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# Business Case: Target SQL

## 1. Import the dataset and do usual exploratory analysis steps like checking the structure & characteristics of the dataset:

### 1.1 Data type of columns in a table

Table Name: customers

Query:

```
SELECT column_name, data_type
FROM `Target.INFORMATION_SCHEMA.COLUMNS`
WHERE   table_name = 'customers'
```

| Row | column_name | data_type |
|---|---|---|
| 1 | customer_id | STRING |
| 2 | customer_unique_id | STRING |
| 3 | customer_zip_code_prefix | INT64 |
| 4 | customer_city | STRING |
| 5 | customer_state | STRING |

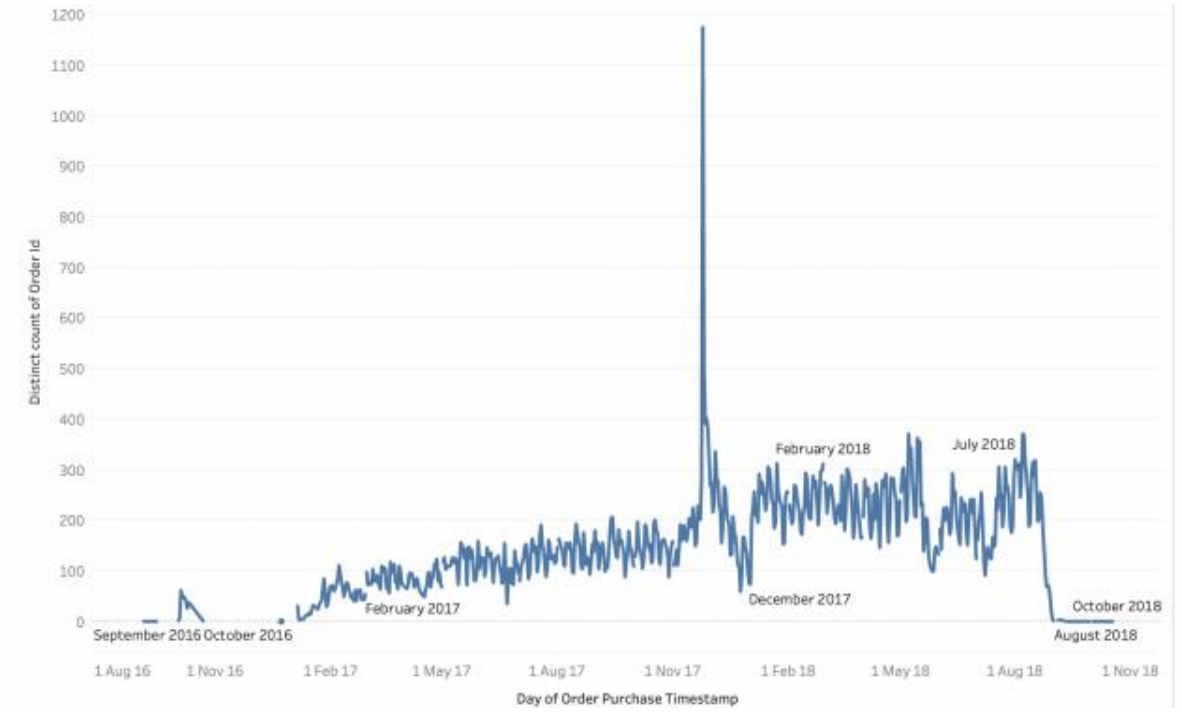
### 1.2 Time period for which the data is given

Query:

```
select min(order_purchase_timestamp) as first_transaction_date,
max(order_purchase_timestamp) as last_transaction_date
from `Target.orders`
```

| Row | first_transaction_date | last_transaction_date |
|---|---|---|
| 1 | 2016-09-04 21:15:19 UTC | 2018-10-17 17:30:18 UTC |

Insights: E-commerce is growing at a really fast. The detailed analysis of the datasets are done to reflect the trend in the Brazilian market. After digging into the datasets for the given period of 2016-2018 , it could be seen they had first transaction on 4th Sept, 2016 (based on the given data).




## 1.3 Cities and States of customers ordered during the given period

### Query:

```
select distinct customer_city, customer_state
from `Target.customers`c
RIGHT JOIN
`Target.orders`o
on c.customer_id = o.customer_id
```

| Row | customer_city | customer_state |
|---|---|---|
| 1 | rio de janeiro | RJ |
| 2 | sao leopoldo | RS |
| 3 | general salgado | SP |
| 4 | brasilia | DF |
| 5 | paranavai | PR |
| 6 | cuiaba | MT |
| 7 | sao luis | MA |
| 8 | maceio | AL |
| 9 | hortolandia | SP |
| 10 | varzea grande | MT |

