In [ ]:
```
pip install mysql-connector-
```

In [ ]:
```
pip install pandas
```

In [1]:
```
import pandas as pd
import mysql.connector
import os

# List of CSV files and their corresponding table names
csv_files = [
    ('customers.csv', 'customers'),
    ('orders.csv', 'orders'),
    ('sellers.csv', 'sellers'),
    ('products.csv', 'products'),
    ('geolocation.csv', 'geolocation'),
    ('payments.csv', 'payments'),
    ('order_items.csv', 'order_items')# Added payments.csv for specific handling
]

# Connect to the MySQL database
conn = mysql.connector.connect(
    host='localhost',
    user='root',
    password='Biswajit@4321',
    database='ecommerc'
)
cursor = conn.cursor()

# Folder containing the CSV files
folder_path = 'C:/Users/biswa/Downloads/archive (2)'

def get_sql_type(dtype):
    if pd.api.types.is_integer_dtype(dtype):
        return 'INT'
    elif pd.api.types.is_float_dtype(dtype):
        return 'FLOAT'
    elif pd.api.types.is_bool_dtype(dtype):
        return 'BOOLEAN'
    elif pd.api.types.is_datetime64_any_dtype(dtype):
        return 'DATETIME'
    else:
        return 'TEXT'

for csv_file, table_name in csv_files:
    file_path = os.path.join(folder_path, csv_file)

    # Read the CSV file into a pandas DataFrame
    df = pd.read_csv(file_path)

    # Replace NaN with None to handle SQL NULL
    df = df.where(pd.notnull(df), None)

    # Debugging: Check for NaN values
    print(f"Processing {csv_file}")
    print(f"NaN values before replacement:\n{df.isnull().sum()}\n")

    # Clean column names
    df.columns = [col.replace(' ', '_').replace('-', '_').replace('.', '_') for
```

```
    # Generate the CREATE TABLE statement with appropriate data types
    columns = ', '.join([f'`{col}` {get_sql_type(df[col].dtype)}' for col in df.
    create_table_query = f'CREATE TABLE IF NOT EXISTS `{table_name}` ({columns})
    cursor.execute(create_table_query)

    # Insert DataFrame data into the MySQL table
    for _, row in df.iterrows():
        # Convert row to tuple and handle NaN/None explicitly
        values = tuple(None if pd.isna(x) else x for x in row)
        sql = f"INSERT INTO `{table_name}` ({', '.join(['`' + col + '`' for col
        cursor.execute(sql, values)

    # Commit the transaction for the current CSV file
    conn.commit()

# Close the connection
conn.close()
```

```
Processing customers.csv
NaN values before replacement:
customer_id                 0
customer_unique_id          0
customer_zip_code_prefix    0
customer_city               0
customer_state              0
dtype: int64

Processing orders.csv
NaN values before replacement:
order_id                            0
customer_id                         0
order_status                        0
order_purchase_timestamp            0
order_approved_at                 160
order_delivered_carrier_date     1783
order_delivered_customer_date    2965
order_estimated_delivery_date       0
dtype: int64

Processing sellers.csv
NaN values before replacement:
seller_id                 0
seller_zip_code_prefix    0
seller_city               0
seller_state              0
dtype: int64

Processing products.csv
NaN values before replacement:
product_id                      0
product category              610
product_name_length           610
product_description_length    610
product_photos_qty            610
product_weight_g                2
product_length_cm               2
product_height_cm               2
product_width_cm                2
dtype: int64

Processing geolocation.csv
NaN values before replacement:
geolocation_zip_code_prefix    0
geolocation_lat                0
geolocation_lng                0
geolocation_city               0
geolocation_state              0
dtype: int64

Processing payments.csv
NaN values before replacement:
order_id                0
payment_sequential      0
payment_type            0
payment_installments    0
payment_value           0
dtype: int64
```

```
Processing order_items.csv
NaN values before replacement:
order_id               0
order_item_id          0
product_id             0
seller_id              0
shipping_limit_date    0
price                  0
freight_value          0
dtype: int64
```

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


db = mysql.connector.connect(host = "localhost",
                             username = "root",
                             password = "Biswajit@4321",
                             database = "ecommerc")

cur = db.cursor()
```

Start Writting Query Based On A Basic To Advance Lvl Question.

Q1 List all unique cities where customers are located.

In [6]:
```
query = """ select distinct customer_city from customers """

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data)
df.head(5)
```

Out[6]:

	0
0	franca
1	sao bernardo do campo
2	sao paulo
3	mogi das cruzes
4	campinas

Q2. Count the number of orders placed in 2017.

In [7]:
```
query = """ select count(order_id) from orders where year(order_purchase_timesta

cur.execute(query)

data = cur.fetchall()

"total orders placed in 2017 are", data[0][0]
```

Out[7]:
```
('total orders placed in 2017 are', 90202)
```

Q3. Find the total sales per category.

In [8]:
```
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
```

Out[8]:

	Category	Sales
0	PERFUMERY	1013477.32
1	FURNITURE DECORATION	2860352.78
2	TELEPHONY	973764.10
3	FASHION BAGS AND ACCESSORIES	436316.56
4	BED TABLE BATH	3425107.34
...	...	...
69	CDS MUSIC DVDS	2398.86
70	LA CUISINE	5827.06
71	FASHION CHILDREN'S CLOTHING	1571.34
72	PC GAMER	4348.86
73	INSURANCE AND SERVICES	649.02

74 rows × 2 columns

Q4 Calculate the percentage of orders that were paid in installments.

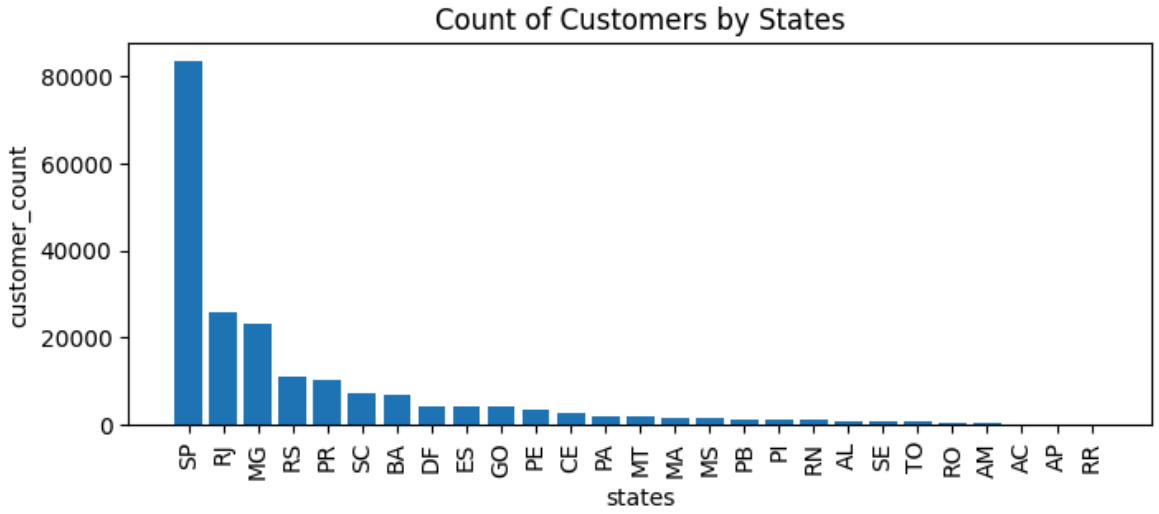
In [9]:
```
query = """ select ((sum(case when payment_installments >= 1 then 1
else 0 end))/count(*))*100 from payments
"""

cur.execute(query)

data = cur.fetchall()

"the percentage of orders that were paid in installments is", data[0][0]
```

Out[9]:
```
('the percentage of orders that were paid in installments is',
 Decimal('99.9981'))
```

Q5 Count the number of customers from each state.

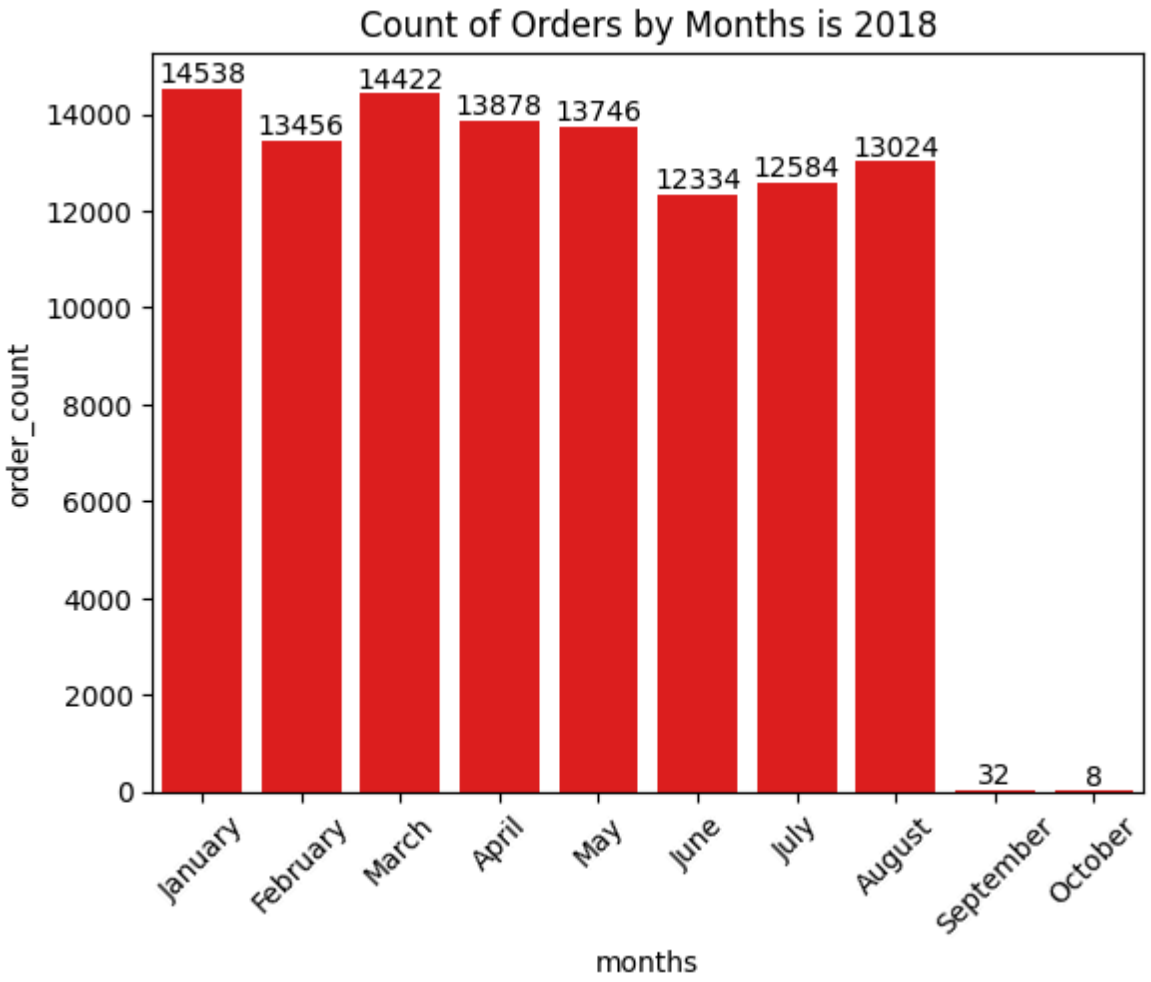
In [10]:
```
query = """ select customer_state ,count(customer_id)
from customers group by customer_state
"""

cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["state", "customer_count" ])
df = df.sort_values(by = "customer_count", ascending= False)
```

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



Q6 Calculate the number of orders per month in 2018.

In [11]:
```
query = """ select monthname(order_purchase_timestamp) months, count(order_id) o
from orders where year(order_purchase_timestamp) = 2018
group by months
"""

cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["months", "order_count"])
o = ["January", "February","March","April","May","June","July","August","Septemb

ax = sns.barplot(x = df["months"],y =  df["order_count"], data = df, order = o,
plt.xticks(rotation = 45)
ax.bar_label(ax.containers[0])
plt.title("Count of Orders by Months is 2018")

plt.show()
```



Q7 Find the average number of products per order, grouped by customer city.

In [12]:

```
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 products/order"])
df.head(10)
```

Out[12]:

	customer city	average products/order
0	padre carvalho	14.00
1	celso ramos	13.00
2	datas	12.00
3	candido godoi	12.00
4	matias olimpio	10.00
5	cidelandia	8.00
6	curralinho	8.00
7	picarra	8.00
8	morro de sao paulo	8.00
9	teixeira soares	8.00

Q8 Calculate the percentage of total revenue contributed by each product category.

In [14]:

