BDM3303 SEC 401

Olist E-commerce

Presentation by

6420055 Myat Thu Thu Kyaw

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Data Discovery

Dataset : Brazilian E-Commerce Public Dataset by Olist

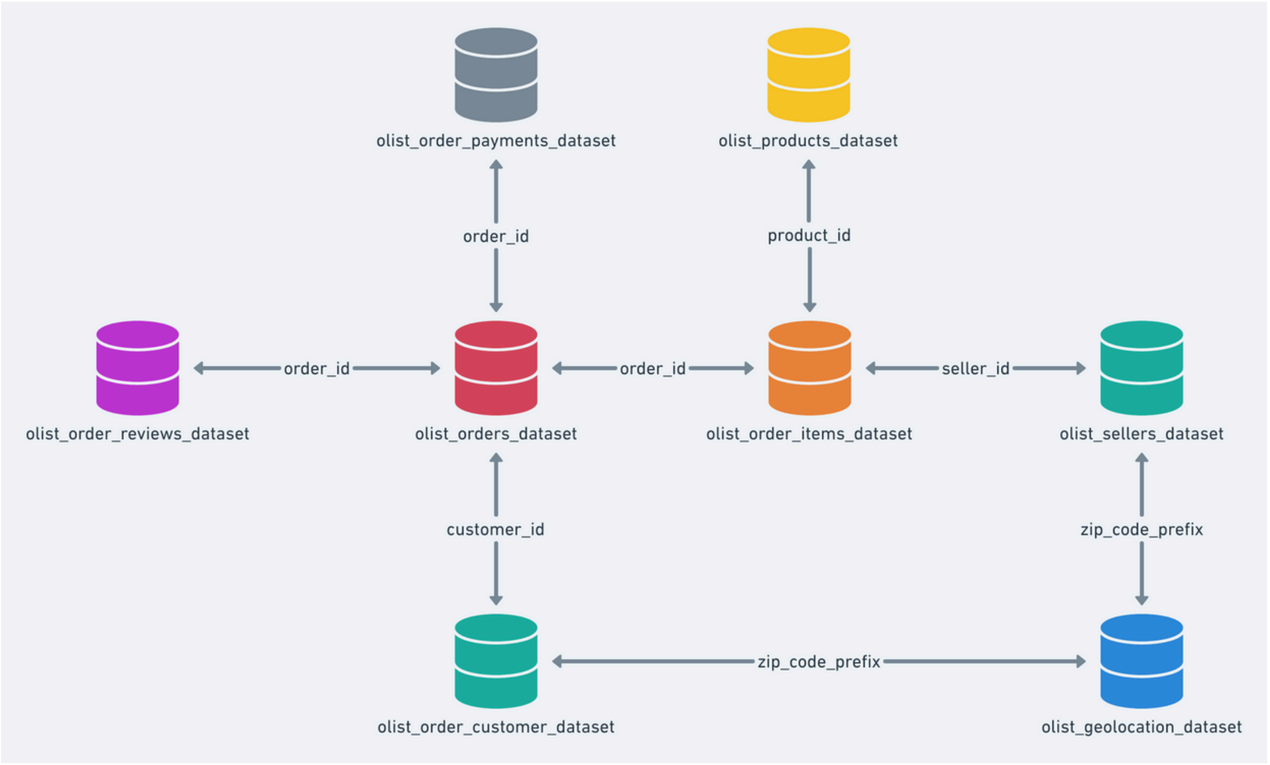
Source: Kaggle
Date : 2016-2018
Link :
https://www.kaggle.com/datasets/olistbr/brazilian-ecommerce

- payments
- orders
- reviews
- customers
- order items
- products
- sellers
- geolocations

- An order might have multiple items.
- Each item might be fulfilled by a distinct seller.
- All text identifying stores and partners where replaced by the names of Game of Thrones great houses.

Brazilian E-Commerce Public Dataset by Olist

100,000 Orders with product, customer and reviews info



Data Profiling

olist_order_items	
order_id	string
order_item_id	Int64
product_id	string
seller_id	string
price	Float64
freight_value	Float64
shipping_date_limit	datetime64

olist_orders	
order_id	string
customer_id	string
order_status	string
purchase_time	datetime64
approve_time	datetime64
delivered_carrier_date	datetime64
delivered_customer_date	datetime64
estimated_date	datetime64

olist_products	
product_id	string
product_category_name	string
product_name_length	Int64
product_description_length	Int64
product_photos_qty	Int64
product_weight_g	Int64
product_length_cm	Int64
product_height_cm	Int64
prouct_width_cm	Int64

product_category_name_trans	
product_category_name	string
product_catergory_name english	string

olist_order_reviews	
review_id	string
order_id	string
review_score	Int64
review_comment_title	string
review_comment_message	string
review_creation_date	datetime64
review_answer_timestamp	datetime64

Data Profiling

olist_customers	
customer_id	string
customer_unique_id	string
customer_zip_code_prefix	Int64
customer_city	string
customer_state	string

olist_payments	
order_id	string
payment_sequential	Int64
payment_type	string
payment_installments	Int64
payment_value	Float64

olist_sellers	
seller_id	string
seller_zip_code_prefix	Int64
seller_city	string
seller_state	string

olist_geolocation	
geolocation_zip_code_prefix	Int64
geolocation_lat	Float64
geolocation_lng	Float64
geolocation_city	string
geolocation_state	string

Data Profiling

01. Item

Name :
Size : ~99441 rows , 5 columns
Features : 2 categorical ,1 numeric
Meta : 3 text
Missing data : none

02. Order

Name : olist_orders_dataset
Size : ~99441 rows , 8 columns
Features : 1 categorical , 5 numeric
Meta :2 text
Missing data : 4908 (0.8%) in features

03. Product

Name : olist_products_dataset
Size : ~ 32951 rows , 9 columns
Features : 1 categorical , 7 numeric
Meta : 1 text
Missing data : 2448 (0.9%) in features

04. Category

Name :
product_category_name_translation
Size : ~ 72 rows , 2 columns
Meta : 2 text
Missing data : none

05. Review

Name : olist_order_reviews_dataset
Size : ~ 99224 rows , 7 columns
Features : 3 numeric
Meta : 4 text
Missing data : 36% missing data

06. Customer

Name : olist_customers_dataset
Size : ~99441 rows , 5 columns
Features : 2 categorical ,1 numeric
Meta : 2 text
Missing data : none

07. Payment

Name : olist_order_payments_dataset
Size : ~ 103886 rows , 5 columns
Features : 1 categorical , 3 numeric
Meta : 1 text
Missing data : none

08. Seller

Name : olist_orders_dataset
Size : ~ 3095 rows , 4 columns
Features : 1 categorical , 1 numeric
Meta : 2 text
Missing data : none

09. Geolocation

Name : olist_geolocation_dataset
Size : ~ 1000163 rows , 5 columns
Features : 1 categorical , 3 numeric
Meta : 1 text
Missing data : none

olist_order_dataset

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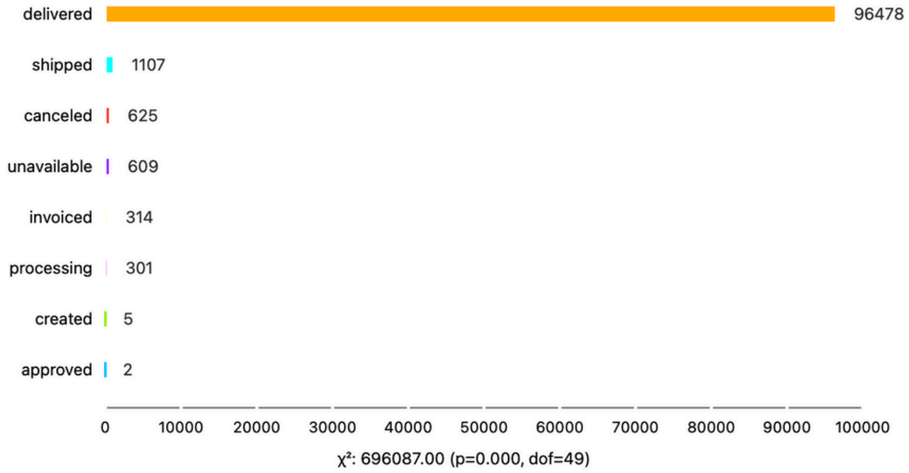
01. Item

Name :
Size : ~99441 rows , 5 columns
Features : 2 categorical ,1 numeric
Meta : 3 text
Missing data : none

olist_orders	
order_id	string
customer_id	string
order_status	string
purchase_time	datetime64
approve_time	datetime64
delivered_carrier_date	datetime64
delivered_customer_date	datetime64
estimated_date	datetime64

Name	Distribution	Mean	Mode	Median	Dispersion	Min.	Max.	Missing
order_purchase_timestamp		2017-12-31 08:43:12.776...	2017-11-20 10:59:08	2018-01-18 23:04:36	~2 years	2016-09-04 21:15:19	2018-10-17 17:30:18	0 (0 %)
order_approved_at		2017-12-31 18:35:24.09...		2018-01-19 11:36:13	~2 years	2016-09-15 12:16:38	2018-09-03 17:40:06	160 (0 %)
order_delivered_carrier_date		2018-01-04 21:49:48.138...		2018-01-24 16:10:58	~23 months	2016-10-08 10:34:01	2018-09-11 19:48:28	1783 (2 %)
order_delivered_customer_date		2018-01-14 12:09:19.035...		2018-02-02 19:28:10.500...	~2 years	2016-10-11 13:46:32	2018-10-17 13:22:46	2965 (3 %)
order_estimated_delivery_date		2018-01-24 03:08:37.73...	2017-12-20 00:00:00	2018-02-15 00:00:00	~2 years	2016-09-30 00:00:00	2018-11-12 00:00:00	0 (0 %)



Most of the orders are already **delivered**.

There is **missing values** in some date because some of the **order are not delivered.**

olist_order_item_dataset

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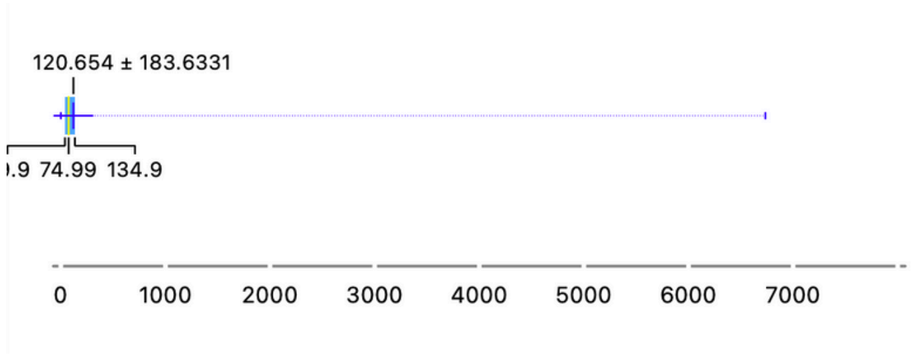
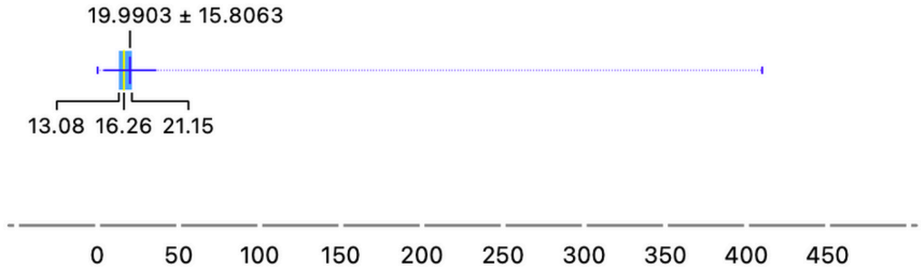
02. Order

Name : olist_orders_dataset
Size : ~99441 rows , 8 columns
Features : 1 categorical , 5 numeric
Meta :2 text
Missing data : 4908 (0.8%) in features

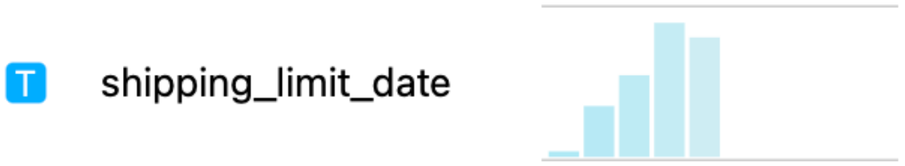
olist_order_items	
order_id	string
order_item_id	Int64
product_id	string
seller_id	string
price	Float64
freight_value	Float64
shipping_date_limit	datetime64



Price of Items
- Average : 120
- Range : 0.85 - 6735
- Mode : 60



Freight Value of Items
- Average : 20
- Range : 0 - 410
- Mode : 15



Shipping Limit Date
- From : 2016-09-19
- To : 2020-04-09
- Dispersion : ~3 years

olist_products_dataset

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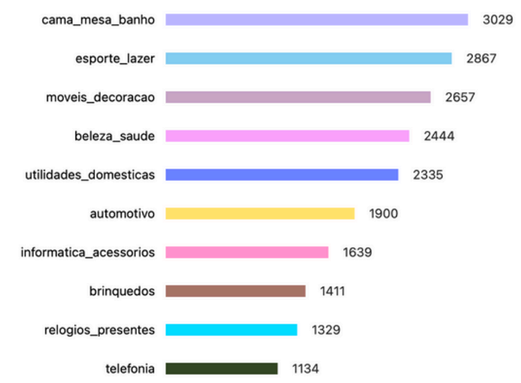
03. Product

Name : olist_products_dataset
Size : ~ 32951 rows , 9 columns
Features : 1 categorical , 7 numeric
Meta : 1 text
Missing data : 2448 (0.9%) in features

olist_products	
product_id	string
product_category_name	string
product_name_length	Int64
product_description_length	Int64
product_photos_qty	Int64
product_weight_g	Int64
product_length_cm	Int64
product_height_cm	Int64
prouct_width_cm	Int64

Name	Distribution	Mean	Mode	Median	Dispersion	Min.	Max.	Missing
product_name_lenght		48.4769	60	51	0.21135	5	76	610 (2 %)
product_description_lenght		771.495		595	0.823214	4	3992	610 (2 %)
product_photos_qty		2.18899	1	1	0.793399	1	20	610 (2 %)
product_weight_g		2276.47	200	700	1.88097	0.00	40425	2 (0 %)
product_length_cm		30.8151	16	25	0.548894	7	105	2 (0 %)
product_height_cm		16.9377	10	13	0.805149	2	105	2 (0 %)
product_width_cm		23.1967	11	20	0.520714	6	118	2 (0 %)



dataset include details information of products.

Bed Bath Table is the **most popular product category** on Olist based on the number of orders made.

product_category_name_translation

04. Category

Name :
product_category_name_translation
Size : ~ 72 rows , 2 columns
Meta : 2 text
Missing data : none

product_category_name_trans	
product_category_name	string
product_catergory_name english	string

Product Category data include only two columns.

Since products category name are in Portuguese it maps to the English translation of the category name.

	X.0	X.1
1	product_category_name	product_category_name_english
2	beleza_saude	health_beauty
3	informatica_acessorios	computers_accessories
4	automotivo	auto
5	cama_mesa_banho	bed_bath_table
6	moveis_decoracao	furniture_decor
7	esporte_lazer	sports_leisure
8	perfumaria	perfumery
9	utilidades_domesticas	housewares
10	telefonia	telephony
11	relogios_presentes	watches_gifts
12	alimentos_bebidas	food_drink
13	bebes	baby
14	papelaria	stationery
15	tablets_impressao_imagem	tablets_printing_image
16	brinquedos	toys
17	telefonia_fixa	fixed_telephony
18	ferramentas_jardim	garden_tools
19	fashion_bolsas_e_acessorios	fashion_bags_accessories
20	eletroportateis	small_appliances

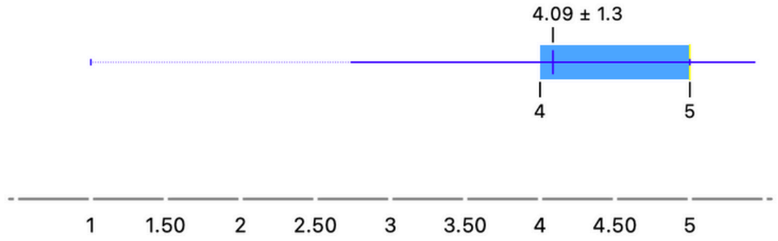
olist_order_reviews_dataset

05. Review

Name : olist_order_reviews_dataset
Size : ~ 99224 rows , 7 columns
Features : 3 numeric
Meta : 4 text
Missing data : 36% missing data

Name	Distribution	Mean	Mode	Median	Dispersion	Min.	Max.	Missing
review_score		4.09	5	5	0.33	1	5	0 (0 %)
review_creation_date		2018-01-12 20:49:23.94...	2017-12-19 00:00:00	2018-02-02 00:00:00	~22 months	2016-10-02 00:00:00	2018-08-31 00:00:00	0 (0 %)
review_answer_timestamp		2018-01-16 00:23:56.97...	2017-06-15 23:21:05	2018-02-04 22:41:47.500...	~2 years	2016-10-07 18:32:28	2018-10-29 12:27:35	0 (0 %)

olist_order_reviews	
review_id	string
order_id	string
review_score	Int64
review_comment_title	string
review_comment_message	string
review_creation_date	datetime64
review_answer_timestamp	datetime64



dataset include details information of reviews.

review comment title and review comment message has missing values because not every order has the text reviews.

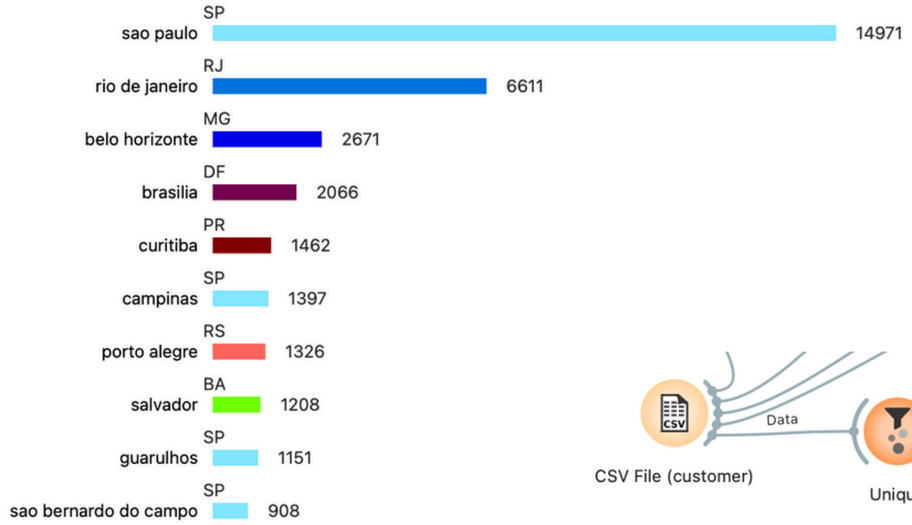
Review Score Range from 1 - 5.
Mean : 4.09
interquartile range: 4-5
indicating most of the customers who give feedback have high satisfaction.

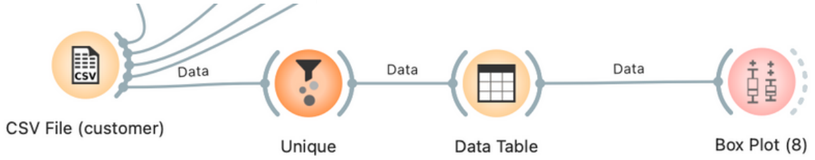
olist_customers_dataset

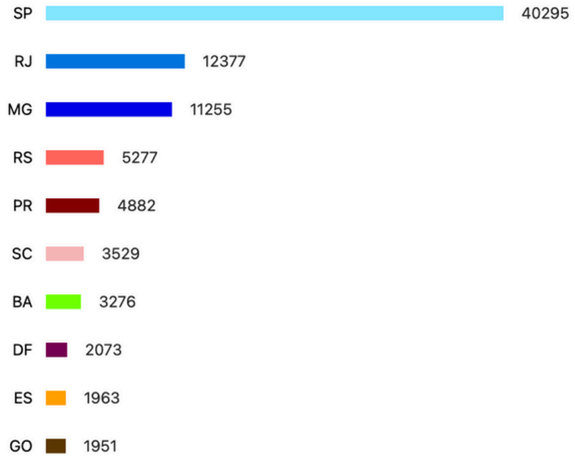
06. Customer

Name : olist_customers_dataset
Size : ~99441 rows , 5 columns
Features : 2 categorical ,1 numeric
Meta : 2 text
Missing data : none

olist_customers	
customer_id	string
customer_unique_id	string
customer_zip_code_prefix	Int64
customer_city	string
customer_state	string







customer id is generated for a single order and customer unique id is to identify a customer entity.

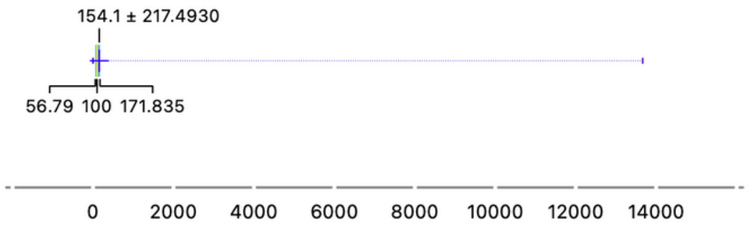
Most of the customer comes from **SP (São Paulo) State.**

Most of the customer comes from **SP (São Paulo) City.**

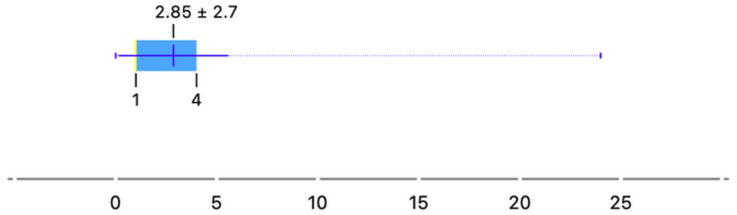
olist_order_payment_dataset

07. Payment

Name : olist_order_payments_dataset
Size : ~ 103886 rows , 5 columns
Features : 1 categorical , 3 numeric
Meta : 1 text
Missing data : none

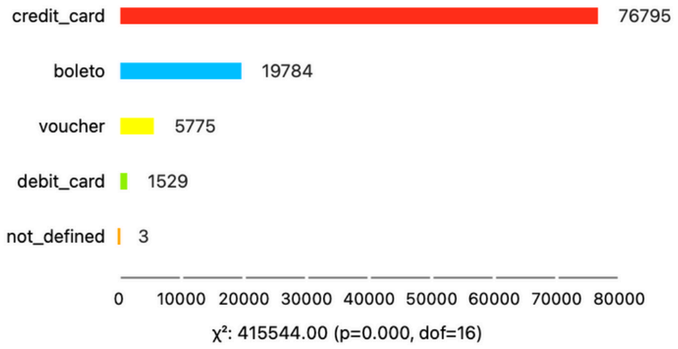


Payment Value



Payment Installments

olist_payments	
order_id	string
payment_sequential	Int64
payment_type	string
payment_installments	Int64
payment_value	Float64



Payment Methods

Mean payment value for each order is **154** with a wide **range 0 to 13664.**

Average number of payment installments made for each order is around **3 times** with the **range from 1 to 24.**

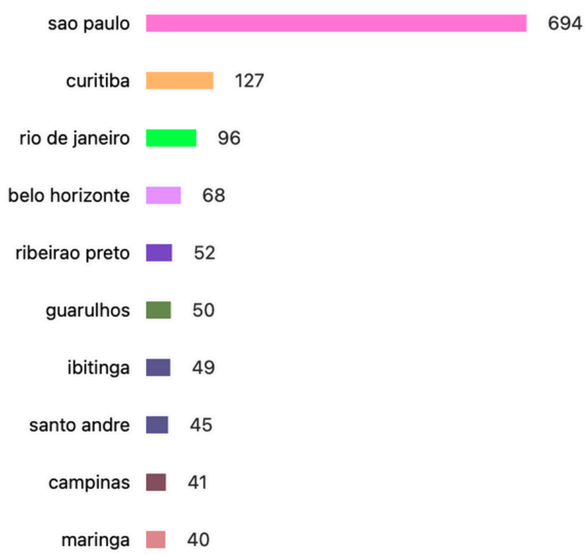
Most of the payment is made with **Credit Card.**

olist_sellers_dataset

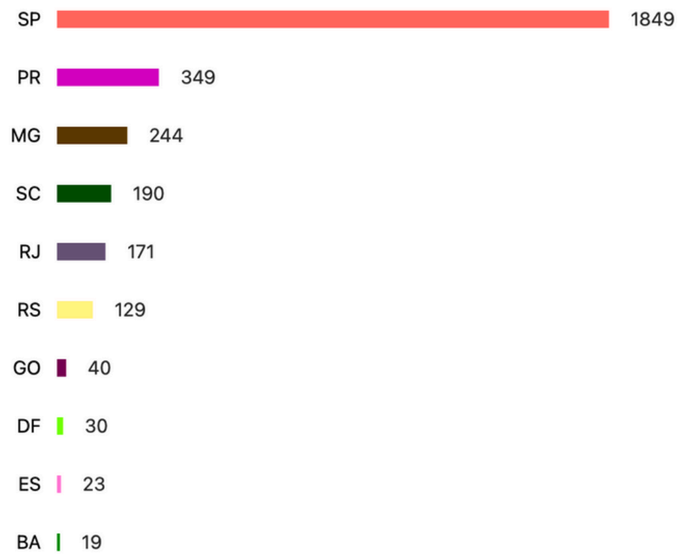
08. Seller

Name : olist_orders_dataset
Size : ~ 3095 rows , 4 columns
Features : 1 categorical , 1 numeric
Meta : 2 text
Missing data : none

olist_sellers	
seller_id	string
seller_zip_code_prefix	Int64
seller_city	string
seller_state	string



Seller City



Seller State

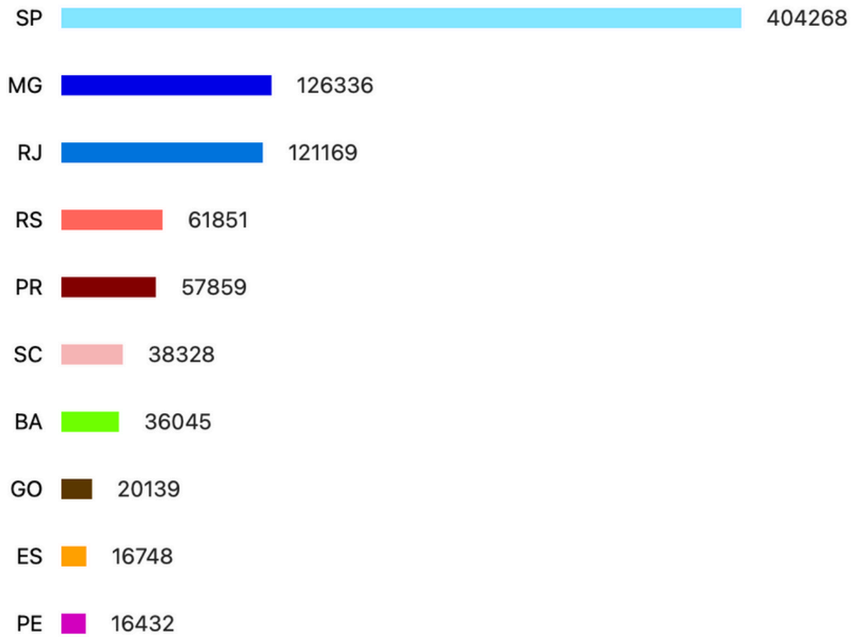
Most of the sellers comes from **SP (São Paulo) State.**

Most of the sellers comes from **SP (São Paulo) City.**

olist_sellers_dataset

09. Geolocation

Name : olist_geolocation_dataset
Size : ~ 1000163 rows , 5 columns
Features : 1 categorical , 3 numeric
Meta : 1 text
Missing data : none



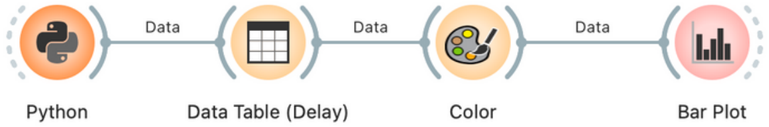
olist_sellers	
seller_id	string
seller_zip_code_prefix	Int64
seller_city	string
seller_state	string

GeoLocation Data helps to identity customers and sellers location using **zip code, llatitude, and longitude.**

São Paulo (SP) has the most location data because

- Brazil's largest economic state
- high population density

Delayed Date

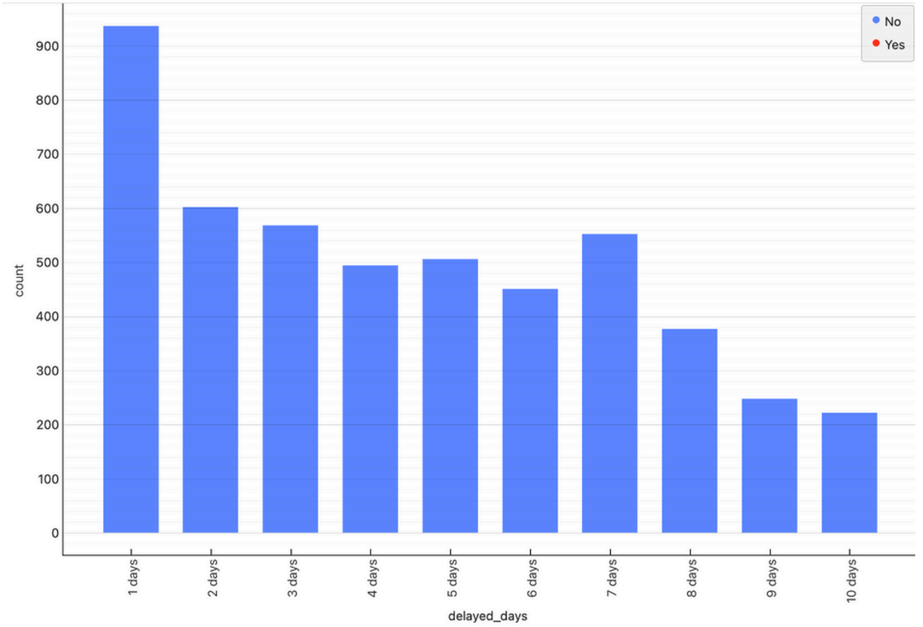



```python
import pandas as pd
from Orange.data.pandas_compat import table_from_frame,table_to_frame

product = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_products_dataset.csv')
item = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_items_dataset.csv')
order = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_orders_dataset.csv')

df = pd.merge(left=order,right=pd.merge(left=item,right=product,on="product_id"),on="order_id")

df = df.loc[df["order_delivered_customer_date"] > df["order_estimated_delivery_date"]].copy()
df["delivered_date"] = pd.to_datetime(df["order_delivered_customer_date"]).dt.date
df["estimated_date"] = pd.to_datetime(df["order_estimated_delivery_date"]).dt.date
df = df.loc[:, ["order_id","delivered_date","estimated_date"]]
df["delayed"] = df["delivered_date"] - df["estimated_date"]
df["delayed_days"] = pd.to_timedelta(df["delayed"])
df['delayed'] = pd.to_timedelta(df['delayed']).dt.days
df = df.loc[(df['delayed'] >=1) & (df["delayed"] <= 10)]
dfs = df.groupby(["delayed_days"])["delayed"].count()
df = dfs.reset_index()
df["count"] = df["delayed"]
df = df.loc[:,["delayed_days","count"]]

out_data = table_from_frame(df)
```

```python
df1 = df.loc[df["delayed"]> 10]["delayed"].count()
print(df1)
```

order delayed more than 10 days = 2298

Delayed Date Count



Steps

- extract product , item and order dataset and merge 3 datasets
- take as order delay if order is not delivered on estimated date
- group by and extract delay date from 1 days to 10 days
- count the delayed days

Insights

- The most delayed days
  - = 1 days
- followed by 2 days , 3 days , 7days etc.
- Delay days greater than 10 days should be reviewed

Regression Analysis

Review and Sales


```
import pandas as pd
from Orange.data.pandas_compat import table_from_frame,table_to_frame

item = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_items_dataset.csv')
review = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_reviews_dataset.csv')
payment = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_payments_dataset.csv')

merged_data = pd.merge(review[['order_id', 'review_score']], payment[['order_id', 'payment_value']],
on='order_id', how='inner')

merged_sellers = pd.merge(merged_data, item[['order_id', 'seller_id']], on='order_id', how='inner')

result = merged_sellers.groupby(['seller_id','review_score']).agg(
    review_score_count =('review_score', 'count'),
    num_orders=('order_id', 'nunique'),
    total_revenue=('payment_value', 'sum')).reset_index()

out_data = table_from_frame(result)
```

Features (3)

Filter

- review_score
- review_score_count
- num_orders

Target (1)

- total_revenue

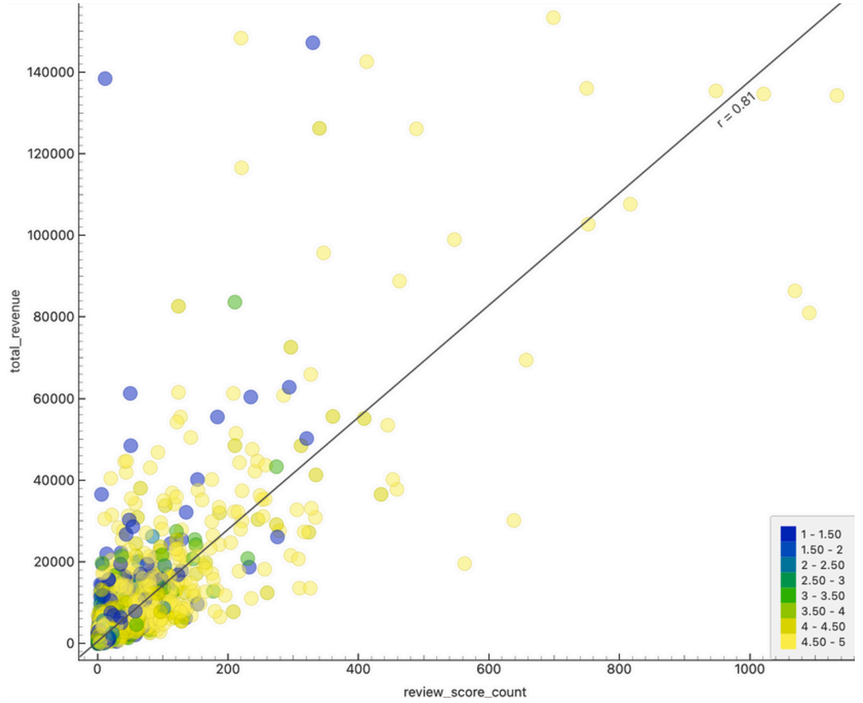
Metas (1)

- seller_id

Model	MSE	RMSE	MAE	MAPE	R2
Linear Regression	20270...	4502.3...	1332....	2.581	0.650

- Linear regression model can only explain 65% of the total revenue.
- Indicating other factors also impact on total revenue generated by each sellers other than review.

Sales Revenue and review count



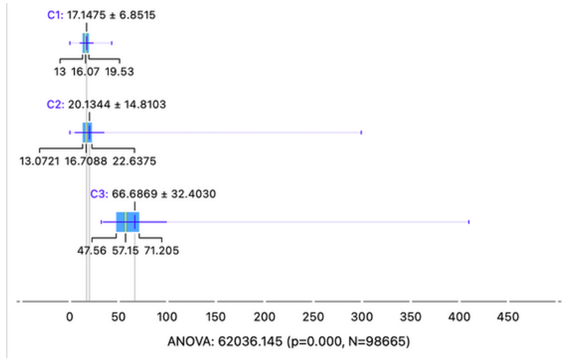
Steps

- merge item, review, payment
- group by seller , review score
- review score count
- number of order > count order_id
- total revenue > sum payment value

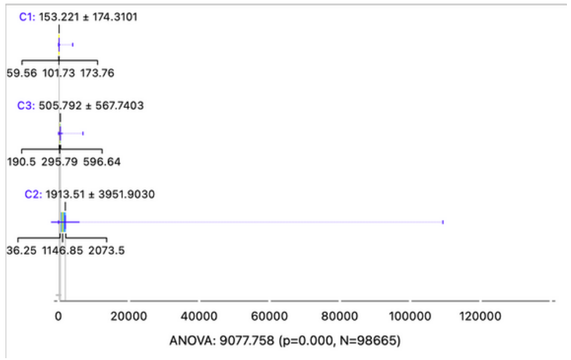
Insights

- according to the plot
- Blue and Green (score: 1-3)
  - 0 - 60,000 sales revenue
- Yellow (score: 3-5)
  - more sales 0- 150,000

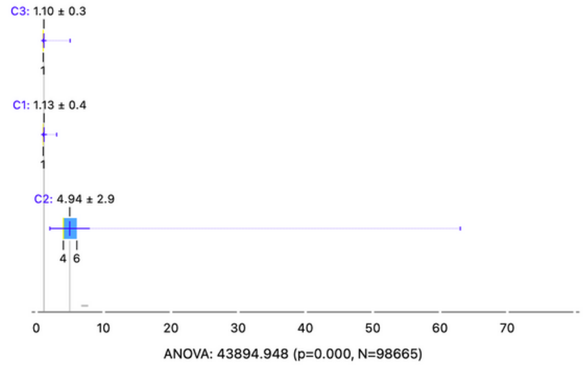
Clustering Sales, Qty and Shipping



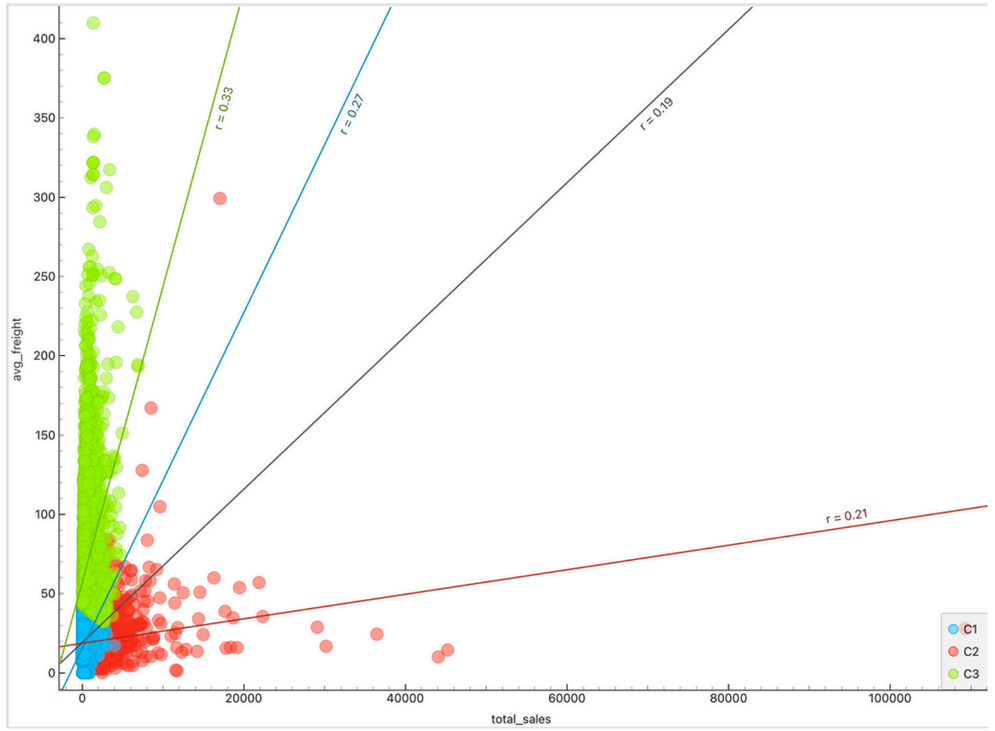
Average shipping by Clusters



Total Sales by Clusters



Number of Items by Clusters



Cluster C1 (Blue)

- r = 27%
- small total sales
- small shipping cost
- can be ordinary size products with free or low shipping fees
- small number of items

Cluster C2 (Red)

- r= 21%
- high total sales
- small shipping cost
- can be small lightweight products with high cost
- large number of items

Cluster C3 (Green)

- r = 33%
- small total sales
- high shipping cost
- moderate cost with large products > high shipping fees
- small number of items

Clustering Shipping Workflow


```python
import pandas as pd
from Orange.data.pandas_compat import table_from_frame,table_to_frame

product = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_products_dataset.csv')
item = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_items_dataset.csv')
order = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_orders_dataset.csv')
payment = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_payments_dataset.csv')


merged_data = pd.merge(order[['order_id', 'order_purchase_timestamp']], item[['order_id', 'price',
'freight_value']], on='order_id', how='inner')

merged_data = pd.merge(merged_data, payment[['order_id', 'payment_value']], on='order_id', how='inner')

df = merged_data.groupby('order_id').agg(
    total_sales=('payment_value', 'sum'),
    num_items=('price', 'count'),
    avg_freight=('freight_value', 'mean')
).reset_index()

out_data = table_from_frame(df)
```

Dataset Used

- order
- Item
- payment

Column Used

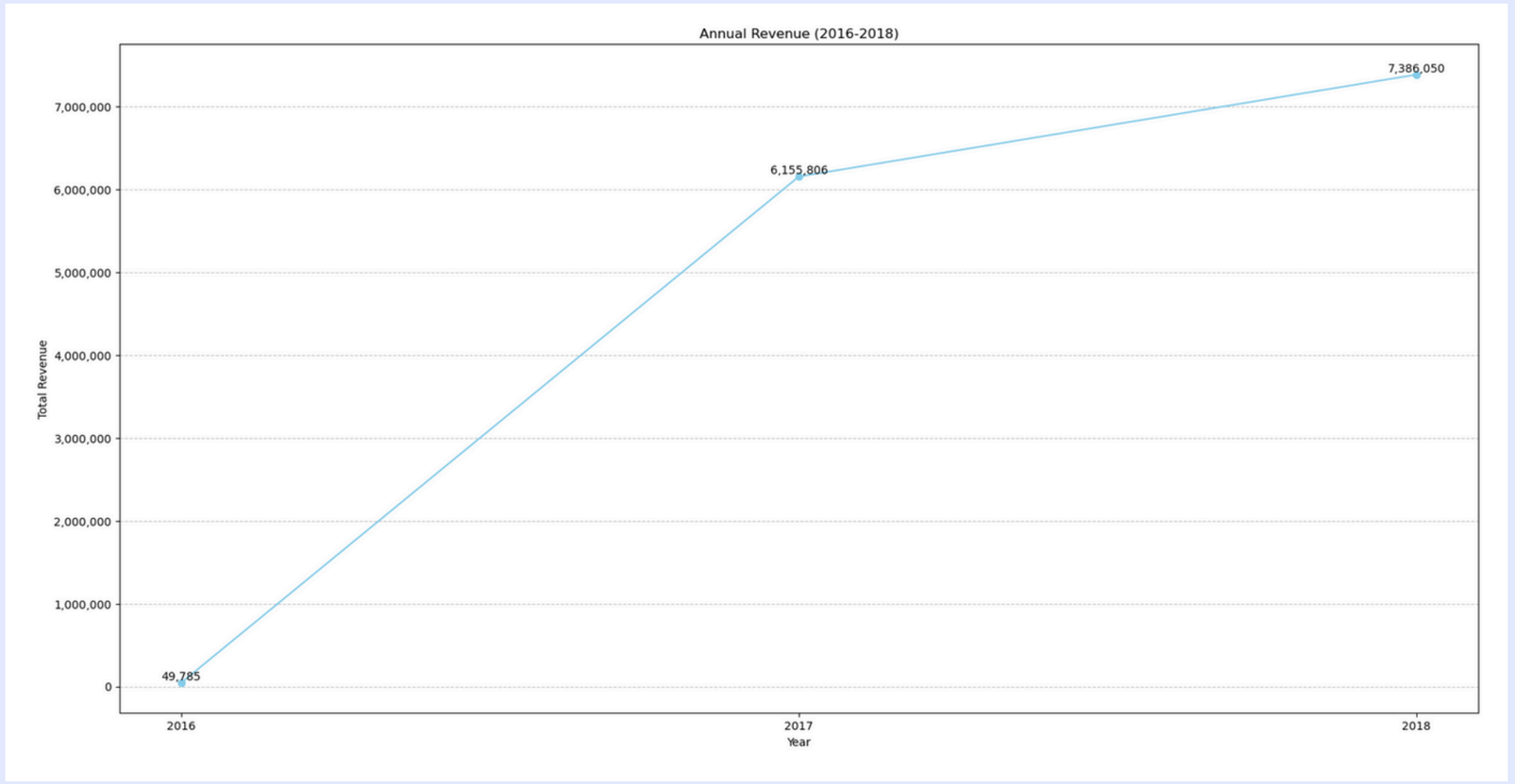
- order_purchase_timestamp
- price
- freight_value
- payment_value

Data Manipulation

- merge 3 dataset
- group by order_id
- Sum of Payment Value
- Count of Price to get number of items
- Average Fright Value

Annual Revenue:

plan for interesing marketing strategy



Interpretation:

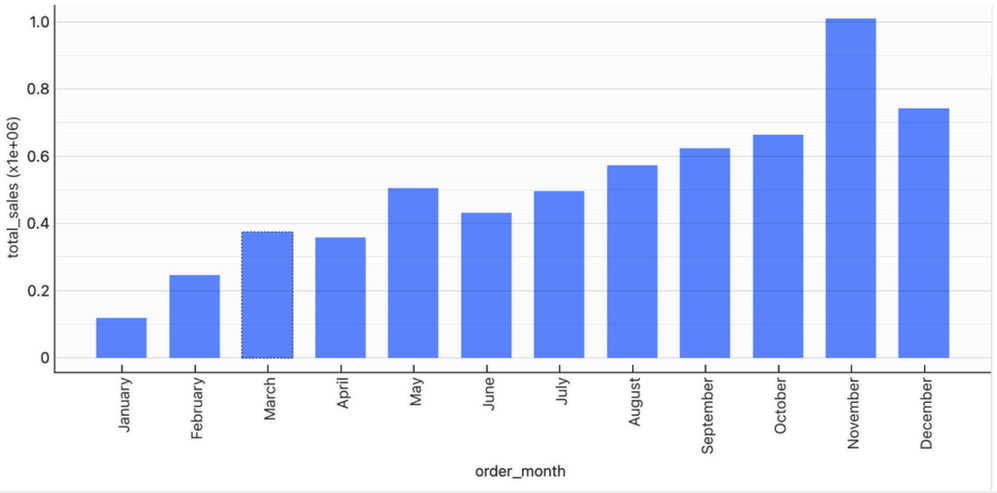
There is a significant difference in revenue between 2016 and the following years, 2017 and 2018. In 2016, the total revenue was 49,785.92, covering only September to December during the initial phase of operations. In contrast, revenues for 2017 and 2018 were much higher, at 6,155,806.98 and 7,386,050.80, respectively. This growth reflects a full year of operations and an expanding customer base.

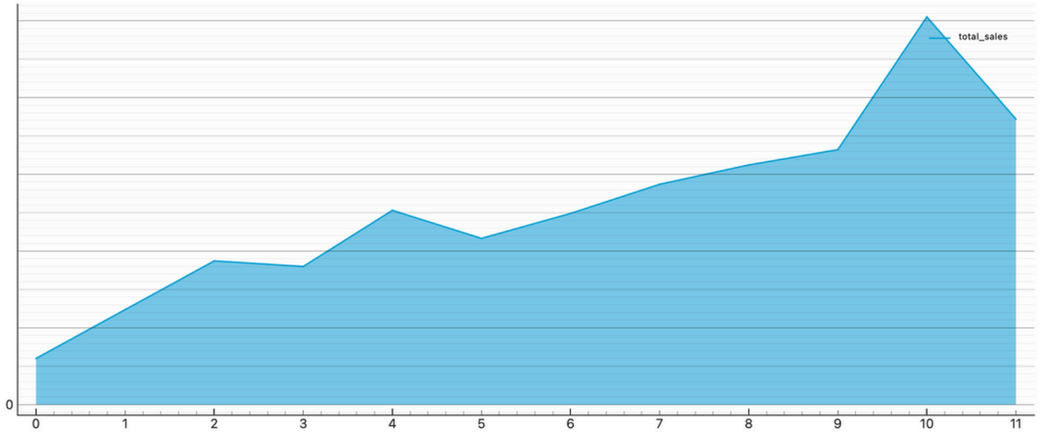
Insight:

- The revenue trends show positive growth, but also indicate that Olist is reaching a more mature phase. To keep growing, the company will need to innovate, either by expanding its product lines, entering new markets, or improving customer retention and operational efficiency.

Sales Trend Analysis

Monthly Total Sales Trend for the Year 2017





Analysis

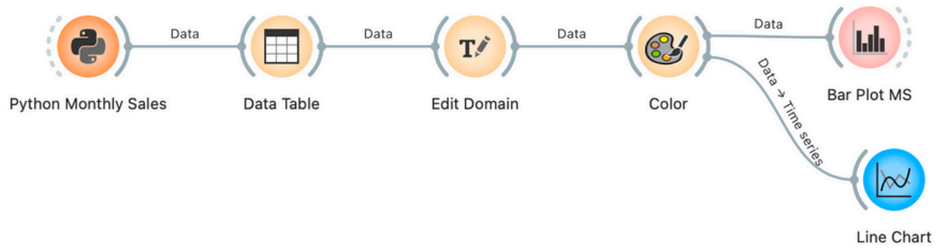
According to the data

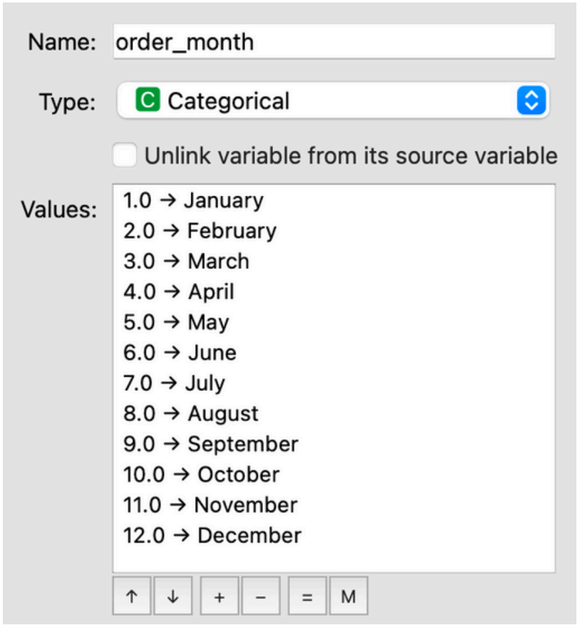
- Highest Sales Volume occurs in November
- Lowest Sales Volume occurs in January

Recomandation

- For High Sales Season
  - Increase Sever Load Capacity
  - Increase Shipping Efficiency
- For Low Sales Season
  - Clearance Sales
  - Referral Discount
  - Free Shipping Period

Sales Trend WorkFlow






```python
import pandas as pd
from Orange.data.pandas_compat import table_from_frame,table_to_frame

item = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_items_dataset.csv')
order = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_orders_dataset.csv')

sale_by_year = pd.merge(order,item,on="order_id")

sale_by_year["order_year"] = pd.to_datetime(sale_by_year["order_purchase_timestamp"]).dt.year
sale_by_year

sale_monthly_2017 = sale_by_year.loc[sale_by_year["order_year"] == 2017]

sale_monthly_2017 = sale_monthly_2017.copy()
sale_monthly_2017["order_month"] = pd.to_datetime(sale_monthly_2017["order_purchase_timestamp"]).dt.month
sale_monthly_2017 = sale_monthly_2017.groupby("order_month")["price"].sum().reset_index()
sale_monthly_2017["total_sales"]=sale_monthly_2017["price"]
sale_monthly_2017 = sale_monthly_2017.loc[:,["order_month","total_sales"]]

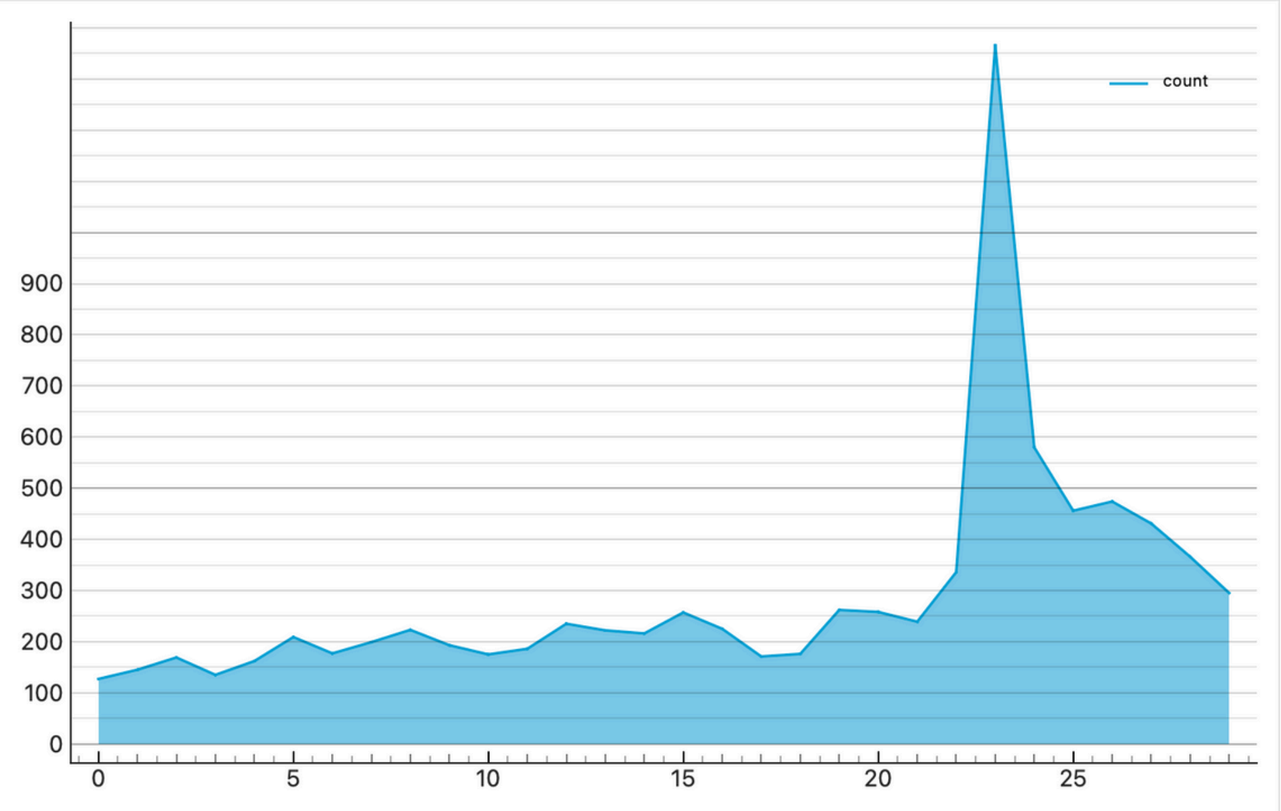
out_data = table_from_frame(sale_monthly_2017)
```

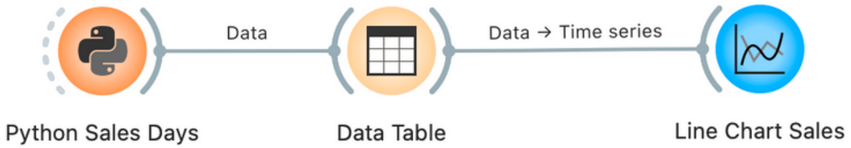
Steps

- merge item and order dataset
- extract 2017 sales
- group by month
- sum price to get total sales

Sales Trend Analysis

Daily Total Sales Trend For November 2017



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item = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/
olist_order_items_dataset.csv')
order = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/
olist_orders_dataset.csv')

sale_by_year = pd.merge(order,item,on="order_id")

sale_by_year["order_year"] =
pd.to_datetime(sale_by_year["order_purchase_timestamp"]).dt.year
sale_by_year["order_month"] =
pd.to_datetime(sale_by_year["order_purchase_timestamp"]).dt.month
sale_by_year["order_day"] =
pd.to_datetime(sale_by_year["order_purchase_timestamp"]).dt.day

sale_monthly_2017 = sale_by_year.loc[sale_by_year["order_year"] == 2017]
sale_monthly_2017 =
sale_monthly_2017[sale_monthly_2017["order_month"]==11].groupby(["order_day"])
.size().reset_index(name="count")

out_data = table_from_frame(sale_monthly_2017)
```

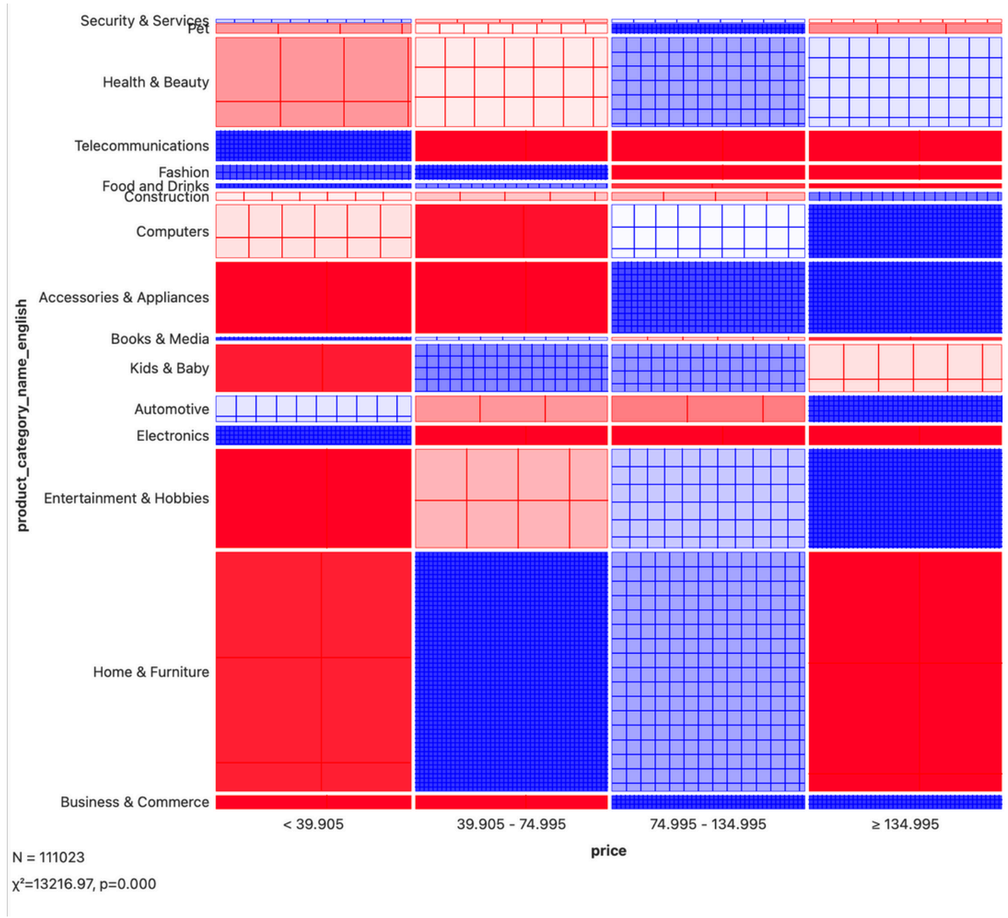
Analysis

According to the data

- Highest Sales Volume occurs in November

- In November 2017
  Highest Sales Volume is made in
  - 24 November , 2017
  - which is **Black Friday Sales**
  - **with highest number of orders**
  - **1366 orders**

Product Analysis



Product Category by Sales Revenue

Analysis

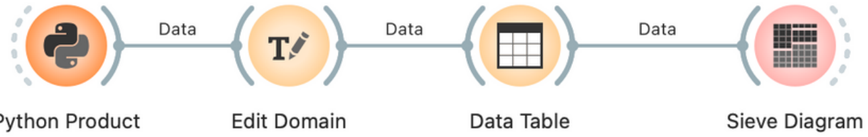
Price Range

- <40 Most Sales comes from
  - Home Appliances (small items)
  - Entertainment and Hobbies
  - Kids and Baby
- 40-75
  - Entertainments and Hobbies
  - Computers
  - Accessories Other appliances
- 75-135
  - Fashion
  - Constructions
  - Food and Drinks
- >135
  - Home and Furniture
  - Electronics
  - Telecommunication

Recomandation

- Product Categories overrepresented (red) in low price (<40) can be said as price sensitive products, should be offered frequent promotion or discount.
- Mid-price to a bit high price products categories can be promoted through proper banding and loyalty program.
- Premium products categories can focus on personalization and customization, warranties services and special shipping.

Product Analysis WorkFlow




```python
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from Orange.data.pandas_compat import table_from_frame,table_to_frame

product = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_products_dataset.csv')
item = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/olist_order_items_dataset.csv')
category = pd.read_csv('/Users/myatthuthukyaw/Downloads/ecom/product_category_name_translation.csv')


merged_products = pd.merge(product[['product_id', 'product_category_name']],
category[['product_category_name', 'product_category_name_english']], on='product_category_name',
how='inner')

merged_data = pd.merge(item[['order_id', 'product_id', 'price']], merged_products[['product_id',
'product_category_name_english']], on='product_id', how='inner')

out_data = table_from_frame(merged_data)
```

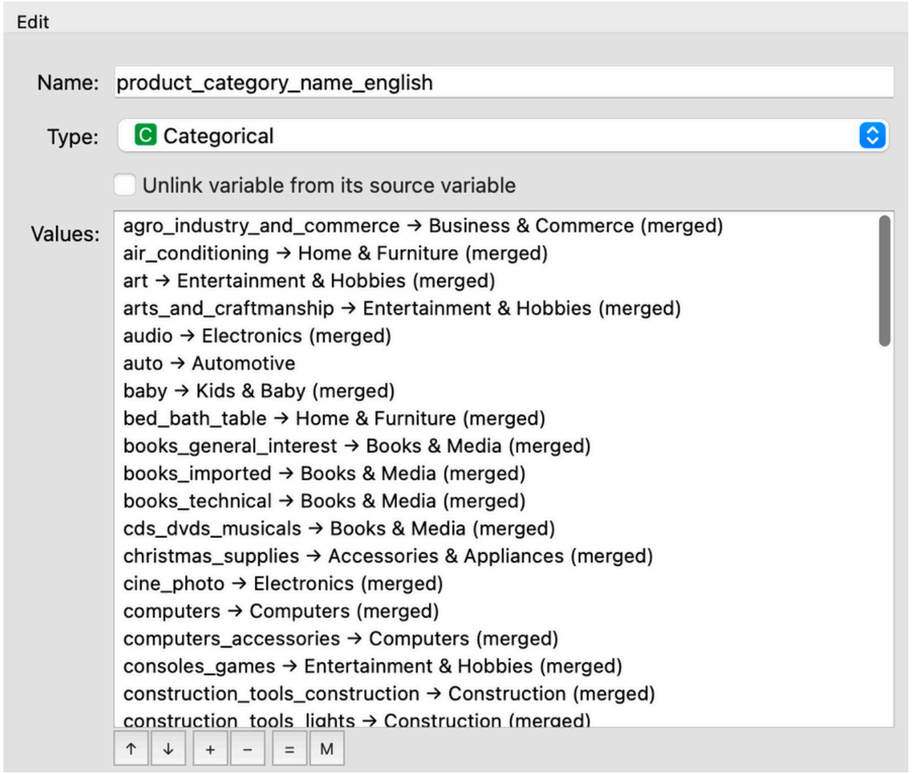

Steps

- merge item , product and category dataset
- edit domain >
  - merge similar item categories into one big category

Business Insights and Recommendation

Most Customers and Seller comes from **SP (São Paulo) State.** Most used payment methods - **credit card**. Peak Sales Season is **Black Friday in November**. Least Sales in January. Most popular product category **Beauty & Health, Home and Furniture , and Sports & Entertainment.**

01. Regional Sales

The firm should expand their market on **underrepresented regions.** Since most of the sales are densely populated in **São Paulo State.**

02. Payment Marketing

The analysis showed that **credit card** is most used payment method. The firm can attract more customers on high value products by providing **no-interest installment payments.**

03. Seasonal Sales

Since the firm gain highest sales volumes in **November** prepare and extend the sales period like **Pre-Black Friday Sales**. For the lowest sales season like January, promote through **New Year clearance sales** and **free shipping** to attract more customers.

04. Shipping Optimization

Since, average shipping periods is **12 days**, the firm should adjust to optimize for the faster shipping days to gain better customer satisfaction. Also, some pattern shows **high shipping cost** with low sales volumes, the firm should adjust that to elevate the sales.

Conclusion

Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu.

01. Performance

Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus.

02. Growth

Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus.

03. Expansion

Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus.

04. Important Notes

Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus.

Thank You

For Your Attention

BDM3303 Data Mining
SEC 401