Insights: The brand ‘Target’ has covered 27 states in Brazil

## 2. In-depth Exploration:

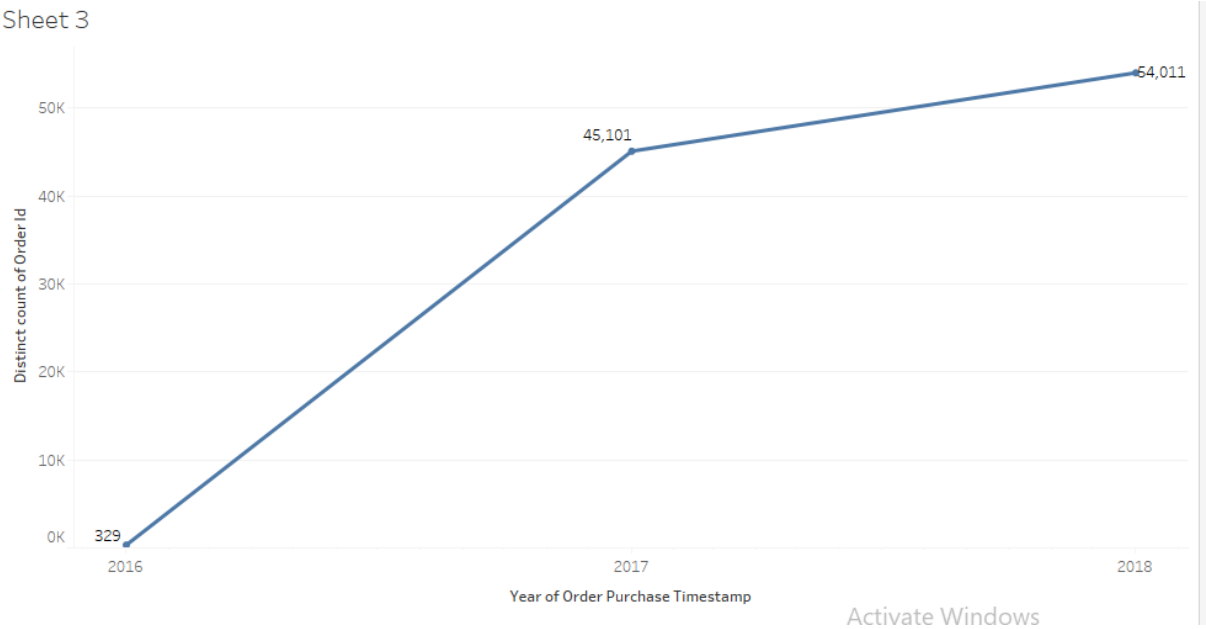
### 2.1 Is there a growing trend on e-commerce in Brazil? How can we describe a complete scenario? Can we see some seasonality with peaks at specific months?

Query:

```
select extract(year from order_purchase_timestamp)as
yearoforder,count (distinct(order_id))as no_of_orders
from `Target.orders`
group by yearoforder
order by yearoforder
```

| Row | yearoforder | no_of_orders |
|---|---|---|
| 1 | 2016 | 329 |
| 2 | 2017 | 45101 |
| 3 | 2018 | 54011 |

Insights: This evaluation clarifies the growing trend of e-commerce along the time in Brazil . The demand of the orders increases at a very fast pace from 2016 to 2018. The below mentioned graph gives a deep insight for the monthly count of orders allowing you to observe growing trend or seasonality at the specific months in e-commerce in Brazil. Majority of the customers prefer to buy the online stuff during the late hours of the day, that is at night.




## 2.2 What time do Brazilian customers tend to buy (Dawn, Morning, Afternoon or Night)?

### Query:

```
SELECT  COUNT(*) as purchase_count,
CASE
WHEN order_purchase between '03:00:00' and '06:00:00'
THEN 'Dawn'
WHEN order_purchase between '06:00:00' and '12:00:00'
THEN 'Morning'
WHEN  order_purchase between '12:00:00' and '17:00:00'
THEN 'Afternoon'
ELSE 'Night'
END AS purchase_time
from (select*,extract(time from order_purchase_timestamp)as
order_purchase from `Target.orders`) time_stamp
GROUP BY purchase_time
order by purchase_count
```

| Row | purchase_count | purchase_time |
|---|---|---|
| 1 | 666 | Dawn |
| 2 | 22240 | Morning |
| 3 | 32212 | Afternoon |
| 4 | 44323 | Night |

Insight: In the given dataset, we have distributed the whole day into four parts Dawn, Morning, Afternoon, Night as per the analysis we can see more orders were made in night as compare to morning and afternoon we should focus on the mid-day buyers by providing some offers and sale.

Recommendations: As we could see night has the highest rate of buyers as compared to afternoon and morning customers. The company should focus on the categorized buyers with some strategies.

