

## Data Analysis

### Summarize:

1. This part shows the work of data analysis.
2. The basic part has been finished.
3. Difficulty: How to find the two product which are always bought together. We only want **one** pair of product.

We have calculated the times of every pair of product are bought together, all we need now is a good standard to decide.

### Details:

1. I need to get some statistic data from the original dataset and write the data to a file. The front end use the data to draw the charts, such as histogram and pie chart.

Here are the data we need and the related code.

(1) Top 10 sales.

```
blackFriday = pd.read_csv('BlackFriday.csv')
a1=blackFriday.groupby(['Product_ID'],as_index=False).agg({'Purchase':sum})
a1.sort_values(['Purchase'], ascending=False, inplace=True)
```

	Product_ID	Purchase
249	P00025442	27532426
1014	P00110742	26382569
2441	P00255842	24652442
1743	P00184942	24060871
581	P00059442	23948299
1028	P00112142	23882624
1016	P00110942	23232538
2261	P00237542	23096487
565	P00057642	22493690
104	P00010742	21865042

(2) Top 10 buyers.

```
a2=blackFriday[['Product_Category_1','Purchase']].groupby(['Product_Category_1'],as_index=False).agg({'Purchase':sum})
a2.sort_values(['Purchase'], ascending=False, inplace=True)
```

	Product_Category_1	Purchase
--	--------------------	----------

0	1	1882666325
4	5	926917497
7	8	840693394
5	6	319355286
1	2	264497242
2	3	200412211
15	16	143168035
10	11	112203088
9	10	99029631
14	15	91658147

(3) The purchase of man and woman.

```
a3=blackFriday[['Gender','Purchase']].groupby(['Gender'],as_index=False).agg(
({'Purchase':sum})
a3.sort_values(['Purchase'],ascending=False,inplace=True)
```

	Gender	Purchase
1	M	3853044357
0	F	1164624021

(a)Top 10 product that man like most.

```
woman=blackFriday[['Gender','Product_ID','Purchase']].groupby('Gender').get_
group('F').groupby('Product_ID').agg({'Purchase':sum})
woman.sort_values(['Purchase'],ascending=False,inplace=True)
```

Product_ID	Purchase
P00255842	6690088
P00059442	6007826
P00110842	5933348
P00025442	5763524
P00110742	5632357
P00110942	5066142
P00148642	5049905
P00112142	4901047
P00028842	4867128
P00184942	4723224

(b) Top 10 product that woman like most.

```
man=blackFriday[['Gender','Product_ID','Purchase']].groupby('Gender').get_group('M')
man2 = man.groupby('Product_ID').agg({'Purchase':sum})
man2.sort_values(['Purchase'],ascending=False,inplace=True)
```

Product_ID	Purchase
P00025442	21768902
P00110742	20750212
P00184942	19337647
P00112142	18981577
P00057642	18720360
P00237542	18562039
P00110942	18166396
P00255842	17962354
P00059442	17940473
P00010742	17517618

(4) The purchase of different age.

```
a4=blackFriday[['Age','Purchase']].groupby(['Age'],as_index=False).agg({'Purchase':sum})
a4.sort_values(['Purchase'],ascending=False,inplace=True)
```

	Age	Purchase
2	26-35	1999749106
3	36-45	1010649565
1	18-25	901669280
4	46-50	413418223
5	51-55	361908356
6	55+	197614842
0	0-17	132659006

(a) Top 10 product that people whose age of 0-17 like most.

```
a0_17=blackFriday.groupby('Age').get_group('0-17').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
------------	----------

P00255842	1096484
P00237542	946872
P00145042	935033
P00112142	931216
P00025442	852540
P00242742	787132
P00184942	728494
P00110742	724021
P00355142	643958
P00110942	634797

(b) Top 10 product that people whose age of 18-25 like most.

```
a18_25=blackFriday.groupby('Age').get_group('18-25').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
P00110742	5532933
P00112142	5479058
P00237542	5029687
P00255842	4954222
P00010742	4944820
P00025442	4884642
P00110842	4678954
P00184942	4587243
P00028842	4566353
P00057642	4446409

(c) Top 10 product that people whose age of 25-35 like most.

```
a26_35=blackFriday.groupby('Age').get_group('26-35').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
P00110742	10605442
P00025442	10594786
P00255842	9860878

P00237542	9697110
P00184942	9493975
P00028842	9286868
P00112142	9258356
P00110942	9218356
P00059442	9211235
P00057642	9110947

(d) Top 10 product that people whose age of 36-45 like most.

```
a36_45 = blackFriday.groupby('Age').get_group('36-45').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
P00025442	5917938
P00110742	5105081
P00255842	4774004
P00059442	4769210
P00110942	4666976
P00057642	4645954
P00184942	4564488
P00052842	4493193
P00080342	4414988
P00112142	4368457

(e) Top 10 product that people whose age of 46-50 like most.

```
a46_50 = blackFriday.groupby('Age').get_group('46-50').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
P00025442	2098048
P00184942	2024545
P00059442	1998392
P00046742	1947669
P00110942	1875581
P00148642	1865060

P00080342	1803851
P00255842	1778397
P00116142	1696717
P00112142	1689463

(f)Top 10 product that people whose age of 51-55 like most.

```
a51_55 = blackFriday.groupby('Age').get_group('51-55').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
P00025442	2041357
P00059442	1985347
P00080342	1853997
P00110742	1812670
P00010742	1738741
P00052842	1656476
P00121342	1589537
P00116142	1587614
P00057642	1576856
P00148642	1525972

(g)Top 10 product that people whose age of 55+ like most.

```
a55Up=blackFriday.groupby('Age').get_group('55+').groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

Product_ID	Purchase
P00080342	1341782
P00059442	1262662
P00184942	1222830
P00085342	1150944
P00025442	1143115
P00110942	983101
P00116142	976456
P00010742	951037
P00110742	917425
P00121342	901195

(5) The purchase of different occupation.

```
a5=blackFriday[['Occupation','Purchase']].groupby(['Occupation'],as_index=False).agg({'Purchase':sum})
a5.sort_values(['Purchase'],ascending=False,inplace=True)
```

Occupation	Purchase
4	4 657530393
0	0 625814811
7	7 549282744
1	1 414552829
17	17 387240355
12	12 300672105
20	20 292276985
14	14 255594745
16	16 234442330
2	2 233275393
6	6 185065697
3	3 160428450
15	15 116540026
10	10 114273954
5	5 112525355
11	11 105437359
19	19 73115489
13	13 71135744
18	18 60249706
9	9 53619309
8	8 14594599

(a)Top 10 product that occupation 0 like most.

```
o0=blackFriday.groupby('Occupation').get_group(0).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(b)Top 10 product that occupation 1 like most.

```
o1=blackFriday.groupby('Occupation').get_group(1).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(c)Top 10 product that occupation 2 like most.

```
o2=blackFriday.groupby('Occupation').get_group(2).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(d)Top 10 product that occupation 3 like most.

```
o3=blackFriday.groupby('Occupation').get_group(3).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(e)Top 10 product that occupation 4 like most.

```
o4=blackFriday.groupby('Occupation').get_group(4).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(f)Top 10 product that occupation 5 like most.

```
o5=blackFriday.groupby('Occupation').get_group(5).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(g)Top 10 product that occupation 6 like most.

```
o6=blackFriday.groupby('Occupation').get_group(6).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(h)Top 10 product that occupation 7 like most.

```
o7=blackFriday.groupby('Occupation').get_group(7).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(i)Top 10 product that occupation 8 like most.

```
o8=blackFriday.groupby('Occupation').get_group(8).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(j)Top 10 product that occupation 9 like most.

```
o9=blackFriday.groupby('Occupation').get_group(9).groupby('Product_ID').agg(
{'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

(k)Top 10 product that occupation 10 like most.

(l)Top 10 product that occupation 11 like most.

(m)Top 10 product that occupation 12 like most.

(n)Top 10 product that occupation 13 like most.

(o)Top 10 product that occupation 14 like most.

(p)Top 10 product that occupation 15 like most.

(q)Top 10 product that occupation 16 like most.

(r)Top 10 product that occupation 17 like most.

(s)Top 10 product that occupation 18 like most.

(t)Top 10 product that occupation 19 like most.



(u)Top 10 product that occupation 20 like most.

```
o10 =
blackFriday.groupby('Occupation').get_group(10).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o11 =
blackFriday.groupby('Occupation').get_group(11).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o12 =
blackFriday.groupby('Occupation').get_group(12).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o13 =
blackFriday.groupby('Occupation').get_group(13).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o14 =
blackFriday.groupby('Occupation').get_group(14).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o15 =
blackFriday.groupby('Occupation').get_group(15).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o16 =
blackFriday.groupby('Occupation').get_group(16).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o17 =
blackFriday.groupby('Occupation').get_group(17).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o18 =
blackFriday.groupby('Occupation').get_group(18).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o19 =
blackFriday.groupby('Occupation').get_group(19).groupby('Product_ID').agg({'
Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
o20 =
```

```
blackFriday.groupby('Occupation').get_group(20).groupby('Product_ID').agg({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

0

	Purchase
Product_ID	
P00025442	3082080
P00110742	3046312
P00059442	2803380
P00184942	2770200
P00057642	2624741
P00255842	2618002
P00237542	2613143
P00112142	2532049
P00110842	2500692
P00110942	2343433

1

	Purchase
Product_ID	
P00110742	2060684
P00025442	2039871
P00059442	2027632
P00255842	1920305
P00184942	1907123
P00080342	1843757
P00110842	1816385
P00110942	1811047
P00028842	1791146
P00112142	1755209

2

	Purchase
Product_ID	

P00025442	1314065
P00059442	1203452
P00110842	1128831
P00110742	1048300
P00052842	1028403
P00237542	953969
P00112142	939542
P00057642	909862
P00110942	907640
P00080342	877452

3

Purchase

Product\_ID

P00255842	792072
P00025442	749383
P00110842	740812
P00059442	740285
P00110742	663237
P00110942	654321
P00237542	647903
P00057642	624675
P00148642	611491
P00114942	602232

4

Purchase

Product\_ID

P00110742	4048063
P00025442	3821259
P00112142	3783361
P00237542	3745206
P00028842	3546970

P00255842	3515094
P00184942	3496923
P00010742	3462799
P00110942	3320694
P00110842	3249265

5

Purchase

Product\_ID

P00114942	579614
P00110742	569372
P00025442	557516
P00057642	526306
P00112542	520450
P00255842	514009
P00080342	503367
P00128942	485208
P00237542	480876
P00010742	470592

6

Purchase

Product\_ID

P00255842	1080045
P00110742	1011923
P00025442	967611
P00184942	943994
P00010742	942453
P00080342	929441
P00148642	863011
P00112142	850808
P00057642	841797
P00059442	837661

7

Purchase

Product\_ID

P00025442	3155471
P00110742	3097921
P00110942	3013049
P00184942	2998813
P00255842	2792269
P00010742	2723861
P00059442	2693158
P00112142	2692172
P00080342	2626270
P00046742	2530922

8

Purchase

Product\_ID

P00052842	118467
P00112142	113742
P00114942	99863
P00242742	96941
P00127642	84689
P00127842	78672
P00270942	74379
P00046742	73501
P00016042	70584
P00110842	69555

9

Purchase

Product\_ID

P00059442	342833
-----------	--------

P00145042	306907
P00255842	305520
P00110842	259411
P00184942	253922
P00110942	252359
P00221442	240836
P00110742	236724
P00085942	231542
P00000142	222531

10

Purchase

Product\_ID

P00255842	958951
P00145042	957464
P00025442	886768
P00112142	871275
P00237542	871101
P00242742	794823
P00184942	674123
P00110742	633429
P00334242	609386
P00355142	592296

11

Purchase

Product\_ID

P00025442	641609
P00059442	629457
P00148642	611638
P00110942	600271
P00080342	592248
P00052842	589440

P00112142	562794
P00184942	548051
P00113242	526591
P00112442	524780

12

Purchase

Product\_ID

P00025442	2076718
P00057642	2011741
P00112142	1929774
P00052842	1911324
P00237542	1893729
P00110742	1836883
P00255842	1777972
P00110942	1739226
P00114942	1679938
P00059442	1560621

13

Purchase

Product\_ID

P00010742	498547
P00080342	480635
P00184942	417389
P00025442	395832
P00177442	373318
P00110742	365628
P00114342	359853
P00057642	353588
P00116142	352670
P00110942	336613

14

Purchase

Product\_ID

P00184942	1556438
P00025442	1415003
P00148642	1349608
P00237542	1334397
P00005042	1315141
P00110742	1313562
P00028842	1266773
P00255842	1212831
P00010742	1201460
P00110942	1156946

15

Purchase

Product\_ID

P00025442	902703
P00110742	793929
P00110942	733301
P00059442	714088
P00110842	690887
P00112142	690020
P00255842	684399
P00057642	679579
P00080342	624583
P00046742	588535

16

Purchase

Product\_ID

P00255842	1063543
-----------	---------



P00025442	1038864
P00110942	1014872
P00052842	1001701
P00110742	974492
P00046742	968884
P00148642	950646
P00184942	909690
P00059442	884547
P00005042	865338

17

Purchase

Product\_ID

P00025442	2426017
P00110742	2329323
P00057642	2315821
P00237542	2298225
P00112142	2234829
P00255842	2234351
P00184942	2200776
P00110942	2139736
P00114942	1961365
P00046742	1938491

18

Purchase

Product\_ID

P00010742	416243
P00080342	390289
P00184942	315384
P00028842	287513
P00046742	283143
P00057642	272759

P00112142	260348
P00059442	259517
P00112542	259474
P00110842	251661

19

Purchase

Product\_ID

P00237542	419498
P00059442	377675
P00111742	360504
P00028842	358315
P00112142	346839
P00025442	337630
P00071442	334536
P00145042	330857
P00010742	314734
P00112442	313479

20

Purchase

Product\_ID

P00059442	1543162
P00110742	1323818
P00025442	1251344
P00052842	1242651
P00148642	1186607
P00110842	1183362
P00080342	1148077
P00028842	1108659
P00255842	1070224
P00184942	1045758

(6) The purchase of people in different city.

(a) Top 10 product that city A like most.

(b) Top 10 product that city B like most.

(c) Top 10 product that city C like most.

```
a6 =
blackFriday[['City_Category','Purchase']].groupby(['City_Category'],as_index
=False).agg({'Purchase':sum})
a6.sort_values(['Purchase'],ascending=False,inplace=True)
A =
blackFriday.groupby('City_Category').get_group('A').groupby('Product_ID').ag
g({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
B =
blackFriday.groupby('City_Category').get_group('B').groupby('Product_ID').ag
g({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
C =
blackFriday.groupby('City_Category').get_group('C').groupby('Product_ID').ag
g({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

	City_Category	Purchase
1	B	2083431612
2	C	1638567969
0	A	1295668797

A

	Purchase
Product_ID	
P00025442	5386234
P00059442	5346393
P00255842	5332815
P00110742	5311364
P00110842	4977844
P00110942	4954446
P00052842	4911429
P00237542	4772290

P00057642	4700520
P00028842	4638774

B

Purchase

Product\_ID

P00110742	9844481
P00025442	9667058
P00059442	8815852
P00184942	8707024
P00237542	8521897
P00028842	8361856
P00110942	8341816
P00255842	8319809
P00010742	8282542
P00112142	8241958

C

Purchase

Product\_ID

P00025442	12479134
P00110742	11226724
P00112142	11052443
P00255842	10999818
P00184942	10978970
P00110942	9936276
P00057642	9891283
P00010742	9834335
P00237542	9802300
P00059442	9786054

(7) The purchase of people in different living time.

(a)Top 10 product that people who live in the city for 1 year like most.

(b)Top 10 product that people who live in the city for 2 year like most.

- (c) Top 10 product that people who live in the city for 3 year like most.
- (d) Top 10 product that people who live in the city for 4 and more than 4 year like most.

```
a7 =
blackFriday[['Stay_In_Current_City_Years', 'Purchase']].groupby(['Stay_In_Current_City_Years'], as_index=False).agg({'Purchase': sum})
a7.sort_values(['Purchase'], ascending=False, inplace=True)
s0 =
blackFriday.groupby('Stay_In_Current_City_Years').get_group('0').groupby('Product_ID').agg({'Purchase': sum}).sort_values("Purchase", inplace=False, ascending=False)
s1 =
blackFriday.groupby('Stay_In_Current_City_Years').get_group('1').groupby('Product_ID').agg({'Purchase': sum}).sort_values("Purchase", inplace=False, ascending=False)
s2 =
blackFriday.groupby('Stay_In_Current_City_Years').get_group('2').groupby('Product_ID').agg({'Purchase': sum}).sort_values("Purchase", inplace=False, ascending=False)
s3 =
blackFriday.groupby('Stay_In_Current_City_Years').get_group('3').groupby('Product_ID').agg({'Purchase': sum}).sort_values("Purchase", inplace=False, ascending=False)
s4Up =
blackFriday.groupby('Stay_In_Current_City_Years').get_group('4+').groupby('Product_ID').agg({'Purchase': sum}).sort_values("Purchase", inplace=False, ascending=False)
```

1	1	1763243917
2	2	934676626
3	3	872531130
4	4+	774711276
0	0	672505429

0

Purchase

Product\_ID

P00025442	4027605
P00255842	3333440
P00110742	3319509
P00112142	3301452
P00110942	3230136
P00057642	3150441
P00184942	3032851
P00110842	3027622
P00059442	2958983
P00237542	2902598

1

Purchase

Product\_ID

P00025442	9360495
P00110742	9309594
P00255842	8903024
P00184942	8621415
P00112142	8406403
P00110942	8306778
P00057642	8138730
P00010742	8136005
P00059442	8120583
P00237542	8103709

2

Purchase

Product\_ID

P00025442	5514347
P00110742	5103819

P00112142	4792310
P00184942	4651101
P00059442	4620803
P00255842	4604033
P00110842	4404119
P00237542	4352629
P00010742	4349317
P00057642	4322813

3

Purchase

Product\_ID

P00025442	4805818
P00110742	4513712
P00059442	4261683
P00237542	4072551
P00110942	3959104
P00255842	3942298
P00184942	3780153
P00052842	3743709
P00112142	3583927
P00110842	3544879

4+

Purchase

Product\_ID

P00110742	4135935
P00059442	3986247
P00184942	3975351
P00255842	3869647
P00025442	3824161
P00112142	3798532
P00237542	3665000
P00080342	3607250

P00028842 3524975

P00110942 3506142

(8) The purchase of people who are married or not.

(a) Top 10 product that people who has been married like most.

(b) Top 10 product that people who has not been married like most.

```
a8 =
blackFriday[['Marital_Status','Purchase']].groupby(['Marital_Status'],as_index=False).agg({'Purchase':sum})
a8.sort_values(['Purchase'],ascending=False,inplace=True)
m0 =
blackFriday.groupby('Marital_Status').get_group(0).groupby('Product_ID').agg
({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
m1 =
blackFriday.groupby('Marital_Status').get_group(1).groupby('Product_ID').agg
({'Purchase':sum}).sort_values("Purchase",inplace=False, ascending=False)
```

	Marital_Status	Purchase
0	0	2966289500
1	1	2051378878

0

	Purchase
Product_ID	
P00025442	16529903
P00110742	15887215
P00255842	15080130
P00112142	14458721
P00237542	14271524
P00059442	14042723
P00184942	13988935
P00110942	13978740
P00057642	13545888
P00028842	12993842



1

	Purchase
Product_ID	
P00025442	11002523
P00110742	10495354
P00184942	10071936
P00059442	9905576
P00255842	9572312
P00112142	9423903
P00110942	9253798
P00010742	9227900
P00057642	8947802
P00080342	8894650

(9) Top 10 product that costumer who are age of 26-35 like most.

```
a9 =
blackFriday.groupby('Marital_Status').get_group(1).groupby('Gender').get_group('M').groupby('Product_ID').agg({'Purchase':sum})
a9.sort_values(['Purchase'],ascending=False,inplace=True)

a9 =
blackFriday.groupby('Marital_Status').get_group(1).groupby('Gender').get_group('F').groupby('Product_ID').agg({'Purchase':sum})
a9.sort_values(['Purchase'],ascending=False,inplace=True)
```

26-35

	Purchase
Product_ID	
P00110742	10605442
P00025442	10594786
P00255842	9860878
P00237542	9697110
P00184942	9493975
P00028842	9286868
P00112142	9258356

P00110942	9218356
-----------	---------

P00059442	9211235
-----------	---------

P00057642	9110947
-----------	---------

2

man

Purchase

Product\_ID

P00025442	8499099
-----------	---------

P00110742	8213098
-----------	---------

P00184942	7937618
-----------	---------

P00059442	7469419
-----------	---------

P00057642	7392952
-----------	---------

P00112142	7364620
-----------	---------

P00010742	7331324
-----------	---------

P00110942	7131772
-----------	---------

P00237542	7109247
-----------	---------

P00080342	6936382
-----------	---------

woman

Purchase

Product\_ID

P00255842	2794105
-----------	---------

P00025442	2503424
-----------	---------

P00110842	2481040
-----------	---------

P00059442	2436157
-----------	---------

P00148642	2360330
-----------	---------

P00110742	2282256
-----------	---------

P00184942	2134318
-----------	---------

P00110942	2122026
-----------	---------

P00112142	2059283
-----------	---------

P00080342	1958268
-----------	---------

2. We want to find the two products which are always bought together.

Now we have the number of every two product are bought together, we haven' t decide the standard of the 'most' .

The code are as follows.

```
import csv
import numpy as np
#只读打开
csvFile = open("BlackFriday.csv", "r")
reader = csv.reader(csvFile)
Uid_PidDic = {}
productSet = set()

for item in reader:
    # 忽略第一行
    if reader.line_num == 1:
        continue
    if item[0] in Uid_PidDic:
        Uid_PidDic[item[0]].append(item[1])
        productSet.add(item[1])
    else:
        Uid_PidDic[item[0]] = [item[1]]
        productSet.add(item[1])
#print(Uid_PidDic['1000001'])
#print(len(Uid_PidDic))
csvFile.close()

#给商品重新编号
product_num = {}
num = 0
for item in productSet:
    product_num[item] = num
    num+=1

#商品对出现次数数组，以及商品单独出现次数
```

```

prodCor = np.zeros((3623,3623),dtype=np.int)
prodNum = np.zeros(3623,dtype=np.int)

values=Uid_PidDic.values()
location = 0

#取出某一个顾客的商品购买列表
for value in values:
    #print('location: ' + str(location), file=f)
    i = 1
    index = 0
#取出该顾客商品购买列表中的一个商品
    for product in value:
        prodNum[product_num[product]]+=1
        i = index + 1
        #print('index: '+ str(index), file=f)
        while i<len(value):
            prodCor[product_num[product]][product_num[value[i]]]+=1
            #print(prodCor[product_num[product]][product_num[value[i]]])
            i+=1
        index+=1
    location += 1

#f = open("output.rtf", 'w+')
#f.close()

for i in range(len(prodCor)):
    for j in range(len(prodCor[i])):
        if i < j:
            temp = prodCor[i][j]
            prodCor[i][j] = prodCor[j][i] = temp + prodCor[j][i]

```

```
max = prodCor[0][0]
x=y=0
a=b=0
for i in range(len(prodCor)):
    for j in range(len(prodCor[i])):
        if i < j and (prodCor[i][j] > max):
            max = prodCor[i][j]
            x = i
            y = j
```