In [1]:
```
import numpy as np
import pandas as pd
from mysql.connector import Error
import mysql.connector
from sqlalchemy import create_engine
from urllib.parse import quote_plus
```

# DATA MODELS

## CUSTOMER_DATASET

In [2]:
```
customers_dataset = pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_cust
```

In [3]:
```
customers_dataset.head()
```

Out[3]:

| | customer_id | customer_unique_id | cus |
|---|---|---|---|
| **0** | 06b8999e2fba1a1fbc88172c00ba8bc7 | 861eff4711a542e4b93843c6dd7febb0 | |
| **1** | 18955e83d337fd6b2def6b18a428ac77 | 290c77bc529b7ac935b93aa66c333dc3 | |
| **2** | 4e7b3e00288586ebd08712fdd0374a03 | 060e732b5b29e8181a18229c7b0b2b5e | |
| **3** | b2b6027bc5c5109e529d4dc6358b12c3 | 259dac757896d24d7702b9acbbff3f3c | |
| **4** | 4f2d8ab171c80ec8364f7c12e35b23ad | 345ecd01c38d18a9036ed96c73b8d066 | |

## GEOLOCATION_DATASET

In [4]:
```
geolocation_dataset = pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_ge
```

In [5]:
```
geolocation_dataset.head()
```

Out[5]:

| | geolocation_zip_code_prefix | geolocation_lat | geolocation_lng | geolocation_c |
|---|---|---|---|---|
| **0** | 1037 | -23.545621 | -46.639292 | sao pa |
| **1** | 1046 | -23.546081 | -46.644820 | sao pa |
| **2** | 1046 | -23.546129 | -46.642951 | sao pa |
| **3** | 1041 | -23.544392 | -46.639499 | sao pa |
| **4** | 1035 | -23.541578 | -46.641607 | sao pa |

In [6]:
```
geolocation_dataset.shape
```

Out[6]:
```
(1000163, 5)
```

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## ITEM_DATASET

In [7]:
```
items_dataset = pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_order_it
```

In [8]:
```
items_dataset.head()
```

Out[8]:

| | order_id | order_item_id | |
|---|---|---|---|
| **0** | 00010242fe8c5a6d1ba2dd792cb16214 | 1 | 4244733e06e7ecb4970a6e2 |
| **1** | 00018f77f2f0320c557190d7a144bdd3 | 1 | e5f2d52b802189ee658865 |
| **2** | 000229ec398224ef6ca0657da4fc703e | 1 | c777355d18b72b67abbee |
| **3** | 00024acbcdf0a6daa1e931b038114c75 | 1 | 7634da152a4610f1595efa |
| **4** | 00042b26cf59d7ce69dfabb4e55b4fd9 | 1 | ac6c3623068f30de0304586 |

In [9]:
```
items_dataset.shape
```

Out[9]:
```
(112650, 7)
```

In [ ]:
```

```

## PAYMENT_DATASET

In [10]:
```
payments_dataset= pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_order_
```

In [11]:
```
payments_dataset.head()
```

Out[11]:

| | order_id | payment_sequential | payment_type | pa |
|---|---|---|---|---|
| **0** | b81ef226f3fe1789b1e8b2acac839d17 | 1 | credit_card | |
| **1** | a9810da82917af2d9aefd1278f1dcfa0 | 1 | credit_card | |
| **2** | 25e8ea4e93396b6fa0d3dd708e76c1bd | 1 | credit_card | |
| **3** | ba78997921bbcdc1373bb41e913ab953 | 1 | credit_card | |
| **4** | 42fdf880ba16b47b59251dd489d4441a | 1 | credit_card | |

In [12]:
```
payments_dataset.shape
```

Out[12]:
```
(103886, 5)
```

## REVIEWS_DATASET

In [13]:
```
reviews_dataset= pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_order_r
```

In [14]:
```
reviews_dataset.head()
```

Out[14]:

| | review_id | order_id | rev |
|---|---|---|---|
| **0** | 7bc2406110b926393aa56f80a40eba40 | 73fc7af87114b39712e6da79b0a377eb | |
| **1** | 80e641a11e56f04c1ad469d5645fdfde | a548910a1c6147796b98fdf73dbeba33 | |
| **2** | 228ce5500dc1d8e020d8d1322874b6f0 | f9e4b658b201a9f2ecdecbb34bed034b | |
| **3** | e64fb393e7b32834bb789ff8bb30750e | 658677c97b385a9be170737859d3511b | |
| **4** | f7c4243c7fe1938f181bec41a392bdeb | 8e6bfb81e283fa7e4f11123a3fb894f1 | |

In [15]:
```
reviews_dataset.shape
```

Out[15]:
```
(99224, 7)
```

## ORDERS_DATASET

In [16]:
```
orders_dataset= pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_orders_d
```

In [17]:
```
orders_dataset.head()
```

Out[17]:

| | order_id | customer_id | orde |
|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 9ef432eb6251297304e76186b10a928d | |
| **1** | 53cdb2fc8bc7dce0b6741e2150273451 | b0830fb4747a6c6d20dea0b8c802d7ef | |
| **2** | 47770eb9100c2d0c44946d9cf07ec65d | 41ce2a54c0b03bf3443c3d931a367089 | |
| **3** | 949d5b44dbf5de918fe9c16f97b45f8a | f88197465ea7920adcdbec7375364d82 | |
| **4** | ad21c59c0840e6cb83a9ceb5573f8159 | 8ab97904e6daea8866dbdbc4fb7aad2c | |

In [18]:
```
orders_dataset.shape
```

Out[18]:
```
(99441, 8)
```

## PRODUCT_DATASET

In [19]:
```
products_dataset= pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_produc
```

In [20]:
```
products_dataset.head()
```

Out[20]:

| | product_id | product_category_name | product_name_ |
|---|---|---|---|
| **0** | 1e9e8ef04dbcff4541ed26657ea517e5 | perfumaria | |
| **1** | 3aa071139cb16b67ca9e5dea641aaa2f | artes | |
| **2** | 96bd76ec8810374ed1b65e291975717f | esporte_lazer | |
| **3** | cef67bcfe19066a932b7673e239eb23d | bebes | |
| **4** | 9dc1a7de274444849c219cff195d0b71 | utilidades_domesticas | |

In [21]:
```
products_dataset.shape
```

Out[21]:
```
(32951, 9)
```

## SELLER_DATASET

In [22]:
```
sellers_dataset= pd.read_csv("C:/Users/hp/Desktop/data/dataset/olist_sellers
```

In [23]:
```
sellers_dataset.head()
```

Out[23]:

| | seller_id | seller_zip_code_prefix | seller_city | seller |
|---|---|---|---|---|
| **0** | 3442f8959a84dea7ee197c632cb2df15 | 13023 | campinas | |
| **1** | d1b65fc7debc3361ea86b5f14c68d2e2 | 13844 | mogi guacu | |
| **2** | ce3ad9de960102d0677a81f5d0bb7b2d | 20031 | rio de janeiro | |
| **3** | c0f3eea2e14555b6faeea3dd58c1b1c3 | 4195 | sao paulo | |
| **4** | 51a04a8a6bdcb23deccc82b0b80742cf | 12914 | braganca paulista | |

In [24]:
```
sellers_dataset.shape
```

Out[24]:
```
(3095, 4)
```

## NAME_TRANSLATION DATASET

In [25]:
```
name_translation= pd.read_csv("C:/Users/hp/Desktop/data/dataset/product_cate
```

In [26]:
```
name_translation.head()
```

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Out[26]:

|   | product_category_name | product_category_name_english |
|---|---|---|
| **0** | beleza_saude | health_beauty |
| **1** | informatica_acessorios | computers_accessories |
| **2** | automotivo | auto |
| **3** | cama_mesa_banho | bed_bath_table |
| **4** | moveis_decoracao | furniture_decor |

In [27]:
```
name_translation.shape
```

Out[27]:
```
(71, 2)
```

## DIMENSION MODEL

In [28]:
```
'''
mycur = conn.cursor()
password = '@db23'
encoded_password = quote_plus(password)
engine = create_engine(f'mysql+mysqlconnector://root:{encoded_password}@loca
'''
```

Out[28]:
```
"\nmycur = conn.cursor()\npassword = '@db23'\nencoded_password = quote_plus
(password)\nengine = create_engine(f'mysql+mysqlconnector://root:{encoded_p
assword}@localhost:3306/e_commerce_pro')\n"
```

In [29]:
```
#mycur = conn.cursor()
```

In [30]:
```
pip install pymysql
```

```
Requirement already satisfied: pymysql in c:\users\hp\miniconda3\envs\envpro
p1\lib\site-packages (1.1.1)
Note: you may need to restart the kernel to use updated packages.
```

In [31]:
```
import pandas as pd
from sqlalchemy import create_engine
password = '@db23'
encoded_password = quote_plus(password)
engine = create_engine(f'mysql+mysqlconnector://root:{encoded_password}@loca
customers_df = pd.read_sql_table('customers_dataset', con=engine)
geolocation_df = pd.read_sql_table('geolocation_dataset', con=engine)
sellers_df = pd.read_sql_table('sellers_dataset', con=engine)
merged_df1 = pd.merge(customers_df, geolocation_df, how='inner',left_on='cus
final_merged_df = pd.merge(merged_df1, sellers_df, how='inner',left_on='geol
print(final_merged_df.head())
```

```
Empty DataFrame
Columns: [customer_id, customer_unique_id, customer_zip_code_prefix, custome
r_city, customer_state, geolocation_zip_code_prefix, geolocation_lat, geoloc
ation_lng, geolocation_city, geolocation_state, seller_id, seller_zip_code_p
refix, seller_city, seller_state]
Index: []
```

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## FACT TABLE

```
In [32]: fact_orders_info = pd.DataFrame()
```

```
In [33]: fact_orders_info.head()
```

```
Out[33]: —
```

```
In [34]: fact_orders_info['order_id']=orders_dataset['order_id']
```

```
In [35]: fact_orders_info.head()
```

Out[35]:

| | order_id |
|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 |
| **1** | 53cdb2fc8bc7dce0b6741e2150273451 |
| **2** | 47770eb9100c2d0c44946d9cf07ec65d |
| **3** | 949d5b44dbf5de918fe9c16f97b45f8a |
| **4** | ad21c59c0840e6cb83a9ceb5573f8159 |

```
In [36]: fact_orders_info  = fact_orders_info.merge(payments_dataset,on='order_id',ho
```

```
In [37]: fact_orders_info.head()
```

Out[37]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

```
In [38]: fact_orders_info=fact_orders_info.merge(items_dataset,on='order_id',how='lef
```

```
In [39]: fact_orders_info.head()
```

Out[39]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

In [40]:
```
fact_orders_info = fact_orders_info.drop(
    columns=["review_comment_title", "review_comment_message", "review_creat
    errors='ignore'
)
```

In [41]:
```
fact_orders_info.head()
```

Out[41]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

In [42]:
```
fact_orders_info=fact_orders_info.merge(orders_dataset,on='order_id',how='le
```

In [43]:
```
fact_orders_info.head()
```

Out[43]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

In [44]:
```
fact_orders_info = fact_orders_info.drop(
    columns=["order_status", "order_purchase_timestamp", "order_approved_at"
    errors='ignore'
)
```

In [45]:
```
fact_orders_info.head()
```

Out[45]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

In [46]:
```
fact_orders_info=fact_orders_info.merge(reviews_dataset,on='order_id',how='l
```

In [47]:
```
fact_orders_info.head()
```

Out[47]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

In [48]:
```
fact_orders_info = fact_orders_info.drop(
    columns=["review_comment_title", "review_comment_message", "review_creat
    errors='ignore'
)
```

In [49]:
```
fact_orders_info.head()
```

Out[49]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

## fact_orders_info DATA CLEANING

In [50]:
```
fact_orders_info.isnull().sum()
```

```
Out[50]: order_id                 0
         payment_sequential       3
         payment_type             3
         payment_installments     3
         payment_value            3
         order_item_id          833
         product_id             833
         seller_id              833
         shipping_limit_date    833
         price                  833
         freight_value          833
         customer_id              0
         review_id              997
         review_score           997
         dtype: int64
```

```
In [51]: fact_orders_info.dropna(inplace=True)  # Drops rows with any missing value
```

```
In [52]: fact_orders_info.head()
```

Out[52]:

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

```
In [53]: nan_count = fact_orders_info.isna().sum().sum()
```

```
In [54]: nan_count
```

```
Out[54]: 0
```

```
In [55]: file_path = 'C:/Users/hp/Desktop/e_commerce_project/fact_orders_info.csv'
         fact_orders_info.to_csv(file_path, index=False)
```

## dim_geolocation DATA CLEANING

```
In [56]: dim_geolocation1 = pd.DataFrame()
```

```
In [57]: dim_geolocation1 = geolocation_dataset.copy(deep=True)
```

```
In [58]: dim_geolocation1.head()
```

Out[58]:

| | geolocation_zip_code_prefix | geolocation_lat | geolocation_lng | geolocation_c |
|---|---|---|---|---|
| **0** | 1037 | -23.545621 | -46.639292 | sao pa |
| **1** | 1046 | -23.546081 | -46.644820 | sao pa |
| **2** | 1046 | -23.546129 | -46.642951 | sao pa |
| **3** | 1041 | -23.544392 | -46.639499 | sao pa |
| **4** | 1035 | -23.541578 | -46.641607 | sao pa |

In [59]:
```
dim_geolocation1.isnull().sum()
```

Out[59]:
```
geolocation_zip_code_prefix    0
geolocation_lat                0
geolocation_lng                0
geolocation_city               0
geolocation_state              0
dtype: int64
```

In [60]:
```
dim_geolocation1.dropna(inplace=True)  # Drops rows with any missing value
```

In [61]:
```
dim_geolocation1.head()
```

Out[61]:

| | geolocation_zip_code_prefix | geolocation_lat | geolocation_lng | geolocation_c |
|---|---|---|---|---|
| **0** | 1037 | -23.545621 | -46.639292 | sao pa |
| **1** | 1046 | -23.546081 | -46.644820 | sao pa |
| **2** | 1046 | -23.546129 | -46.642951 | sao pa |
| **3** | 1041 | -23.544392 | -46.639499 | sao pa |
| **4** | 1035 | -23.541578 | -46.641607 | sao pa |

In [ ]:
```
nan_count = dim_geolocation1.isna().sum().sum()
```

In [ ]:
```
nan_count
```

In [ ]:
```
file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_geolocation1.csv'
dim_geolocation1.to_csv(file_path, index=False)
```

## DIM_CUSTOMERS DATA CLEANING

In [ ]:
```
dim_customers = customers_dataset.copy(deep=True)
```

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

In [ ]:
```
dim_customers.isnull().sum()
```

In [ ]:
```
dim_customers.dropna(inplace=True)  # Drops rows with any missing value
```

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In [ ]:
```
dim_customers.head()
```
In [ ]:
```
dim_customers.shape
```
In [ ]:
```
nan_count = dim_customers.isna().sum().sum()
```
In [ ]:
```
nan_count
```

### TO SAVE CSV FILE

In [ ]:
```
file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_geolocation1.csv'
dim_geolocation1.to_csv(file_path, index=False)
```

## DIM_SELLER_DATASET

In [ ]:
```
dim_seller = sellers_dataset.copy(deep=True)
```
In [ ]:
```
dim_customers.isnull().sum()
```
In [ ]:
```
dim_seller.dropna(inplace=True)  # Drops rows with any missing value
```
In [ ]:
```
dim_seller.head()
```
In [ ]:
```
dim_seller.shape
```
In [ ]:
```
nan_count = dim_seller.isna().sum().sum()
```
In [ ]:
```
nan_count
```
In [ ]:
```
file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_seller.csv'
dim_seller.to_csv(file_path, index=False)
```

## DIM_PAYMENT_DATASET

In [ ]:
```
dim_payments = payments_dataset.copy(deep=True)
```
In [ ]:
```
dim_payments.head()
```
In [ ]:
```
dim_payments.isnull().sum()
```
In [ ]:
```
dim_payments.dropna(inplace=True)  # Drops rows with any missing value
```
In [ ]:
```
dim_payments.head()
```
In [ ]:
```
dim_payments.shape
```

```
In [ ]: nan_count = dim_payments.isna().sum().sum()
```

```
In [ ]: nan_count
```

```
In [ ]: file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_payments.csv'
        dim_payments.to_csv(file_path, index=False)
```

## DIM_REVIEWS_DATASET

```
In [ ]: dim_reviews = reviews_dataset.copy(deep=True)
```

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

```
In [ ]: dim_reviews.isnull().sum()
```

```
In [ ]: dim_reviews.dropna(inplace=True)  # Drops rows with any missing value
```

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

```
In [ ]: dim_reviews.shape
```

```
In [ ]: nan_count = dim_reviews.isna().sum().sum()
```

```
In [ ]: nan_count
```

```
In [ ]: file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_reviews.csv'
        dim_reviews.to_csv(file_path, index=False)
```

## DIM_PRODUCTS_DATASETS

```
In [ ]: dim_products = products_dataset.copy(deep=True)
```

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

```
In [ ]: dim_products.isnull().sum()
```

```
In [ ]: dim_products.dropna(inplace=True)  # Drops rows with any missing value
```

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

```
In [ ]: nan_count = dim_products.isna().sum().sum()
```

```
In [ ]: nan_count
```

```
In [ ]: file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_products.csv'
        dim_products.to_csv(file_path, index=False)
```

## DIM_ORDERS_DATASET

```
In [ ]: dim_orders = orders_dataset.copy(deep=True)
```

```
In [ ]: dim_orders
```

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

```
In [ ]: dim_orders_date = pd.DataFrame()
```

```
In [ ]: dim_orders_date = orders_dataset.copy(deep=True)
```

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

```
In [ ]: date_diam = pd.DataFrame()
```

```
In [ ]: dates = pd.concat([
            dim_orders_date['order_purchase_timestamp'].dropna(),
            dim_orders_date['order_approved_at'].dropna(),
            dim_orders_date['order_delivered_carrier_date'].dropna(),
            dim_orders_date['order_delivered_customer_date'].dropna(),
            dim_orders_date['order_estimated_delivery_date'].dropna(),
        ]).drop_duplicates().reset_index(drop=True)
```

```
In [ ]: dates = pd.to_datetime(dates)
```

```
In [ ]: dates
```

```
In [ ]: date_diam = pd.DataFrame({
            'date' : dates,
            'date_id' : range(1,len(dates) + 1)
        })
```

```
In [ ]: print(date_diam.columns)
```

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

```
In [ ]: date_diam['year'] = date_diam['date'].dt.year
```

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

```
In [ ]: date_diam['month'] = date_diam['date'].dt.month
```

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

```
In [ ]: date_diam['quarter'] = date_diam['date'].dt.quarter
```

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

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```
In [ ]: date_diam['day'] = date_diam['date'].dt.day
```

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

```
In [ ]: date_diam['day_of_week'] = date_diam['date'].dt.day_of_week
```

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

```
In [ ]: date_diam.dropna(inplace=True)  # Drops rows with any missing value
```

```
In [142…: date_diam.head()
```

Out[142…

| | date | date_id | year | month | quarter | day | day_of_week |
|---|---|---|---|---|---|---|---|
| **0** | 2017-10-02 10:56:33 | 1 | 2017 | 10 | 4 | 2 | 0 |
| **1** | 2018-07-24 20:41:37 | 2 | 2018 | 7 | 3 | 24 | 1 |
| **2** | 2018-08-08 08:38:49 | 3 | 2018 | 8 | 3 | 8 | 2 |
| **3** | 2017-11-18 19:28:06 | 4 | 2017 | 11 | 4 | 18 | 5 |
| **4** | 2018-02-13 21:18:39 | 5 | 2018 | 2 | 1 | 13 | 1 |

```
In [143…: nan_count = date_diam.isna().sum().sum()
```

```
In [144…: nan_count
```

```
Out[144…: 0
```

```
In [145…: file_path = 'C:/Users/hp/Desktop/e_commerce_project/date_diam.csv'
          date_diam.to_csv(file_path, index=False)
```

```
In [ ]:
```

```
In [146…: dim_orders_datessF = dim_orders.copy(deep=True)
```

```
In [147…: dim_orders_datessF.head()
```

Out[147…

| | order_id | customer_id | ord |
|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 9ef432eb6251297304e76186b10a928d | |
| **1** | 53cdb2fc8bc7dce0b6741e2150273451 | b0830fb4747a6c6d20dea0b8c802d7ef | |
| **2** | 47770eb9100c2d0c44946d9cf07ec65d | 41ce2a54c0b03bf3443c3d931a367089 | |
| **3** | 949d5b44dbf5de918fe9c16f97b45f8a | f88197465ea7920adcdbec7375364d82 | |
| **4** | ad21c59c0840e6cb83a9ceb5573f8159 | 8ab97904e6daea8866dbdbc4fb7aad2c | |

In [148…
```
dim_orders_datessF.dtypes
```
Out[148…
```
order_id                         object
customer_id                      object
order_status                     object
order_purchase_timestamp         object
order_approved_at                object
order_delivered_carrier_date     object
order_delivered_customer_date    object
order_estimated_delivery_date    object
dtype: object
```
In [149…
```
# Update original DataFrame columns to datetime
dim_orders_datessF['order_purchase_timestamp'] = pd.to_datetime(dim_orders_d
dim_orders_datessF['order_approved_at'] = pd.to_datetime(dim_orders_datessF[
dim_orders_datessF['order_delivered_carrier_date'] = pd.to_datetime(dim_orde
dim_orders_datessF['order_delivered_customer_date'] = pd.to_datetime(dim_orc
dim_orders_datessF['order_estimated_delivery_date'] = pd.to_datetime(dim_orc
```
In [150…
```
dim_orders_datessF.dtypes
```
Out[150…
```
order_id                                 object
customer_id                              object
order_status                             object
order_purchase_timestamp         datetime64[ns]
order_approved_at                datetime64[ns]
order_delivered_carrier_date     datetime64[ns]
order_delivered_customer_date    datetime64[ns]
order_estimated_delivery_date    datetime64[ns]
dtype: object
```
In [172…
```
import pandas as pd

# Convert timestamps to datetime and merge with date dimension table to get
dim_orders_datessF['order_purchase_timestamp_key'] = pd.to_datetime(dim_orde
dim_orders_datessF = pd.merge(
    dim_orders_datessF,
    date_diam[['date', 'date_id']],
    left_on='order_purchase_timestamp_key',
    right_on='date',
```
Loading [MathJax]/extensions/Safe.js

```
    how='left'
).drop(columns=['date', 'order_purchase_timestamp_key'])
dim_orders_datessF['order_purchase_timestamp_key'] = dim_orders_datessF['dat
dim_orders_datessF = dim_orders_datessF.drop(columns='date_id')

# Repeat for order_approved_at
dim_orders_datessF['order_approved_at_key'] = pd.to_datetime(dim_orders_date
dim_orders_datessF = pd.merge(
    dim_orders_datessF,
    date_diam[['date', 'date_id']],
    left_on='order_approved_at_key',
    right_on='date',
    how='left'
).drop(columns=['date', 'order_approved_at_key'])
dim_orders_datessF['order_approved_at_key'] = dim_orders_datessF['date_id']
dim_orders_datessF = dim_orders_datessF.drop(columns='date_id')

# Repeat for order_delivered_carrier_date
dim_orders_datessF['order_delivered_carrier_date_key'] = pd.to_datetime(dim_
dim_orders_datessF = pd.merge(
    dim_orders_datessF,
    date_diam[['date', 'date_id']],
    left_on='order_delivered_carrier_date_key',
    right_on='date',
    how='left'
).drop(columns=['date', 'order_delivered_carrier_date_key'])
dim_orders_datessF['order_delivered_carrier_date_key'] = dim_orders_datessF[
dim_orders_datessF = dim_orders_datessF.drop(columns='date_id')

# Repeat for order_delivered_customer_date
dim_orders_datessF['order_delivered_customer_date_key'] = pd.to_datetime(dim
dim_orders_datessF = pd.merge(
    dim_orders_datessF,
    date_diam[['date', 'date_id']],
    left_on='order_delivered_customer_date_key',
    right_on='date',
    how='left'
).drop(columns=['date', 'order_delivered_customer_date_key'])
dim_orders_datessF['order_delivered_customer_date_key'] = dim_orders_datessF
dim_orders_datessF = dim_orders_datessF.drop(columns='date_id')

# Repeat for order_estimated_delivery_date
dim_orders_datessF['order_estimated_delivery_date_key'] = pd.to_datetime(dim
dim_orders_datessF = pd.merge(
    dim_orders_datessF,
    date_diam[['date', 'date_id']],
    left_on='order_estimated_delivery_date_key',
    right_on='date',
    how='left'
).drop(columns=['date', 'order_estimated_delivery_date_key'])
dim_orders_datessF['order_estimated_delivery_date_key'] = dim_orders_datessF
dim_orders_datessF = dim_orders_datessF.drop(columns='date_id')
```

In [167…
```
dim_orders_datessF.head()
```

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Out[167…

| | order_id | customer_id | ord |
|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 9ef432eb6251297304e76186b10a928d | |
| **1** | 53cdb2fc8bc7dce0b6741e2150273451 | b0830fb4747a6c6d20dea0b8c802d7ef | |
| **2** | 47770eb9100c2d0c44946d9cf07ec65d | 41ce2a54c0b03bf3443c3d931a367089 | |
| **3** | 949d5b44dbf5de918fe9c16f97b45f8a | f88197465ea7920adcdbec7375364d82 | |
| **4** | ad21c59c0840e6cb83a9ceb5573f8159 | 8ab97904e6daea8866dbdbc4fb7aad2c | |

In [ ]:
```python
dim_orders_datessF.dtypes
```

In [ ]:
```python
dim_orders_datessF.drop(columns=[
    'order_purchase_timestamp',
    'order_approved_at',
    'order_delivered_carrier_date',
    'combined_dates',
    'order_delivered_customer_date',
    'order_estimated_delivery_date',
    'order_purchase_timestamp_date_id',
    'order_approved_at_date_id',
    'order_delivered_carrier_date_id',
    'order_delivered_customer_date_id',
    'order_estimated_delivery_date_id',
    'date_id_x',
    'date_id_y'
], errors='ignore', inplace=True)
```

In [ ]:
```python
dim_orders_datessF.dtypes
```

In [ ]:
```python
dim_orders_datessF['order_purchase_timestamp_key'] = dim_orders_datessF['ord
dim_orders_datessF['order_approved_at_key'] = dim_orders_datessF['order_appr
dim_orders_datessF['order_delivered_carrier_date_key'] = dim_orders_datessF[
dim_orders_datessF['order_delivered_customer_date_key'] = dim_orders_datessF
dim_orders_datessF['order_estimated_delivery_date_key'] = dim_orders_datessF
```

In [ ]:
```python
dim_orders_datessF.dropna(inplace=True)  # Drops rows with any missing value
```

In [ ]:
```python
dim_orders_datessF.head()
```

In [ ]:
```python
dim_orders_datessF.dtypes
```

In [ ]:
```python
nan_count = dim_orders_datessF.isna().sum().sum()
```

In [ ]:
```python
nan_count
```

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In [ ]:
```
file_path = 'C:/Users/hp/Desktop/e_commerce_project/dim_orders_datessF.csv'
dim_orders_datessF.to_csv(file_path, index=False)
```

In [152…
```
dim_orders_datessF.head()
```

Out[152…

| | order_id | customer_id | ord |
|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 9ef432eb6251297304e76186b10a928d | |
| **1** | 53cdb2fc8bc7dce0b6741e2150273451 | b0830fb4747a6c6d20dea0b8c802d7ef | |
| **2** | 47770eb9100c2d0c44946d9cf07ec65d | 41ce2a54c0b03bf3443c3d931a367089 | |
| **3** | 949d5b44dbf5de918fe9c16f97b45f8a | f88197465ea7920adcdbec7375364d82 | |
| **4** | ad21c59c0840e6cb83a9ceb5573f8159 | 8ab97904e6daea8866dbdbc4fb7aad2c | |

In [153…
```
dim_orders_date.dtypes
```

Out[153…
```
order_id                         object
customer_id                      object
order_status                     object
order_purchase_timestamp         object
order_approved_at                object
order_delivered_carrier_date     object
order_delivered_customer_date    object
order_estimated_delivery_date    object
dtype: object
```

In [154…
```
fact_orders_info.head()
```

Out[154…

| | order_id | payment_sequential | payment_type | pay |
|---|---|---|---|---|
| **0** | e481f51cbdc54678b7cc49136f2d6af7 | 1.0 | credit_card | |
| **1** | e481f51cbdc54678b7cc49136f2d6af7 | 3.0 | voucher | |
| **2** | e481f51cbdc54678b7cc49136f2d6af7 | 2.0 | voucher | |
| **3** | 53cdb2fc8bc7dce0b6741e2150273451 | 1.0 | boleto | |
| **4** | 47770eb9100c2d0c44946d9cf07ec65d | 1.0 | credit_card | |

## DATA VUSUALIZATION

## line plot

In [155…
```
import matplotlib.pyplot as plt
import os  # Add this import
```

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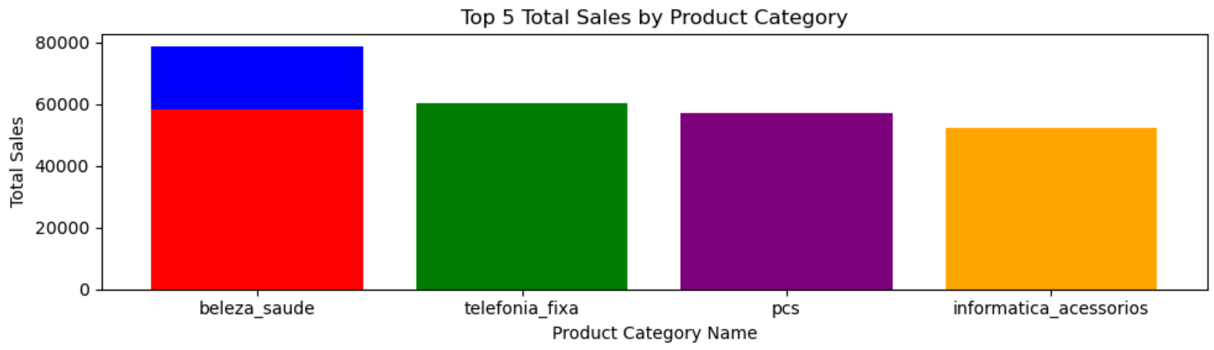
```
fact_orders_info['total_sales'] = fact_orders_info['price'] * fact_orders_ir
total_sales_by_product = fact_orders_info.groupby('product_id')['total_sales
print(dim_products.columns)  # Ensure 'product_category_name' is a valid col
total_sales_by_product = pd.merge(total_sales_by_product,
                                  dim_products[['product_id', 'product_categ
                                  on='product_id',
                                  how='left')
total_sales_by_product['product_category_name'] = total_sales_by_product['pr
total_sales_by_product['product_category_name'] = total_sales_by_product['pr
top_5_sales = total_sales_by_product.sort_values(by='total_sales', ascending
colors = ['blue', 'green', 'red', 'purple', 'orange']
plt.figure(figsize=(10, 3))
plt.bar(top_5_sales['product_category_name'], top_5_sales['total_sales'], co
plt.title('Top 5 Total Sales by Product Category')
plt.ylabel('Total Sales')
plt.xlabel('Product Category Name')
plt.tight_layout()
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop", "top_5_sales
plt.savefig(desktop_path)
plt.show()
```