## 3. Evolution of E-commerce orders in the Brazil region:

### 3.1 Get month on month orders by states

Query:

```
select extract(month from o.order_purchase_timestamp)as month,
count(o.order_id)as order_id, c.customer_state,
from `Target.orders`as o
Join `Target.customers`as c
on o.customer_id=c.customer_id
group by month, c.customer_state
order by month
```

| Row | month | order_id | customer_state |
|---|---|---|---|
| 1 | 1 | 990 | RJ |
| 2 | 1 | 3351 | SP |
| 3 | 1 | 151 | DF |
| 4 | 1 | 427 | RS |
| 5 | 1 | 99 | CE |
| 6 | 1 | 113 | PE |
| 7 | 1 | 443 | PR |
| 8 | 1 | 264 | BA |
| 9 | 1 | 971 | MG |
| 10 | 1 | 51 | RN |

Insight: company receives the more of the sale from 'SP' state

### 3.2 Distribution of customers across the states in Brazil

Query:

```
select distinct c.customer_state, count(distinct c.customer_id)as
number_of_customer
from `Target.customers`c
right join `Target.orders`o
```

```
on c.customer_id=o.customer_id
group by 1
```

| Row | customer_state | number_of_custome |
|---|---|---|
| 1 | RJ | 12852 |
| 2 | RS | 5466 |
| 3 | SP | 41746 |
| 4 | DF | 2140 |
| 5 | PR | 5045 |
| 6 | MT | 907 |
| 7 | MA | 747 |
| 8 | AL | 413 |
| 9 | MG | 11635 |
| 10 | PE | 1652 |

Insight: Brazil has the highest customer base from the state SP with the count of 41746, as compare to other states.

4. Impact on Economy:

Analyze the money movement by e-commerce by looking at order prices, freight and others.

4.1 Get % increase in cost of orders from 2017 to 2018 (include months between Jan to Aug only) - You can use “payment_value” column in payments table

Query:

```
with cte as
(
select *
from (select round(sum(payment_value), 2) as payment_sum_2017
from `Target.orders` ord
INNER JOIN
`Target.payments` pay
on ord.order_id = pay.order_id
where extract(year from order_purchase_timestamp) = 2017 and
extract(month from
order_purchase_timestamp) between 1 and 8
) x
Cross Join
(
```

```
select round(sum(payment_value), 2) as payment_sum_2018
from `Target.orders` ord
INNER JOIN
`Target.payments` pay
on ord.order_id = pay.order_id
where extract(year from order_purchase_timestamp) = 2018 and
extract(month from
order_purchase_timestamp) between 1 and 8
)y
group by payment_sum_2017, payment_sum_2018
)
select*, round(( payment_sum_2018- payment_sum_2017)/
payment_sum_2017 ),4)
*100 as percent_change
from cte
```

| Row | payment_sum_2017 | payment_sum_2018 | percent_change |
|---|---|---|---|
| 1 | 3669022.12 | 8694733.84 | 136.98 |

Insight: Here, we have analyzed the increase in the cost of orders for 2017 and 2018 respectively.

### 4.2 Mean & Sum of price and freight value by customer state

Query:

```
select c.customer_state,round(sum(oi.price+oi.freight_value),4)as
total_price,round(avg(oi.price+oi.freight_value),4)as avg_price
from `Target.order_items` oi
join `Target.orders` o
on o.order_id=oi.order_id
join `Target.customers` c
on c.customer_id=o.customer_id
group by 1
```

| Row | customer_state | total_price | avg_price |
|---|---|---|---|
| 1 | SP | 5921678.12 | 124.8009 |
| 2 | RJ | 2129681.98 | 146.0787 |
| 3 | PR | 800935.44 | 139.5358 |
| 4 | SC | 610213.6 | 146.1239 |
| 5 | DF | 353229.44 | 146.8119 |
| 6 | MG | 1856161.49 | 141.3787 |
| 7 | PA | 217647.11 | 201.5251 |
| 8 | BA | 611506.67 | 160.9652 |

## 5. Analysis on sales, freight and delivery time

### 5.1 Calculate days between purchasing, delivering and estimated delivery

Query:

```
select
distinct order_id, extract(date from order_purchase_timestamp) as
Purchase_date,
extract(date from order_delivered_carrier_date) as
Delivery_Carrier_Date,
extract(date from order_estimated_delivery_date) as
Estimated_Delivery_Date,
(extract(day from order_delivered_carrier_date) - extract(day from
order_purchase_timestamp)) as pur_delivery_days,
(extract(day from order_delivered_carrier_date) - extract(day from
order_estimated_delivery_date)) as diff_est_delivery
from `Target.orders`
where order_status = 'delivered'
```

