Shopify

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0.1 Shopify: Summer 2022 Data Science Intern Challenge

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a. The naive Average Order Value calculation is done by taking the mean of all the order values. The issue with this dataset is **large outliers skewing the mean** - our data is not normally distirbuted.

b. The simplest option is to **take the median** or mode. More complicated options might include assuming a multi-modal distribution and using a cluter method to extract the AOV for each group. This notebook shows both of those methods

c. * **median** $284.00 * **mode:** $153.00 * **K-means** (3): * 1: $302.58 (Majority of orders: 98.75%) * 2: $49,213.04 (0.92% of orders) * 3: $704,000.00 (0.34% of orders)

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

[44]:
```
# Import and View data characteristics
df_sales = pd.read_csv('2019 Winter Data Science Intern Challenge Data Set -␣
 ↪Sheet1.csv')
print(df_sales.head())
df_sales.nunique()
```

```
   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
4         5       18      883           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
4   2017-03-01 4:35:11
```

```
[44]: order_id          5000
      shop_id            100
      user_id            301
      order_amount       258
      total_items          8
      payment_method       3
      created_at        4991
      dtype: int64
```

0.1.2 a. Naive Calc issue

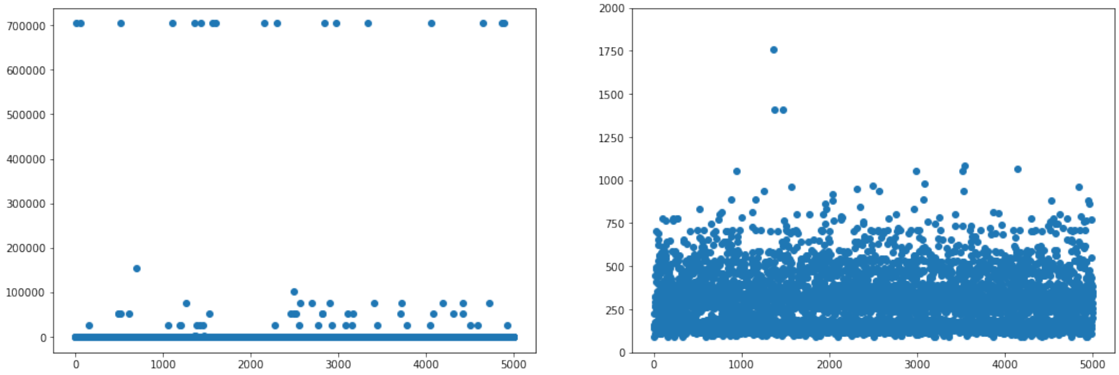
```
[45]: print('Naive AOV: ${:.2f}'.format(df_sales['order_amount'].mean()))
```

```
Naive AOV: $3145.13
```

A quick visualization (below) shows that we have a couple modes of very large outliers that can vastly skew the mean. We would want to remove or spearate our data into these modes for better analysis. A quick glance suggests 3-4 clusters, although a long-tail distribution is the most realistic model to consider.

```
[71]: # Naive Calculation is likely an average accross stores, averaged again
      fig, (ax1,ax2) = plt.subplots(1,2,figsize=(18,6))
      ax1.scatter(range(df_sales['order_amount'].shape[0]),df_sales['order_amount'])
      ax2.scatter(range(df_sales['order_amount'].shape[0]),df_sales['order_amount'])
      ax2.set_ylim([0,2000])
```

```
[71]: (0.0, 2000.0)
```



0.1.3 b and c: Alternative Calcs

```
[85]: print('Median AOV: ${:.2f}'.format(df_sales['order_amount'].median()))
      print('Mode AOV: ${:.2f}'.format(df_sales['order_amount'].mode()[0]))
```

```
Median AOV: $284.00
Mode AOV: $153.00
```

[90]:

```
# K-means, 3 clusters
from sklearn.cluster import KMeans
km = KMeans(3, init='random',n_init=10, max_iter=300,tol=1e-04, random_state=0)
km.fit(df_sales['order_amount'].to_numpy().reshape(-1,1))
km.cluster_centers_
```

[90]:

```
array([[3.02580514e+02],
       [7.04000000e+05],
       [4.92130435e+04]])
```

[96]:

```
# Percent in each cluster
df_sales['kmean'] = km.labels_
df_sales['kmean'].value_counts()/50
```

[96]:

```
0    98.74
2     0.92
1     0.34
Name: kmean, dtype: float64
```