Gayathri_Gopalan_DS_Challenge_Shopify

September 21, 2021

0.1 Winter 2022 Data Science Intern Challenge

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Question 1: Given some sample data, write a program to answer the following: click here to access the required data set

```
[14]: import pandas as pd
```

```
[15]: df= pd.read_csv('2019 Winter Data Science Intern Challenge Data Set - Sheet1.
       ↪csv')
```

```
[16]: df.head(4)
```

```
[16]:    order_id  shop_id  user_id  order_amount  total_items payment_method  \
      0         1       53      746           224            2           cash
      1         2       92      925            90            1           cash
      2         3       44      861           144            1           cash
      3         4       18      935           156            1    credit_card

                  created_at
      0  2017-03-13 12:36:56
      1  2017-03-03 17:38:52
      2   2017-03-14 4:23:56
      3  2017-03-26 12:43:37
```

On Shopify, we have exactly 100 sneaker shops, and each of these shops sells only one model of shoe. We want to do some analysis of the average order value (AOV). When we look at orders data over a 30 day window, we naively calculate an AOV of $3145.13. Given that we know these shops are selling sneakers, a relatively affordable item, something seems wrong with our analysis.

0.1.1 a. Think about what could be going wrong with our calculation. Think about a better way to evaluate this data.

AOV (Average Order Value)- It is the average amount spent each time a customer places an order of the shoe Since Sneakers are relatively affordable, and also that an individual cannot spend an average of $3145 on an order.

Current AOV calculation = (x1+x2+x3+…+xn)/n

This calculation of the average of order amount is wrong. Since it has some of the value that have huge numbers. Let's take the median and standard deviation of this column.

Metric	Value
Median	284
Std Dev	41,282.54
Average	3145.128

[30]:

```
df.describe()
```

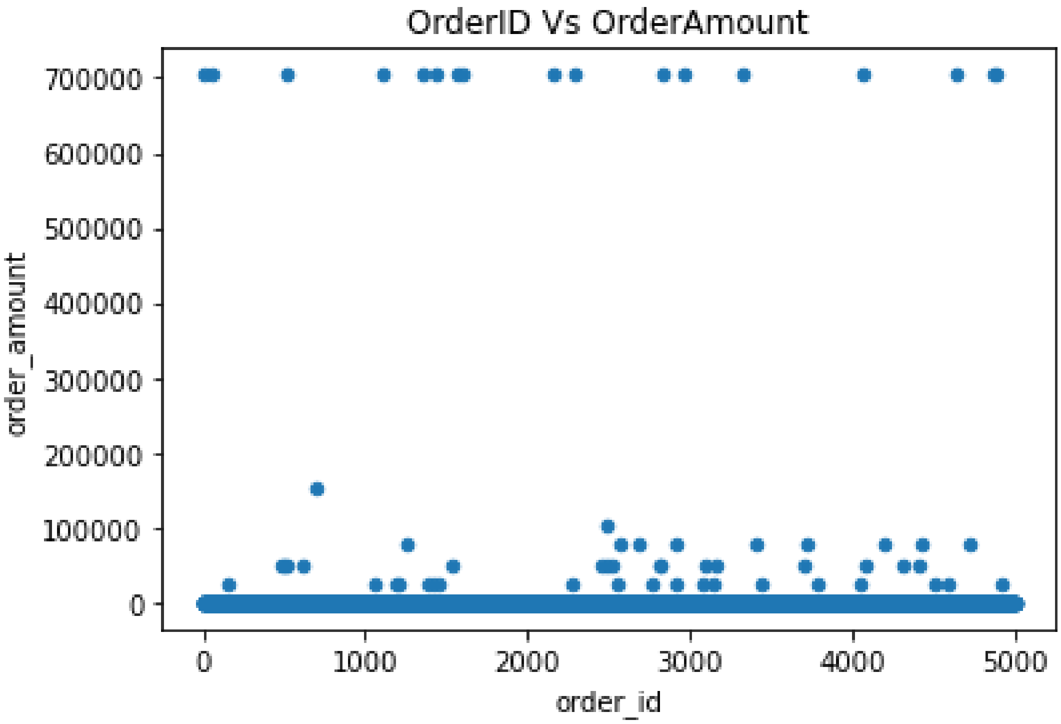
[30]:

```
          order_id      shop_id      user_id   order_amount  total_items
count  5000.000000  5000.000000  5000.000000    5000.000000   5000.00000
mean   2500.500000    50.078800   849.092400    3145.128000      8.78720
std    1443.520003    29.006118    87.798982   41282.539349    116.32032
min       1.000000     1.000000   607.000000      90.000000      1.00000
25%    1250.750000    24.000000   775.000000     163.000000      1.00000
50%    2500.500000    50.000000   849.000000     284.000000      2.00000
75%    3750.250000    75.000000   925.000000     390.000000      3.00000
max    5000.000000   100.000000   999.000000  704000.000000   2000.00000
```

We can see that the standard deviation is too high. It implies that the dispersion of data is too much which could be due to outliers.

[36]:

```
ax2 = df.plot.
 ↪scatter(x='order_id',y='order_amount',colormap='viridis',title="OrderID Vs␣
 ↪OrderAmount")
```



This proves that the outliers (in range of 200k-700k) is causing the average to an unrealistic number. Now let's try to remove the records which have unexpected order amounts (>100000).

[19]:
```
df2=df[df['order_amount'] < 100000]
```

[20]:
```
df2.describe()
```

[20]:
```
          order_id      shop_id      user_id  order_amount  total_items
count  4981.000000  4981.000000  4981.000000   4981.000000  4981.000000
mean   2501.425216    50.095162   849.915880    702.748444     1.992773
std    1443.152284    29.052172    86.816531   4627.726634     0.981326
min       1.000000     1.000000   700.000000     90.000000     1.000000
25%    1251.000000    24.000000   776.000000    163.000000     1.000000
50%    2503.000000    50.000000   850.000000    284.000000     2.000000
75%    3751.000000    75.000000   925.000000    390.000000     3.000000
max    5000.000000   100.000000   999.000000  77175.000000     8.000000
```

The std dev has reduced, but is still higher. Lets also take a look at max value for the 4th quartile order amt is 77175.00. Let's further remove the orders greater than 10k

[21]:
```
df2[df2['order_amount'] < 10000].describe()
```

[21]:
```
          order_id      shop_id      user_id  order_amount  total_items
count  4937.000000  4937.000000  4937.000000   4937.000000  4937.000000
```

```
mean   2499.551347   49.846465   849.752279   302.580514    1.994734
std    1444.069407   29.061131    86.840313   160.804912    0.982821
min       1.000000    1.000000   700.000000    90.000000    1.000000
25%    1248.000000   24.000000   775.000000   163.000000    1.000000
50%    2497.000000   50.000000   850.000000   284.000000    2.000000
75%    3751.000000   74.000000   925.000000   387.000000    3.000000
max    5000.000000  100.000000   999.000000  1760.000000    8.000000
```

Here the AOV=$302.58 which looks like a realistic value for the avg order amt placed by each customer. Hence this would be a better solution.

b. What metric would you report for this dataset? We can check two main metrics here:

```
- High Valued Customers (HVA): User_id vs order amount and total items(To see who purchased - T
- High Valued shops (HVS): Shop_id vs order amount and total items to know which shop made the
```

[37]:
```
df_grouped=df.groupby(by='user_id').agg({'order_amount':'sum', 'total_items':
 ↪'sum'}).reset_index()
```

[38]:
```
df_grouped
```

[38]:
```
     user_id  order_amount  total_items
0        607      11968000        34000
1        700          4790           30
2        701          5162           34
3        702          5286           34
4        703          6091           41
..       ...           ...          ...
296      995          5316           35
297      996          5312           37
298      997         29236           24
299      998          2620           18
300      999          7195           47

[301 rows x 3 columns]
```

[39]:
```
# Now lets sort
df_grouped.sort_values(by=['order_amount', 'total_items'], ascending=False)
```

[39]:
```
     user_id  order_amount  total_items
0        607      11968000        34000
179      878        156936           24
135      834        108342           38
88       787         85707           57
270      969         84269           50
..       ...           ...          ...
51       750          2359           15
```

```
18          717          2337          16
20          719          2314          15
240         939          2196          15
203         902          2108          14

[301 rows x 3 columns]
```

- User IDs **607** is makinng bulk purchases of items and gives the max revenue (they could be a whole sale retailer or small business).
- Followed by are user ids **878, 834** who are elite buyers purchasing expensive sneakers.

These customers could be targetted for promotional offers, to encourage their purchasing capabilities and build more trust with the company

```
[29]: df_groupshop=df.groupby(by='shop_id').agg({'order_amount':'sum', 'total_items':
       ↪'sum'}).reset_index()
      df_groupshop.sort_values(by=['order_amount', 'total_items'], ascending=False)
```

```
[29]:     shop_id  order_amount  total_items
      41       42      11990176        34063
      77       78       2263800           88
      88       89         23128          118
      80       81         22656          128
      5         6         22627          121
      ..      …            …          …
      1         2          9588          102
      99      100          8547           77
      55       56          8073           69
      31       32          7979           79
      91       92          6840           76

      [100 rows x 3 columns]
```

- Shop IDs **42** is doing good with a revenue of 11.9M and total item sale of 34K shoes
- Followed by are user ids **78** which sells expensive sneakers for a high revenue of 2M

These shops can be improved with more investments and seasonal offers

0.2 Question 2: For this question you'll need to use SQL. Follow this link to access the data set required for the challenge. Please use queries to answer the following questions. Paste your queries along with your final numerical answers below.

0.2.1 a. How many orders were shipped by Speedy Express in total?

```
SELECT count(OrderID) as Total_Orders
FROM Orders as O
inner join Shippers as S
on S.ShipperID=O.ShipperID
where S.ShipperName='Speedy Express'
```

ANS: 54

0.2.2 b. What is the last name of the employee with the most orders?

```
SELECT E.LastName, count(OrderID) as Most_Orders
FROM Employees as E
inner join Orders as O
on E.EmployeeID=O.EmployeeID
group by E.LastName
order by count(OrderID) desc
```

ANS: Peacock 40

0.2.3 c. What product was ordered the most by customers in Germany?

```
SELECT P.ProductName, sum(OD.Quantity) as Most_Ordered
FROM Customers as C, Orders as O, OrderDetails as OD, Products as P
where C.Country='Germany'
and C.CustomerID=O.CustomerID
and O.OrderID=OD.OrderID
and OD.ProductID=P.ProductID
group by P.ProductName
order by sum(OD.Quantity) desc
```

ANS: Boston Crab Meat

0.2.4 Thank you