerItem
count	985958.000000	9.859580e+05	9.859580e+05	985958.000000	9.859580e+05
mean	239753.113719	6.159355e+06	6.970262e+05	26.772075	9.794548e+00
std	146942.415142	1.485303e+05	6.965321e+05	674.510526	2.419630e+03
min	11.000000	5.900015e+06	4.200000e+01	-242985.000000	1.000000e-02
25%	829.000000	6.026460e+06	4.615170e+05	3.000000	1.730000e+00
50%	305361.000000	6.166105e+06	4.756710e+05	9.000000	2.900000e+00
75%	345660.000000	6.292308e+06	4.892580e+05	30.000000	5.700000e+00
max	384027.000000	6.397446e+06	1.000001e+07	242985.000000	1.696285e+06

In [54]:
```
uk_data = uk_data[(uk_data['NumberOfItemsPurchased']>0)]
uk_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 970246 entries, 0 to 1083817
Data columns (total 8 columns):
 #   Column                  Non-Null Count   Dtype  
---  ------                  --------------   -----  
 0   UserId                  970246 non-null  int64  
 1   TransactionId           970246 non-null  int64  
 2   TransactionTime         970246 non-null  object 
 3   ItemCode                970246 non-null  int64  
 4   ItemDescription         970246 non-null  object 
 5   NumberOfItemsPurchased  970246 non-null  int64  
 6   CostPerItem             970246 non-null  float64
 7   Country                 970246 non-null  object 
dtypes: float64(1), int64(4), object(3)
memory usage: 66.6+ MB
```

In [64]:
```
uk_data['TotalPrice'] = uk_data['NumberOfItemsPurchased'] * uk_data['CostPerItem']
```

In [56]:
```
uk_data=uk_data[['UserId','TransactionId','TransactionTime','NumberOfItemsPurchased','CostPerItem']]
```

In [57]:
```
uk_data['TransactionTime'].min(),uk_data['TransactionTime'].max()
```

Out[57]:
```
('Fri Apr 06 06:15:00 IST 2018', 'Wed Sep 26 13:29:00 IST 2018')
```

In [58]:
```
PRESENT = dt.datetime(2020,6,6)
uk_data['TransactionTime'] = pd.to_datetime(uk_data['TransactionTime'])
```

```
c:\python36\lib\site-packages\dateutil\parser\_parser.py:1218: UnknownTimezoneWarning: tzname IST identified b
ut not understood.  Pass `tzinfos` argument in order to correctly return a timezone-aware datetime.  In a futu
re version, this will raise an exception.
  category=UnknownTimezoneWarning)
```

In [65]:
```
uk_data.head()
```

Out[65]:

	UserId	TransactionId	TransactionTime	NumberOfItemsPurchased	CostPerItem	TotalPrice
0	278166	6355745	2019-02-02 12:50:00	6	11.73	70.38
1	337701	6283376	2018-12-26 09:06:00	3	3.52	10.56
3	380478	6044973	2018-06-22 07:14:00	3	1.73	5.19
4	11	6143225	2018-09-10 11:58:00	3	3.40	10.20
5	285957	6307136	2019-01-11 09:50:00	12	3.52	42.24

In [66]:
```
rfm= uk_data.groupby('UserId').agg({'TransactionTime': lambda date: (PRESENT - date.max()).days,
                                        'TransactionId': lambda num: len(num),
                                        'TotalPrice': lambda price: price.sum()})
```

In [67]:
```
rfm.columns
```

Out[67]:
```
Index(['TransactionTime', 'TransactionId', 'TotalPrice'], dtype='object')
```

In [68]:
```
rfm.columns=['monetary','frequency','recency']
```

In [69]:
```
rfm['recency'] = rfm['recency'].astype(int)
```

In [70]:
```
rfm.head()
```

Out[70]:

UserId	monetary	frequency	recency
11	634	1410	72177
12	704	158	24458
13	523	528	14997
14	475	1442	74758
15	572	408	12627

In [71]:
```
rfm['r_quartile'] = pd.qcut(rfm['recency'], 4, ['1','2','3','4'])
rfm['f_quartile'] = pd.qcut(rfm['frequency'], 4, ['4','3','2','1'])
rfm['m_quartile'] = pd.qcut(rfm['monetary'], 4, ['4','3','2','1'])
```

In [72]:
```
rfm.head()
```

Out[72]:

UserId	monetary	frequency	recency	r_quartile	f_quartile	m_quartile
11	634	1410	72177	4	1	2
12	704	158	24458	4	2	1
13	523	528	14997	4	1	3
14	475	1442	74758	4	1	4
15	572	408	12627	3	1	2

In [73]:
```
rfm['RFM_Score'] = rfm.r_quartile.astype(str)+ rfm.f_quartile.astype(str) + rfm.m_quartile.astype(str)
rfm.head()
```

Out[73]:

UserId	monetary	frequency	recency	r_quartile	f_quartile	m_quartile	RFM_Score
11	634	1410	72177	4	1	2	412
12	704	158	24458	4	2	1	421
13	523	528	14997	4	1	3	413
14	475	1442	74758	4	1	4	414
15	572	408	12627	3	1	2	312

In [74]:
```
rfm[rfm['RFM_Score']=='421'].sort_values('monetary', ascending=False).head()
```

Out[74]:

UserId	monetary	frequency	recency	r_quartile	f_quartile	m_quartile	RFM_Score
514	824	186	14382	4	2	1	421
977	800	170	15609	4	2	1	421
269	796	154	16026	4	2	1	421
581	793	182	16634	4	2	1	421
147	789	178	15055	4	2	1	421

In [75]:
```
rfm['RFM_Score'].value_counts()
```

Out[75]:
```
414    468
141    452
142    277
413    236
232    228
231    223
324    194
233    193
323    190
143    187
322    158
412    126
424    117
321    110
411    110
234    104
314     99
144     96
221     92
423     90
131     87
223     86
311     85
312     84
333     83
242     81
313     80
332     79
132     78
241     73
222     73
422     67
133     62
334     60
224     59
243     52
331     31
134     29
244     29
342     28
421     25
434     20
124     18
123     17
432     15
433     15
344     15
341     14
442     13
214     13
343     13
122     11
213     10
121     10
444      7
443      7
212      6
441      5
431      2
211      1
Name: RFM_Score, dtype: int64
```

In [76]:
```
rfm.shape
```

Out[76]:
```
(5293, 7)
```

In [77]:
```
segment=rfm.RFM_Score.unique()
```

In [78]:
```
segment.shape
```

Out[78]:
```
(60,)
```

In [80]:
```
rfm['RFM_Score'].median()
```

Out[80]:
```
244.0
```

In [81]:
```
rfm['RFM_Score'].mode()
```

Out[81]:
```
0    414
dtype: object
```

In [83]:
```
rfm.to_csv ('Output_Segmented.csv')
```

In [ ]: