Target Corporation Overview

Target Corporation is a prominent American retail corporation headquartered in Minneapolis, Minnesota. It operates a chain of discount department stores and hypermarkets, making it the seventh-largest retailer in the United States[4]. Key aspects of Target include:

- **Founded**: 1902
- **Headquarters**: Minneapolis, Minnesota
- **Number of Stores**: Approximately 1,963 stores across the U.S.
- **Employees**: Over 400,000
- **Revenue**: $107 billion in 2023[1]

E-commerce Analysis

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'),
    ('payments.csv', 'payments'),
    ('geolocation.csv', 'geolocation'),
    ('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='Pawan@131019',
    database='ecommerce'
)
cursor = conn.cursor()

# Folder containing the CSV files
folder_path = 'D:/Business Analytics Learn File/Learning AI/Project practice/Ecommerce Sql with python/Datasets'

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 col in df.columns]

    # Generate the CREATE TABLE statement with appropriate data types
    columns = ', '.join([f'`{col}` {get_sql_type(df[col].dtype)}' for col in df.columns])
    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 in df.columns])}) VALUES
        ({', '.join(['%s'] * len(row))})"
        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 payments.csv
NaN values before replacement:
order_id                0
payment_sequential      0
payment_type            0
payment_installments    0
payment_value           0
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 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 numpy as np
import seaborn as sns
import mysql.connector

db = mysql.connector.connect(   host='localhost',
                                user='root',
                                password='Pawan@131019',
                                database='ecommerce')

cur = db.cursor()
```

1.List all unique cities where customers are located.

In [3]:

```
query = """ select distinct customer_city from customers"""

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data, columns = ["City"])
df.head()
```

Out[3]:

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

2. Count the number of orders placed in 2017

In [4]:

```
query = """ select count(order_id) from orders where year(order_purchase_timestamp) = 2017"""

cur.execute(query)

data = cur.fetchall()

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

Out[4]: ('Total orders placed in 2017 are', 45101)

3. Find the total sales per category.

In [5]:

```
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"])
```

In [6]:

```
df
```

Out[6]:

	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

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

In [7]:

```
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",data[0][0]
```

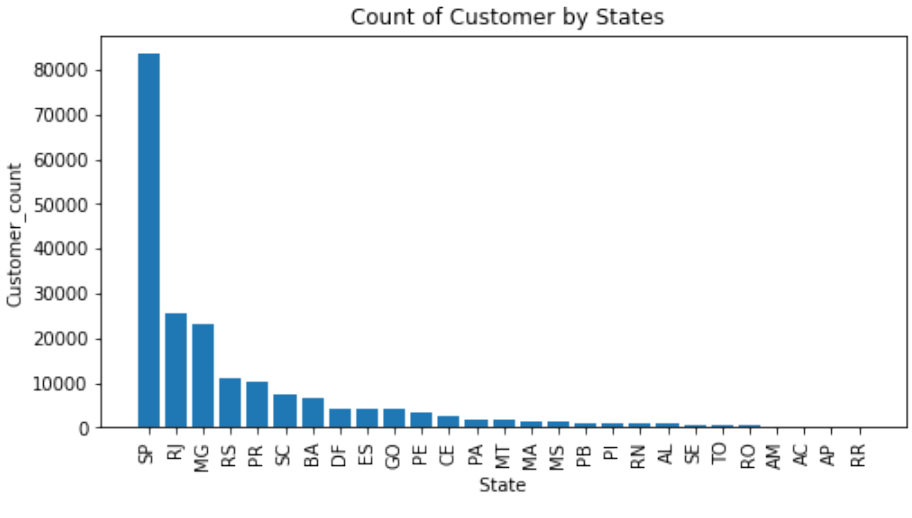
Out[7]: ('the percentage of orders that were paid in installments', Decimal('99.9981'))

5. Count the number of customers from each state.

In [8]:

```
query = """ select customer_state ,count(customer_id)
from customers group by customer_state

"""
```

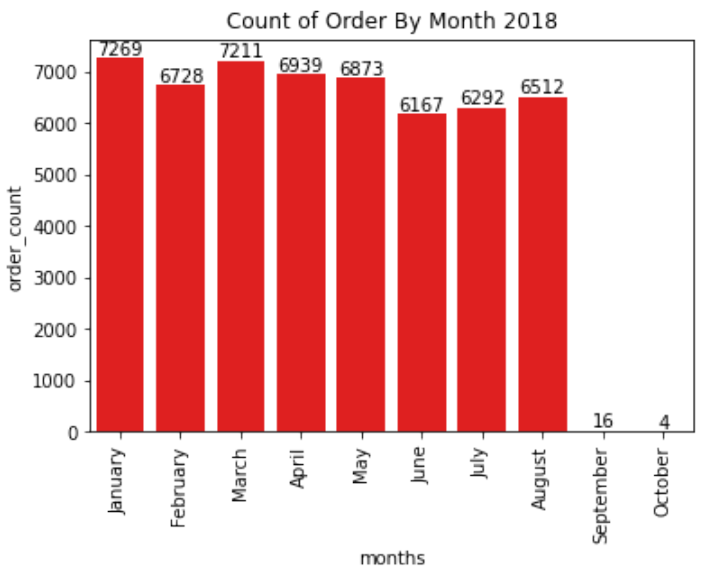
```
cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data, columns = ["state", "Customer_count"])
df = df.sort_values(by = "Customer_count", ascending = False)

plt.figure(figsize = (8,4))
plt.bar(df["state"],df["Customer_count"])
plt.xticks(rotation =90)
plt.xlabel(" State ")
plt.ylabel("Customer_count")
plt.title(" Count of Customer by States")
plt.show()
```



1. Calculate the number of orders per month in 2018.

In [9]:

```
query = """ select monthname(order_purchase_timestamp) months
, count(order_id) 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"])

# List of o names
o = [
    "January", "February", "March", "April", "May",
    "June", "July", "August", "September", "October"]

ax = sns.barplot(x = df["months"],y =df["order_count"], data = df, order =o, color = "red")
plt.xticks(rotation =90)
plt.title("Count of Order By Month 2018")

ax.bar_label(ax.containers[0])
plt.show()
```



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

In [10]:

```
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 orders/order"])

df.head(10)
```

Out[10]:

	customer city	average orders/order
0	padre carvalho	7.00
1	celso ramos	6.50
2	datas	6.00
3	candido godoi	6.00
4	matias olimpio	5.00
5	cidelandia	4.00
6	curralinho	4.00
7	picarra	4.00
8	morro de sao paulo	4.00
9	teixeira soares	4.00

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

In [11]:

```
query = """ select upper(products.product_category) category,
round((sum(payments.payment_value)/(select sum(payment_value) from payments))*100,2)
sales_percentage
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(10)
```

Out[11]:

	Category	Percentage distribution
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

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

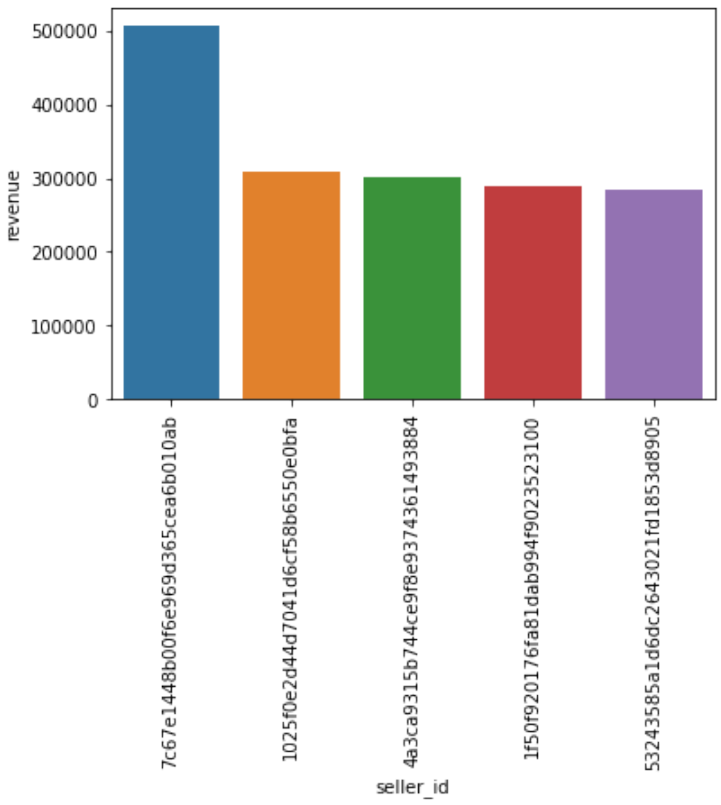
In [13]:

```
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 between price and number of times a product has been purchased",a[0][1])
```

```
the correlation between price and number of times a product has been purchased -0.10631514167157562
```

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

In [15]:
```
query = """
select *, dense_rank() over(order by revenue desc) as rn from (
    select order_items.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"])
df = df.head()
sns.barplot(x="seller_id", y="revenue", data=df)
plt.xticks(rotation=90)

plt.show()
```



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

In [17]:
```
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,columns=["seller_id", "Date", "Price", "Moving_avg_price"] )
df
```

Out[17]:

	seller_id	Date	Price	Moving_avg_price
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
...	...	...	...	...
103881	fffecc9f79fd8c764f843e9951b11341	2018-03-29 16:59:26	71.23	27.120001
103882	fffeda5b6d849fbd39689bb92087f431	2018-05-22 13:36:02	63.13	63.130001
103883	ffff42319e9b2d713724ae527742af25	2018-06-13 16:57:05	214.13	214.130005
103884	ffffa3172527f765de70084a7e53aae8	2017-09-02 11:53:32	45.50	45.500000
103885	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001

103886 rows × 4 columns

2. Calculate the cumulative sales per month for each year.

In [20]:
```
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,columns=["Years", "Months", "Payment", "Cummulative_sales"] )
df
```

Out[20]:

	Years	Months	Payment	Cummulative_sales
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

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

In [22]:

```
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
```

Out[22]:

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

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

In [26]:

```
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_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))
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
```

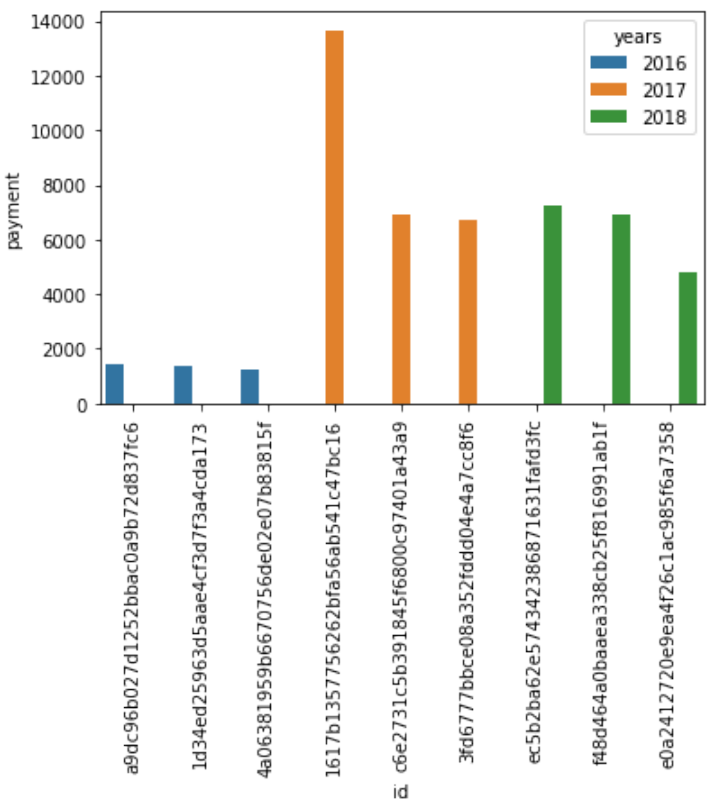
Out[26]:

	Repeated_customer
0	None

In [ ]:
```
#who make another purchase within 6 months of their first purchase no Repeated_customer 0 None
```

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

In [29]:
```
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()
```



In [ ]:
```

```