| Row | order_id | Purchase_date | Delivery_Carrier_Dat | Estimated_Delivery_[ | pur_delivery_days | diff_est_delivery |
|---|---|---|---|---|---|---|
| 1 | 44879a8f19c5e8a5e9278477b... | 2018-08-23 | 2018-08-27 | 2018-10-04 | 4 | 23 |
| 2 | 0562291f2b37f55cc259053d2... | 2018-04-30 | 2018-04-30 | 2018-06-06 | 0 | 24 |
| 3 | a01f50d51f398895df76f09531... | 2018-05-12 | 2018-05-28 | 2018-06-06 | 16 | 22 |
| 4 | 628923e74a955e432c826a2e0... | 2018-05-11 | 2018-05-30 | 2018-06-06 | 19 | 24 |
| 5 | ab879558e02a4aec8e7aa5941... | 2018-04-21 | 2018-04-28 | 2018-06-06 | 7 | 22 |
| 6 | b10350ed7f626af6db79354ad... | 2018-05-23 | 2018-05-28 | 2018-06-06 | 5 | 22 |
| 7 | 656ada45a719393ba3e97d8d... | 2018-04-27 | 2018-04-30 | 2018-06-06 | 3 | 24 |
| 8 | d1594d3b636b86cf4ce22e2ca... | 2018-04-29 | 2018-05-29 | 2018-06-06 | 0 | 23 |
| 9 | a8214c9e03a43c85448925684... | 2018-05-22 | 2018-05-30 | 2018-06-06 | 8 | 24 |
| 10 | 7a74611af770d37eb88aa4c25... | 2018-05-22 | 2018-05-29 | 2018-06-06 | 7 | 23 |
| 11 | 0ed4bf3a5a970c8b076ce4cce... | 2018-05-22 | 2018-05-28 | 2018-06-06 | 6 | 22 |
| 12 | 3407bfcbaa0cb49c244ededbc... | 2018-04-21 | 2018-04-30 | 2018-06-06 | 9 | 24 |

5.2 Find time_to_delivery & diff_estimated_delivery. Formula for the same given below:

time_to_delivery =

order_delivered_customer_date-order_purchase_timestamp

diff_estimated_delivery =

order_estimated_delivery_date-order_delivered_customer_date

Query:

```
select
distinct order_id, extract(datetime from order_purchase_timestamp)
as
Purchase_date,
extract(datetime from order_delivered_customer_date) as
Delivery_Customer_Date,
extract(datetime from order_estimated_delivery_date) as
Estimated_Delivery_Date,
(extract(datetime from order_delivered_customer_date) -
extract(datetime from
order_purchase_timestamp)) as time_to_delivery,
(extract(datetime from order_estimated_delivery_date) -
extract(datetime from
order_delivered_customer_date)) as diff_estimated_delivery
from `Target.orders`
where order_status = 'delivered'
```

| Row | order_id | Purchase_date | Delivery_Customer_Date | Estimated_Delivery_Date | time_to_delivery | diff_estimated_delivery |
|---|---|---|---|---|---|---|
| 1 | c158e9806f85a33877bdfd4f60... | 2017-04-14T22:06:32 | 2017-05-08T11:10:26 | 2017-05-18T00:00:00 | 0-0 23 13:3:54 | 0-0 9 12:49:34 |
| 2 | b60b53ad0bb7dacacf2989fe2... | 2017-05-10T14:03:27 | 2017-05-23T13:12:27 | 2017-05-18T00:00:00 | 0-0 12 23:9:0 | 0-0 -5 -13:12:27 |
| 3 | c830f223aae08493ebecb52f2... | 2017-04-22T15:50:30 | 2017-05-05T13:27:50 | 2017-05-18T00:00:00 | 0-0 12 21:37:20 | 0-0 12 10:32:10 |
| 4 | a8aa2cd070eeac7e4368cae3d... | 2017-05-09T17:42:45 | 2017-05-16T23:22:20 | 2017-05-18T00:00:00 | 0-0 7 5:39:35 | 0-0 1 0:37:40 |
| 5 | 813c55ce9b6baa8f879e064fbf... | 2017-04-26T01:01:39 | 2017-05-08T08:54:36 | 2017-05-18T00:00:00 | 0-0 12 7:52:57 | 0-0 9 15:5:24 |
| 6 | 44558a1547e448b41c48c4087... | 2017-05-10T20:47:02 | 2017-05-12T17:00:05 | 2017-05-18T00:00:00 | 0-0 1 20:13:3 | 0-0 5 6:59:55 |
| 7 | 036b791897847cdb8e39df794... | 2017-05-10T15:34:59 | 2017-05-17T11:14:40 | 2017-05-18T00:00:00 | 0-0 6 19:39:41 | 0-0 0 12:45:20 |
| 8 | 1aba60c04110bdd421b250ea3... | 2017-04-18T21:20:40 | 2017-05-10T11:50:00 | 2017-05-18T00:00:00 | 0-0 21 14:29:20 | 0-0 7 12:10:0 |
| 9 | 0312ecf90786def87f98aa19e0... | 2017-05-10T22:02:40 | 2017-05-18T17:09:46 | 2017-05-18T00:00:00 | 0-0 7 19:7:6 | 0-0 0 -17:9:46 |
| 10 | 635c894d068ac37e6e03dc54e... | 2017-04-15T15:37:38 | 2017-05-16T14:49:55 | 2017-05-18T00:00:00 | 0-0 30 23:12:17 | 0-0 1 9:10:5 |
| 11 | f79bd0b3bacc5142f90f81a15b... | 2017-04-22T13:55:16 | 2017-05-12T13:55:55 | 2017-05-18T00:00:00 | 0-0 20 0:0:39 | 0-0 5 10:4:5 |