```
query = """select upper(products.product_category) category,
round((sum(payments.payment_value)/(select sum(payment_value) from payments))*10
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_percentage desc"""


cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data,columns = ["Category", "percentage distribution"])
df.head(7)
```

Out[14]:

	Category	percentage distribution
0	BED TABLE BATH	21.40
1	HEALTH BEAUTY	20.71
2	COMPUTER ACCESSORIES	19.81
3	FURNITURE DECORATION	17.87
4	WATCHES PRESENT	17.86
5	SPORT LEISURE	17.39
6	HOUSEWARES	13.68

Q9 Identify the correlation between product price and the number of times a product has been purchased.)

In [19]:
```
import numpy as np
cur = db.cursor()
query = """select products.product_category,
count(order_items.product_id),
round(avg(order_items.price),2)
from products join order_items
on products.product_id = order_items.product_id
group by products.product_category"""

cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data,columns = ["Category", "order_count","price"])

arr1 = df["order_count"]
arr2 = df["price"]

a = np.corrcoef([arr1,arr2])
print("the correlation is", a[0][-1])
```

```
the correlation is -0.10631514167157562
```

Q10 Calculate the total revenue generated by each seller, and rank them by revenue.

In [ ]:
```
query = """ select *, dense_rank() over(order by revenue desc) as rn from
(select order_items.seller_id, sum(payments.payment_value)
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"])
df = df.head()
sns.barplot(x = "seller_id", y = "revenue", data = df)
plt.xticks(rotation = 90)
plt.show()
```

Q11 Calculate the moving average of order values for each customer over their order history.

In [21]:
```
query = """select customer_id, order_purchase_timestamp, payment,
avg(payment) over(partition by customer_id order by order_purchase_timestamp
```

```
rows between 2 preceding and current row) as mov_avg
from
(select orders.customer_id, orders.order_purchase_timestamp,
payments.payment_value as payment
from payments join orders
on payments.order_id = orders.order_id) as a"""
cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data)
df.head()
```

Out[21]:

	0	1	2	3
0	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
1	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
2	000161a058600d5901f007fab4c27140	2017-07-16 09:40:32	67.41	67.410004
3	000161a058600d5901f007fab4c27140	2017-07-16 09:40:32	67.41	67.410004
4	0001fd6190edaaf884bcaf3d49edf079	2017-02-28 11:06:43	195.42	195.419998

Q12 Calculate the cumulative sales per month for each year.

In [22]:

```
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) as 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)
df.head()
```

Out[22]:

	0	1	2	3
0	2016	9	504.48	504.48
1	2016	10	118180.96	118685.44
2	2016	12	39.24	118724.68
3	2017	1	276976.08	395700.76
4	2017	2	583816.02	979516.78

Q13 Calculate the year-over-year growth rate of total sales.

In [24]:
```
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.head()
```

Out[24]:

	years	yoy % growth
0	2016	NaN
1	2017	12112.703761
2	2018	20.000924

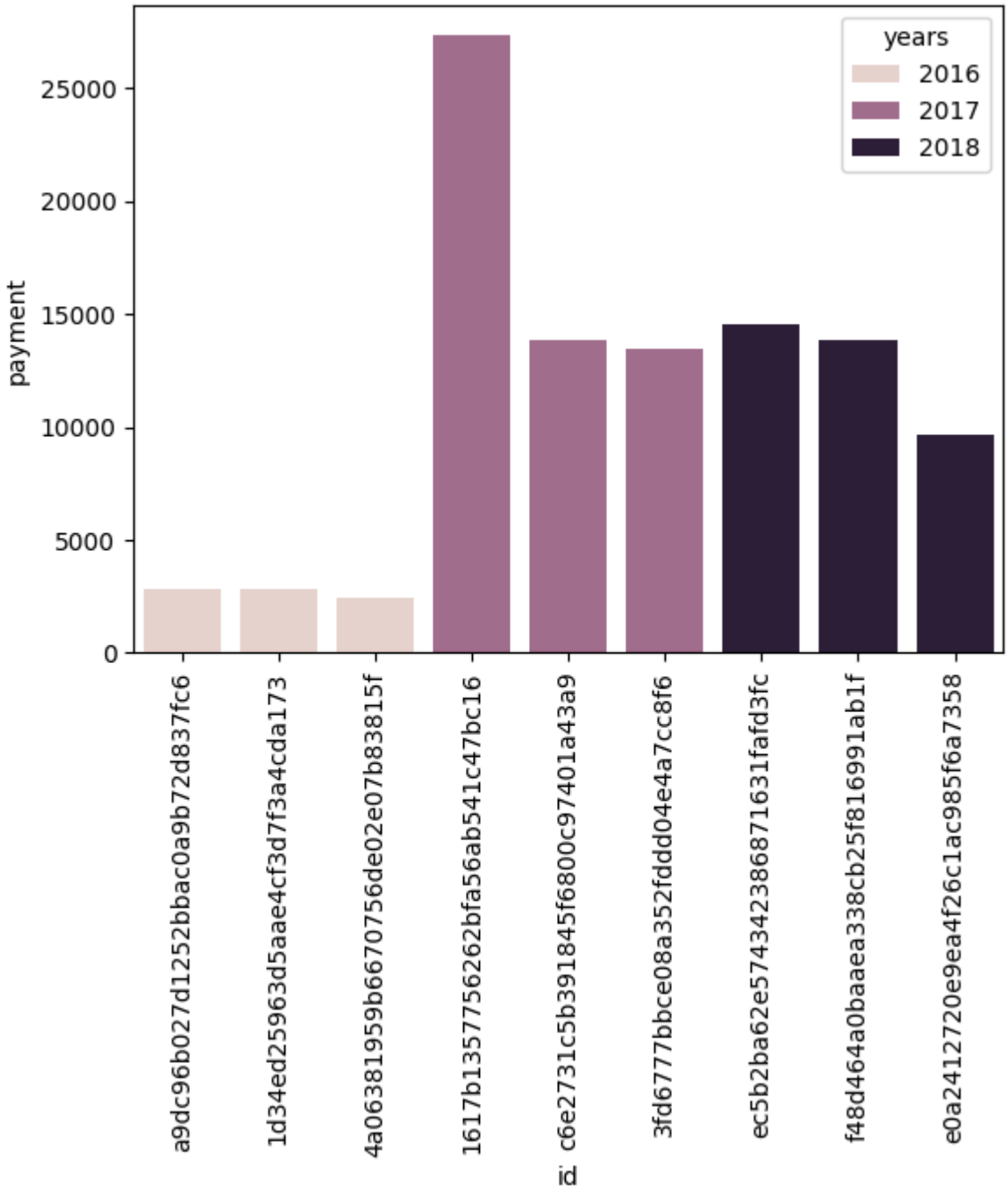
Q14 Calculate the retention rate of customers, defined as the percentage of customers who make another purchase within 6 months of their first purchase.

In [25]:
```
query = """with a as (select customers.customer_id,
min(orders.order_purchase_timestamp) 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) next
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))
from a left join b
on a.customer_id = b.customer_id ;"""

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

Out[25]:
```
[(None,)]
```

Q15 Identify the top 3 customers who spent the most money in each year.

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

cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data, columns = ["years","id","payment","rank"])
sns.barplot(x = "id", y = "payment", data = df, hue = "years")
plt.xticks(rotation = 90)
plt.show()
```



About Dataset

Target is a globally recognized brand and a leading retailer in the United States, known for offering exceptional value, inspiration, innovation, and a unique shopping experience.

This dataset focuses on Target's operations in Brazil, covering 100,000 orders placed between 2016 and 2018. It includes detailed information on order status, pricing, payment and shipping performance, customer locations, product attributes, and customer reviews.

Potential Use Cases

Analyzing this dataset offers valuable insights into Target's Brazilian operations, revealing details about order processing,

pricing strategies, payment and shipping efficiency, customer demographics, product characteristics, and customer satisfaction.

This comprehensive dataset is a valuable resource for understanding various business aspects and enhancing strategic decision-making.

How It's Goanna Help Organization

This project helps the organization by identifying inefficiencies in order processing and shipping,

improving customer satisfaction through insights into product and pricing preferences,

and optimizing payment methods. It also supports data-driven strategies for enhancing operational performance and

targeting key customer demographics more effectively.

In [ ]: