Ecommerce Sales Data Analytics Project

•[2]:

```python
#  Import the Python Libraries Pandas, Seaborn, MatplotLib and MySQL Connector
import seaborn as sns
import pandas as pd
import matplotlib.pyplot as plt
import mysql.connector


#  Build the SQL Connection
db = mysql.connector.connect(host = "127.0.0.1",
                             username = "root",
                             password = "1234!@#$Tushar",
                             database = "ecommerce")

cur = db.cursor();
```

List all unique cities where customers are located.

•[3]:

```python
#  SQL Query
query = """select distinct(customer_city)
           from customers"""
cur.execute(query)

data = cur.fetchall()
data
```

[3]:

```
[('franca',),
 ('sao bernardo do campo',),
 ('sao paulo',),
 ('mogi das cruzes',),
 ('campinas',),
 ('jaragua do sul',),
 ('timoteo',),
 ('curitiba',),
 ('belo horizonte',),
 ('montes claros',),
 ('rio de janeiro',),
 ('lencois paulista',),
 ('caxias do sul',),
 ('piracicaba',),
 ('guarulhos',),
 ('pacaja',),
 ('florianopolis',),
 ('aparecida de goiania',),
```

Count the number of orders placed in 2017.

[4]:

```python
query = """select count(order_id)
from orders
where year(order_purchase_timestamp) = 2017 """
cur.execute(query)

data = cur.fetchall()

"Total Order Placed in the year 2017 are:- ", data[0][0]
```

[4]:

```
('Total Order Placed in the year 2017 are:- ', 45101)
```

Find the total sales per category.

[5]:

```python
query = """ select upper(products.product_category) category, round(sum(payments.payment_value), 2) sales
      from products join order_items
      on products.product_id = order_items.product_id
      join payments
      on payments.order_id = order_items.order_id
      group by category"""
cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["Category", "Sales"])
df
```

[5]:

	Category	Sales
0	PERFUMERY	506738.66
1	FURNITURE DECORATION	1430176.39
2	TELEPHONY	486882.05
3	FASHION BAGS AND ACCESSORIES	218158.28
4	BED TABLE BATH	1712553.67
...	...	...
69	CDS MUSIC DVDS	1199.43
70	LA CUISINE	2913.53
71	FASHION CHILDREN'S CLOTHING	785.67
72	PC GAMER	2174.43

```
73      INSURANCE AND SERVICES      324.51
```

74 rows × 2 columns

Calculate the percentage of orders that were paid in installments.

```
[6]: query = """ select (sum(case when payment_installments >= 1 then 1
     else 0 end))/count(*)*100 from payments
     """
     cur.execute(query)

     data = cur.fetchall()
     "Percentage of the Installment People:- ",data[0][0]
```

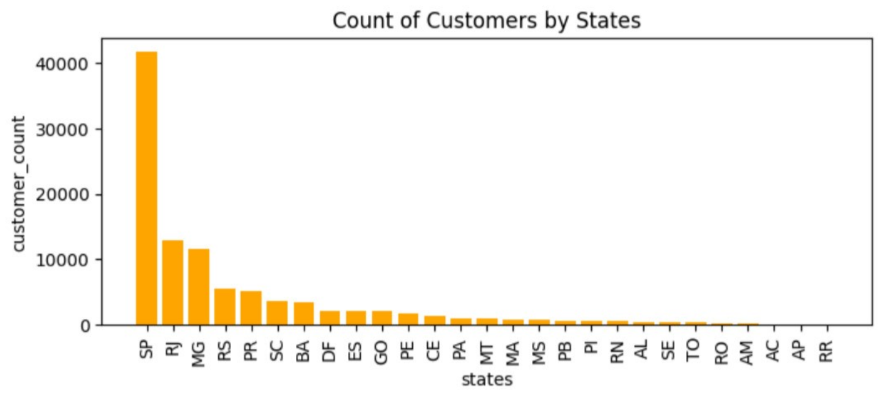
```
[6]: ('Percentage of the Installment People:- ', Decimal('99.9981'))
```