5.3 Group data by state, take mean of freight_value, time_to_delivery, diff_estimated_delivery

Query:

```
select distinct customer_state, avg(freight_value) as meanfreight,
avg(extract(datetime from order_delivered_customer_date) -
extract(datetime
```

```
from order_purchase_timestamp)) as time_to_delivery,
avg(extract(datetime from order_estimated_delivery_date) -
extract(datetime
from order_delivered_customer_date)) as diff_estimated_delivery
from `Target.customers` cust
Inner join
`Target.orders` ord
on cust.customer_id = ord.customer_id
Inner join
`Target.order_items` ord_items
on ord_items.order_id = ord.order_id
where order_status = 'delivered'
group by cust.customer_state
```

| Row | customer_state | meanfreight | time_to_delivery | diff_estimated_delivery |
|---|---|---|---|---|
| 1 | GO | 22.56286780851... | 0-0 14 33:40:48.375933245 | 0-0 11 14:18:7.996486605 |
| 2 | SP | 15.11518235446... | 0-0 8 17:22:20.194547921 | 0-0 10 12:17:14.311513533 |
| 3 | RS | 21.61319204434... | 0-0 14 28:31:32.063916517 | 0-0 13 10:22:7.941790314 |
| 4 | BA | 26.48755633994... | 0-0 18 29:56:34.191963073 | 0-0 10 6:55:31.734727124 |
| 5 | MG | 20.62634252090... | 0-0 11 23:34:48.313564571 | 0-0 12 15:23:35.678460823 |
| 6 | MT | 27.99691417550... | 0-0 17 23:4:49.308582449 | 0-0 13 21:30:17.274831243 |
| 7 | RJ | 20.91143604610... | 0-0 14 27:32:58.179594145 | 0-0 11 7:17:3.752386339 |
| 8 | SC | 21.50735904320... | 0-0 14 23:56:36.372711740 | 0-0 10 20:50:21.306809860 |
| 9 | SE | 36.57317333333... | 0-0 20 35:12:59.317333333 | 0-0 9 7:49:3.408 |
| 10 | PE | 32.69333333333... | 0-0 17 30:42:8.667239404 | 0-0 12 18:20:47.015463917 |
| 11 | TO | 37.43503225806... | 0-0 17 10:45:40.490322580 | 0-0 11 15:36:27.777419354 |
| 12 | CE | 32.73449509116... | 0-0 20 23:41:56.934081346 | 0-0 10 9:51:29.995792426 |
| 13 | PR | 20.47181625066... | 0-0 11 22:43:59.571074526 | 0-0 12 19:0:31.719242343 |
| 14 | PA | 35.62901328273... | 0-0 23 18:5:50.211574952 | 0-0 13 13:39:52.679316888 |

## 4. Sort the data to get the following:

### 5.5 Top 5 states with highest/lowest average freight value - sort in desc/asc limit 5

### Query:

### : Top 5 states with lowest average freight value

```
select c.customer_state,round(avg(oi.freight_value),4)as
lowest_avg_freight_value
from `Target.customers`c
join `Target.orders`o
on c.customer_id=o.customer_id
join `Target.order_items`oi
on o.order_id=oi.order_id
group by 1
order by 2
```

```
limit 5
```

| Row | customer_state | lowest_avg_freight_y |
|---|---|---|
| 1 | SP | 15.1473 |
| 2 | PR | 20.5317 |
| 3 | MG | 20.6302 |
| 4 | RJ | 20.9609 |
| 5 | DF | 21.0414 |

Top 5 states with highest average freight value :

Query:

```
select c.customer_state,round(avg(oi.freight_value),4)as
highest_avg_freight_value
from `Target.customers`c
join `Target.orders`o
on c.customer_id=o.customer_id
join `Target.order_items`oi
on o.order_id=oi.order_id
group by 1
order by 2 desc
limit 5
```

| Row | customer_state | highest_avg_freight_ |
|---|---|---|
| 1 | RR | 42.9844 |
| 2 | PB | 42.7238 |
| 3 | RO | 41.0697 |
| 4 | AC | 40.0734 |
| 5 | PI | 39.148 |

5.6 Top 5 states with highest/lowest average time to delivery

Query:

lowest average time to delivery:

```
select
c.customer_state,round(avg(date_diff(o.order_delivered_customer_date
,o.order_purchase_timestamp,day)),4)as time_to_delivery,
from `Target.orders`o
join `Target.customers`c
on c.customer_id=o.customer_id
group by 1
order by 2
limit 5
```

| Row | customer_state | time_to_delivery |
|---|---|---|
| 1 | SP | 8.2981 |
| 2 | PR | 11.5267 |
| 3 | MG | 11.5438 |
| 4 | DF | 12.5091 |
| 5 | SC | 14.4796 |

highest average time to delivery :

Query:

```
select
c.customer_state,round(avg(date_diff(o.order_delivered_customer_date
,o.order_purchase_timestamp,day)),4)as highest_time_to_delivery,
from `Target.orders`o
join `Target.customers`c
on c.customer_id=o.customer_id
group by 1
order by 2 desc
limit 5
```

| Row | customer_state | highest_time_to_delivery |
|---|---|---|
| 1 | RR | 28.9756 |
| 2 | AP | 26.7313 |
| 3 | AM | 25.9862 |
| 4 | AL | 24.0403 |
| 5 | PA | 23.3161 |

5.7 Top 5 states where delivery is really fast/ not so fast compared to estimated date :

Top 5 states where delivery is really fast

Query:

```
select distinct cust.customer_state,
avg(extract(datetime from order_estimated_delivery_date) -
extract(datetime from
order_delivered_customer_date)) as delivery_diff
from `Target.orders` ord
left join
`Target.customers` cust
on ord.customer_id = cust.customer_id
group by cust.customer_state
order by delivery_diff
limit 5
```

| Row | customer_state | delivery_diff |
|---|---|---|
| 1 | AL | 0-0 7 24:46:9.886649874 |
| 2 | MA | 0-0 8 21:18:29.762900976 |
| 3 | SE | 0-0 9 7:53:14.623880597 |
| 4 | ES | 0-0 9 19:7:50.208521303 |
| 5 | BA | 0-0 9 26:22:39.872542997 |

Top 5 states where delivery is not so fast:

Query:

```
select distinct cust.customer_state,
avg(extract(datetime from order_estimated_delivery_date)-
extract(datetime from
order_delivered_customer_date)) as delivery_diff
from `Target.orders` ord
left join
`Target.customers` cust
on ord.customer_id = cust.customer_id
group by cust.customer_state
order by delivery_diff desc
limit 5
```

| Row | customer_state | delivery_diff |
|---|---|---|
| 1 | AC | 0-0 19 25:50:53.400 |
| 2 | RO | 0-0 19 9:31:25.802469135 |
| 3 | AP | 0-0 18 25:25:34.119402985 |
| 4 | AM | 0-0 18 20:26:36.986206896 |
| 5 | RR | 0-0 16 14:16:13.243902439 |

6. Payment type analysis:

6.1 Month over Month count of orders for different payment types

Query:

```
select distinct payment_type, extract(month from
order_purchase_timestamp) as
month, count(*) as order_count
from `Target.payments` pay
inner join
`Target.orders` ord
on pay.order_id = ord.order_id
group by month, payment_type
order by month
```

| Row | payment_type | month | order_count |
|---|---|---|---|
| 1 | voucher | 1 | 477 |
| 2 | credit_card | 1 | 6103 |
| 3 | debit_card | 1 | 118 |
| 4 | UPI | 1 | 1715 |
| 5 | credit_card | 2 | 6609 |
| 6 | voucher | 2 | 424 |
| 7 | UPI | 2 | 1723 |
| 8 | debit_card | 2 | 82 |
| 9 | voucher | 3 | 591 |
| 10 | credit_card | 3 | 7707 |
| 11 | UPI | 3 | 1942 |
| 12 | debit_card | 3 | 109 |
| 13 | credit_card | 4 | 7301 |
| 14 | voucher | 4 | 572 |

Load more

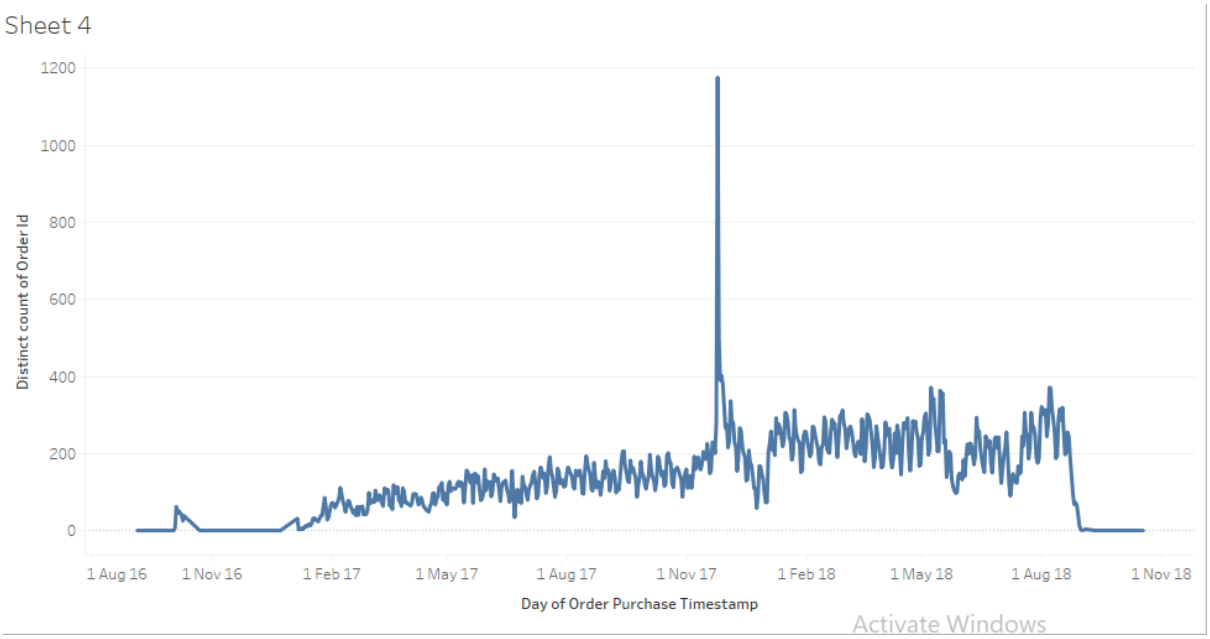
6.2 Count of orders based on the no. of payment installments

Query:

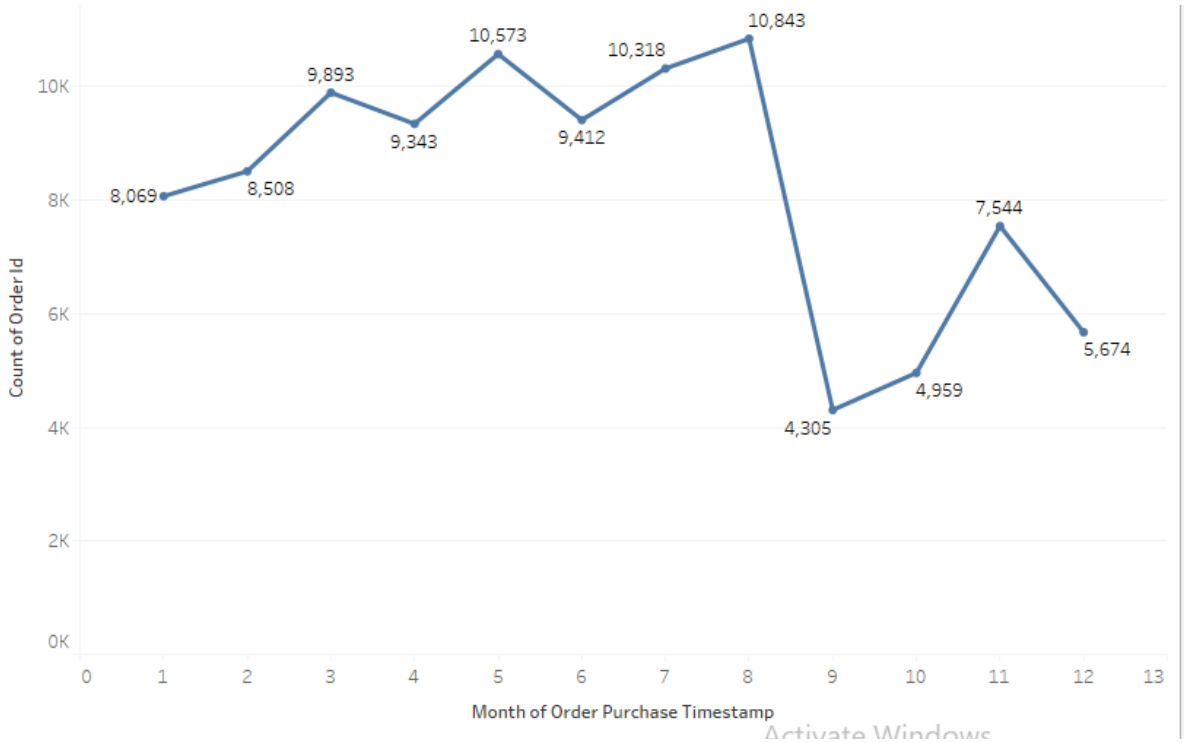
```
select count(*) as total_order,payment_installments
from `Target.payments`
group by 2
limit 10
```

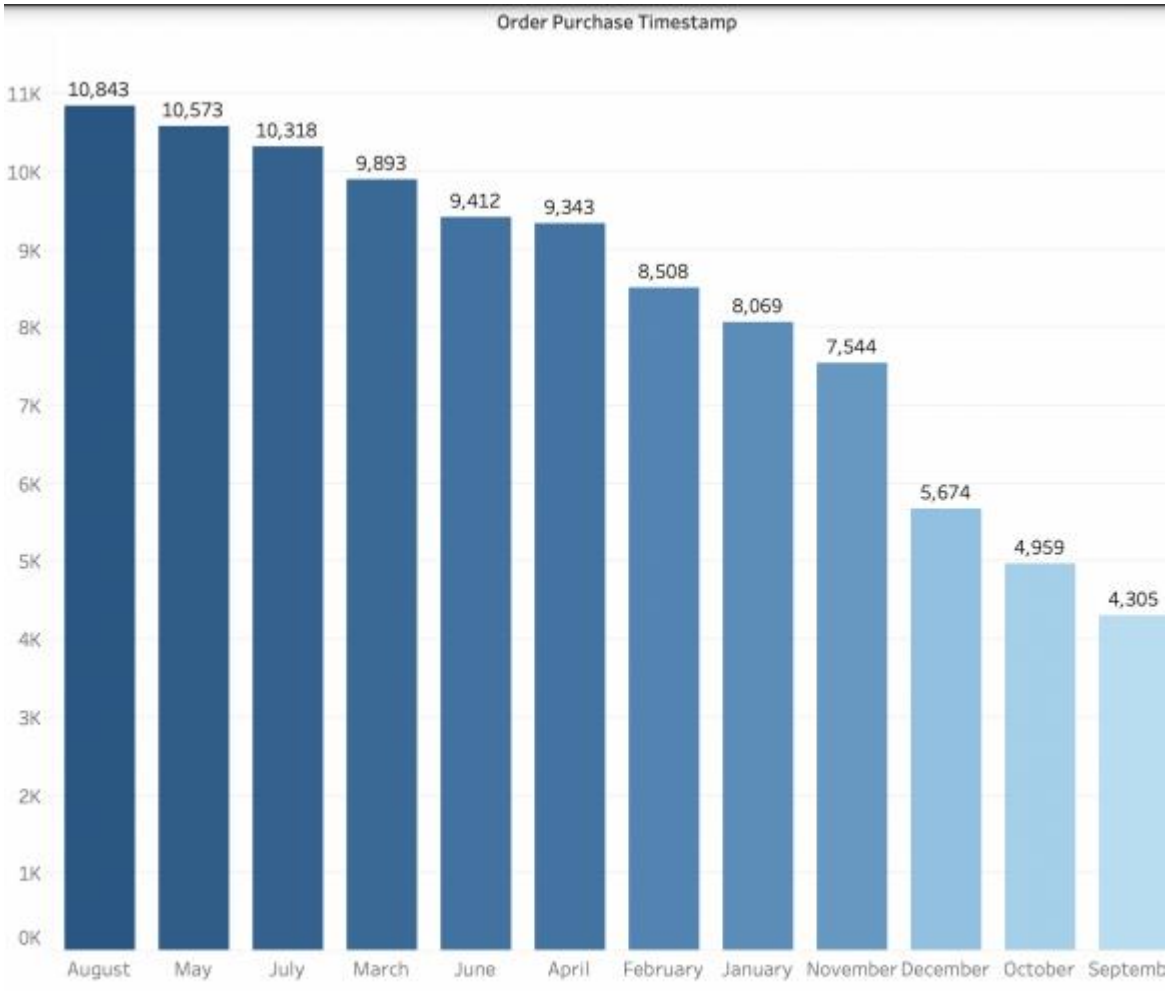
| Row | total_order | payment_installmen |
|---|---|---|
| 1 | 2 | 0 |
| 2 | 52546 | 1 |
| 3 | 12413 | 2 |
| 4 | 10461 | 3 |
| 5 | 7098 | 4 |
| 6 | 5239 | 5 |
| 7 | 3920 | 6 |
| 8 | 1626 | 7 |
| 9 | 4268 | 8 |
| 10 | 644 | 9 |

Insights: After analysing the customer data for the country Brazil, the company took its first online order on 4th September 2016 with the growing trend of orders, August month has highest sale most of the year throughout.




The company has the least sale in the month of September but has the highest sale in August month. In the below mentioned graph, we can have a detailed insight about the trend of orders throughout the year and according we can focus on sales.






8. Recommendation: The month of August shows the highest sale in the entire year, that shows we can plan more ideas to increase the sales bar. We can provide them some good offers or we can try mid sale and discounts to increase the sale. We can provide some vouchers or gift cards to the customers who come under medium range buyers category. We can Send additional small gifts to boost the customer buying interest like some freebies.