Count the number of customers from each state

```
[22]: query = """select customer_state , count(customer_id) as Count
      from customers
      group by customer_state
      """
      cur.execute(query)

      data = cur.fetchall()
      df = pd.DataFrame(data, columns = ["States", "Count of People"])
      df = df.sort_values(by = "Count of People", ascending = False)

      plt.figure(figsize = (8,3))
      plt.bar(df["States"], df["Count of People"], color = "orange")
      plt.xticks(rotation = 90)
      plt.xlabel("states")
      plt.ylabel("customer_count")
      plt.title("Count of Customers by States")
      plt.show()
```



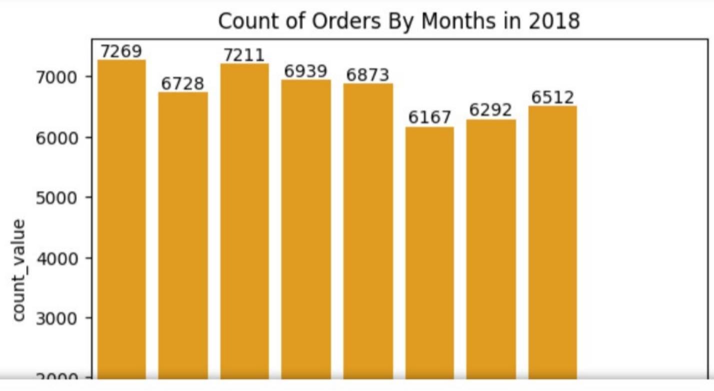
Calculate the number of orders per month in 2018.

```
[23]: query = """select monthname(order_purchase_timestamp) months, count(order_id) order_count
      from orders
      where year(order_purchase_timestamp) = 2018
      group by months"""
      cur.execute(query)

      data = cur.fetchall()

      df = pd.DataFrame(data, columns = ["Months", "count_value"])
      o = ["January", "February", "March", "April", "May","June", "July","August", "September", "October"]
      # df = df.sort_values(by = "count_Value", ascending = False)

      ax = sns.barplot(x = df["Months"],y = df["count_value"], data = df, order = o, color = "orange")
      plt.xticks(rotation = 35)
      ax.bar_label(ax.containers[0])
      plt.title("Count of Orders By Months in 2018")
      plt.show()
```



[9]:
```
# Find the average number of products per order, grouped by customer city.

query = """with count_per_order as
(select orders.order_id, orders.customer_id, count(order_items.order_id) as oc
from orders join order_items
on orders.order_id = order_items.order_id
group by orders.order_id, orders.customer_id)

select customers.customer_city, round(avg(count_per_order.oc),2) average_orders
from customers join count_per_order
on customers.customer_id = count_per_order.customer_id
group by customers.customer_city order by average_orders desc
"""
cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["Customer_city", "Average Per Order"])
df.head(10)
```

[9]:

	Customer_city	Average Per Order
0	padre carvalho	7.00
1	celso ramos	6.50
2	candido godoi	6.00
3	datas	6.00
4	matias olimpio	5.00
5	morro de sao paulo	4.00
6	cidelandia	4.00
7	picarra	4.00
8	teixeira soares	4.00
9	curralinho	4.00

Calculate the percentage of total revenue contributed by each product category.

[10]:
```
query = """select upper(products.product_category) category, round(sum(payments.payment_value) / (select sum(payment_value) from payments) * 100 , 2) sales
      from products join order_items
      on products.product_id = order_items.product_id
      join payments
      on payments.order_id = order_items.order_id
      group by category order by sales desc"""
cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["Categories", "Sales(in %)"])
df.head(10)
```

[10]:

	Categories	Sales(in %)
0	BED TABLE BATH	10.70
1	HEALTH BEAUTY	10.35
2	COMPUTER ACCESSORIES	9.90
3	FURNITURE DECORATION	8.93
4	WATCHES PRESENT	8.93
5	SPORT LEISURE	8.70
6	HOUSEWARES	6.84
7	AUTOMOTIVE	5.32
8	GARDEN TOOLS	5.24
9	COOL STUFF	4.87

Identify the correlation between product price and the number of times a product has been purchased.

[11]:
```
#  We Need to Calculate the correlation between the Order Count and the Averaage Price.
# For Finding The relation between Them we just Simply Use the Function present into the nympy....


import seaborn as sns
import pandas as pd
import matplotlib.pyplot as plt
import mysql.connector
import numpy as np

query  = """select upper(p.product_category), count(o.product_id), round(avg(o.price), 2)
from products p join order_items o
on p.product_id = o.product_id
group by p.product_category
order by count(o.product_id) desc"""
cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["Category", "Order_Count", "Average Price"])
df.head(10)
```

```
arr1 = df["Order_Count"];
arr2 = df["Average Price"]

#  There are no dependencies for both things means we cannot say that one is increasing on the behalf of the second Thing
a = np.corrcoef([arr1, arr2])
print("The Correlation between the price and the No. of Order Count",  a[0][1])
```

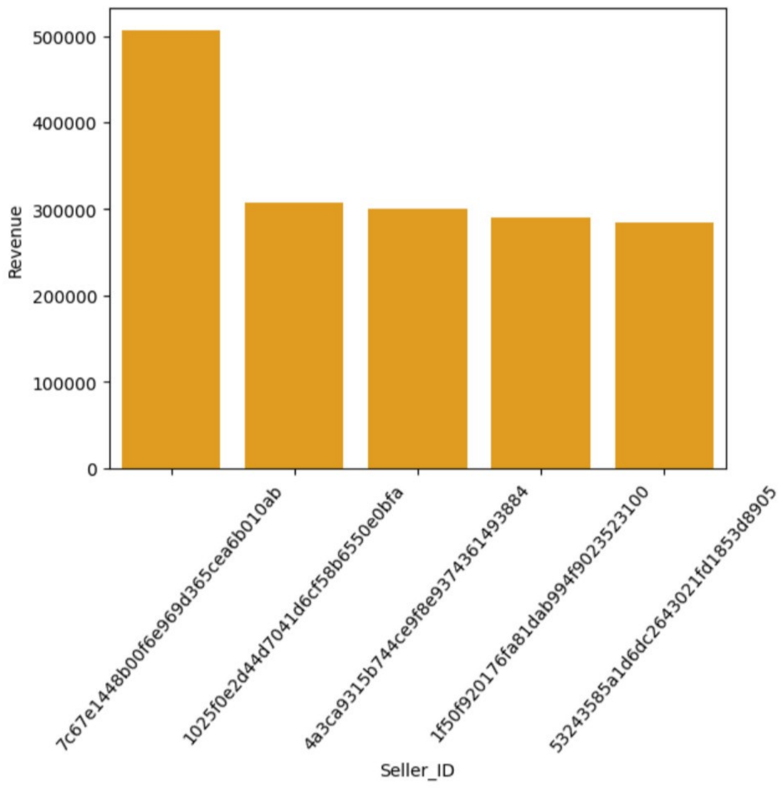
```
The Correlation between the price and the No. of Order Count -0.10631514167157564
```

Calculate the total revenue generated by each seller, and rank them by revenue.

[24]:
```
query  = """select *, dense_rank() over(order by Revenue desc) as Rank_Column from
(select order_items.seller_id as Seller_ID, sum(payments.payment_value) as Revenue
from order_items join payments
on order_items.order_id = payments.order_id
group by order_items.seller_id) as a"""

cur.execute(query)
data = cur.fetchall()

df = pd.DataFrame(data, columns = ["Seller_ID", "Revenue", "Rank By Revenue"])
# df.head(10)
sns.barplot(x = "Seller_ID", y = "Revenue", data = df.head(5), color = "orange")
plt.xticks(rotation  = 50)
plt.show()
```



Calculate the moving average of order values for each customer over their order history.

[13]:
```
query = """select customer_id, order_purchase_timestamp, payment,
avg(payment) over (partition by customer_id order by order_purchase_timestamp rows between 5 preceding and current row) as Moving_Avg
from
(select orders.customer_id, orders.order_purchase_timestamp, payments.payment_value as payment
from orders join payments
on orders.order_id = payments.order_id)  as a"""
cur.execute(query)
data = cur.fetchall()

df = pd.DataFrame(data, columns = ["Customer_ID", "Order_Purchase_Timestamp", "Payment", "Moving_Average"])
df.head(20)
```

[13]:

	Customer_ID	Order_Purchase_Timestamp	Payment	Moving_Average
0	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
1	000161a058600d5901f007fab4c27140	2017-07-16 09:40:32	67.41	67.410004
2	0001fd6190edaaf884bcaf3d49edf079	2017-02-28 11:06:43	195.42	195.419998
3	0002414f95344307404f0ace7a26f1d5	2017-08-16 13:09:20	179.35	179.350006
4	000379cdec625522490c315e70c7a9fb	2018-04-02 13:42:17	107.01	107.010002
5	0004164d20a9e969af783496f3408652	2017-04-12 08:35:12	71.80	71.800003
6	000419c5494106c306a97b5635748086	2018-03-02 17:47:40	49.40	49.400002
7	00046a560d407e99b969756e0b10f282	2017-12-18 11:08:30	166.59	166.589996
8	00050bf6e01e69d5c0fd612f1bcfb69c	2017-09-17 16:04:44	85.23	85.230003

9	000598caf2ef4117407665ac33275130	2018-08-11 12:14:35	1255.71	1255.709961
10	0005aefbb696d34b3424dccd0a0e9fd0	2018-06-20 09:46:53	147.33	147.330002
11	00062b33cb9f6fe976afdcff967ea74d	2017-03-15 23:44:09	58.95	58.950001
12	00066ccbe787a588c52bd5ff404590e3	2018-02-06 16:10:09	270.00	270.000000
13	00072d033fe2e59061ae5c3aff1a2be5	2017-09-01 09:24:39	106.97	106.970001
14	0009a69b72033b2d0ec8c69fc70ef768	2017-04-28 13:36:30	173.60	173.600006
15	000bf8121c3412d3057d32371c5d3395	2017-10-11 07:44:31	45.56	45.560001
16	000e943451fc2788ca6ac98a682f2f49	2017-04-20 19:37:14	25.83	25.830000
17	000e943451fc2788ca6ac98a682f2f49	2017-04-20 19:37:14	26.80	26.315000
18	000e943451fc2788ca6ac98a682f2f49	2017-04-20 19:37:14	26.80	26.476666
19	000e943451fc2788ca6ac98a682f2f49	2017-04-20 19:37:14	26.80	26.557499

Calculate the cumulative sales per month for each year.

[14]:
```
query = """select Years, Months, Payment, sum(Payment) over(order by Years, Months) Cumulative_Sales from
(select year(orders.order_purchase_timestamp) as Years, month(orders.order_purchase_timestamp) as Months,
round(sum(payments.payment_value), 2) Payment
from orders join payments
on orders.order_id = payments.order_id
group by Years, Months order by Years,Months) as a"""

cur.execute(query)
data = cur.fetchall()

df = pd.DataFrame(data, columns = ["Year", "Month", "Price" , "Cumulative Price"])
df
```

[14]:

	Year	Month	Price	Cumulative Price
0	2016	9	252.24	252.24
1	2016	10	59090.48	59342.72
2	2016	12	19.62	59362.34
3	2017	1	138488.04	197850.38
4	2017	2	291908.01	489758.39
5	2017	3	449863.60	939621.99
6	2017	4	417788.03	1357410.02
7	2017	5	592918.82	1950328.84
8	2017	6	511276.38	2461605.22
9	2017	7	592382.92	3053988.14
10	2017	8	674396.32	3728384.46
11	2017	9	727762.45	4456146.91
12	2017	10	779677.88	5235824.79
13	2017	11	1194882.80	6430707.59
14	2017	12	878401.48	7309109.07
15	2018	1	1115004.18	8424113.25
16	2018	2	992463.34	9416576.59
17	2018	3	1159652.12	10576228.71
18	2018	4	1160785.48	11737014.19
19	2018	5	1153982.15	12890996.34
20	2018	6	1023880.50	13914876.84
21	2018	7	1066540.75	14981417.59
22	2018	8	1022425.32	16003842.91
23	2018	9	4439.54	16008282.45
24	2018	10	589.67	16008872.12

Calculate the year-over-year growth rate of total sales.

[15]:
```
query = """
with a as(select year(orders.order_purchase_timestamp) as Years, round(sum(payments.payment_value),2) as payment
from orders join payments
on orders.order_id = payments.order_id
group by Years order by Years)

select Years, ((payment - lag(payment, 1) over(order by Years))/ lag(payment, 1) over(order by Years)) * 100 from a
"""

cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data, columns = ["Years", "YOY Growth (%)"])
df
```

[15]:

	Years	YOY Growth (%)
0	2016	NaN
1	2017	12112.703761
2	2018	20.000924

Calculate the retention rate of customers, defined as the percentage of customers who make another purchase within 6 months of their first purchase.

[16]:
```
query = """with a as(select customers.customer_id , min(orders.order_purchase_timestamp) as First_Order
from customers join orders
on customers.customer_id = orders.customer_id
group by customers.customer_id),
 b as (select a.customer_id, count(distinct(orders.order_purchase_timestamp)) as Next_Order
from a join orders
on orders.customer_id = a.customer_id
and orders.order_purchase_timestamp > First_Order
and orders.order_purchase_timestamp < date_add(First_Order, interval 6 month)
group by a.customer_id)

select 100 * (count(distinct(a.customer_id)) / count(distinct(b.customer_id))) as Customer_Count
from a left join b
on a.customer_id = b.customer_id"""

cur.execute(query)
data = cur.fetchall()

df = pd.DataFrame(data, columns = ["Repeated Customer"])
df

#  So here we dont have any person who purchase any Item in 6 months after the first Order
```

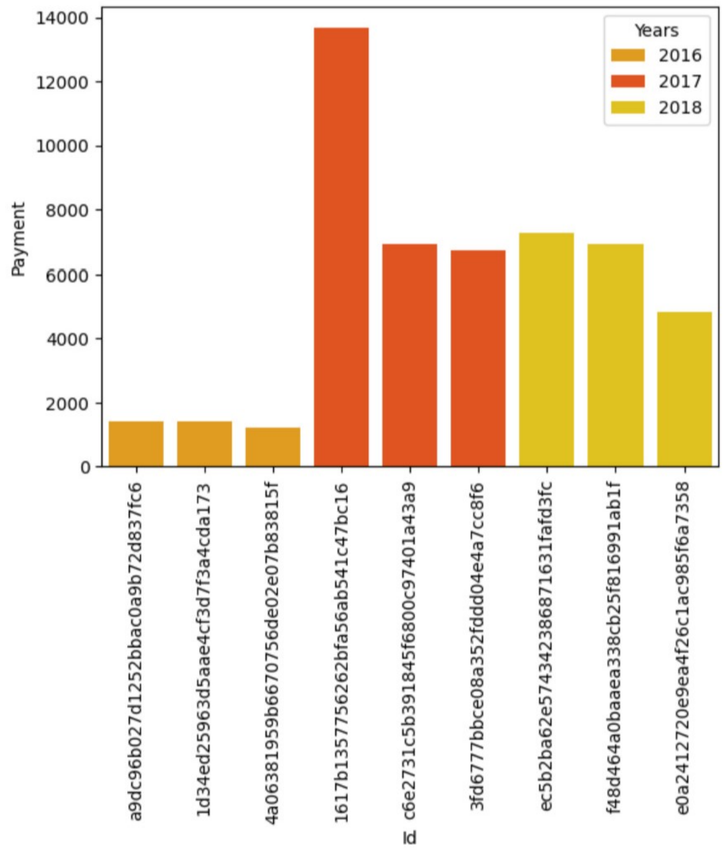
[16]:

	Repeated Customer
0	None

Identify the top 3 customers who spent the most money in each year.

[28]:
```
query = """select Years, customer_id, Payment, Dense_Ranks
from (select year(orders.order_purchase_timestamp) as Years, orders.customer_id, sum(payments.payment_value) as Payment,
dense_rank() over(partition by year(orders.order_purchase_timestamp) order by sum(payments.payment_value) desc) as Dense_Ranks
from orders join payments
on orders.order_id = payments.order_id
group by year(orders.order_purchase_timestamp), orders.customer_id) as a
where Dense_Ranks <= 3;"""

cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data, columns = ["Years", "Id", "Payment", "Rank"])
palette = sns.color_palette(["#FFA500", "#FF4500", "#FFD700"])
sns.barplot(x = "Id", y = "Payment", data = df, hue = "Years", palette = palette)
plt.xticks(rotation = 90)
plt.show()
```



```
[ ]:
```