```
Index(['product_id', 'product_category_name', 'product_name_lenght',
       'product_description_lenght', 'product_photos_qty', 'product_weight_
g',
       'product_length_cm', 'product_height_cm', 'product_width_cm'],
      dtype='object')
```



In [ ]:

In [156…

```
import pandas as pd
import matplotlib.pyplot as plt
import os
fact_orders_info['total_sales'] = fact_orders_info['price'] * fact_orders_ir
merged_data = pd.merge(
    fact_orders_info,
    dim_customers[['customer_id', 'customer_state']],
    on='customer_id',
    how='left',
    suffixes=('', '_dup')
)
for col in merged_data.columns:
    if '_dup' in col:
        merged_data.drop(col, axis=1, inplace=True)
total_sales_by_state = merged_data.groupby('customer_state')['total_sales'].
top_5_states = total_sales_by_state.sort_values(by='total_sales', ascending=
```

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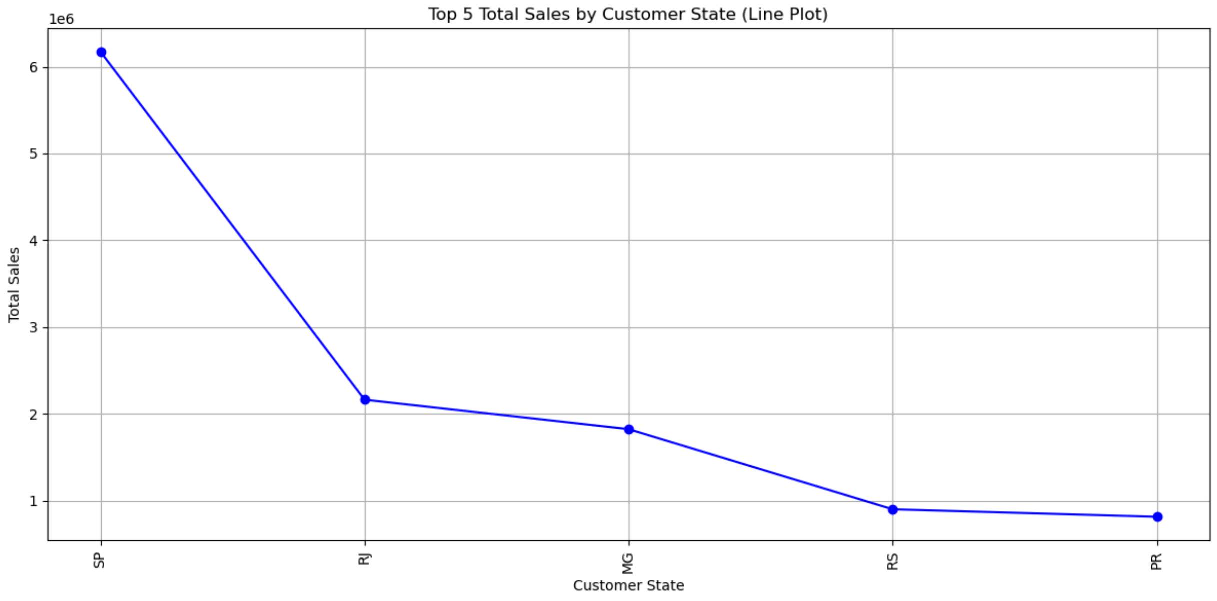
```
plt.figure(figsize=(12, 6))
plt.plot(top_5_states['customer_state'], top_5_states['total_sales'], marker
plt.xticks(rotation=90)
plt.title('Top 5 Total Sales by Customer State (Line Plot)')
plt.ylabel('Total Sales')
plt.xlabel('Customer State')
plt.grid(True)
plt.tight_layout()
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop", "top_5_sales
plt.savefig(desktop_path)
plt.show()
```

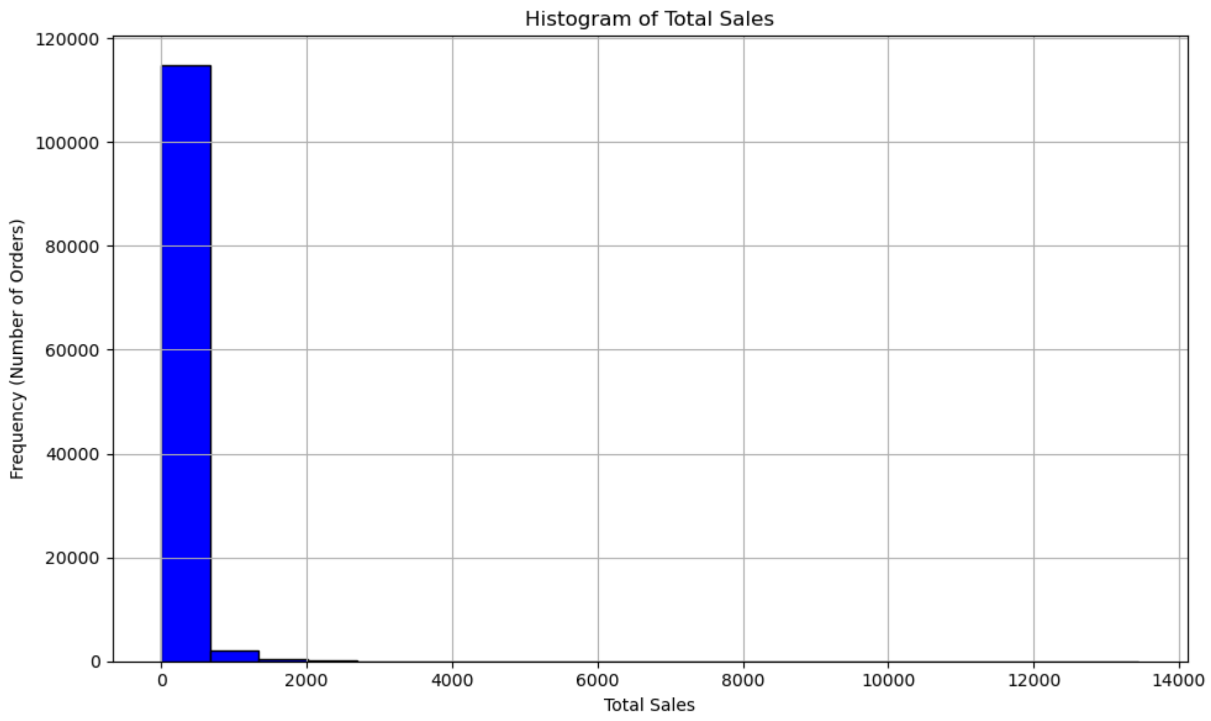


In [ ]:

In [157…

```
import pandas as pd
import matplotlib.pyplot as plt
import os
fact_orders_info['total_sales'] = fact_orders_info['price'] * fact_orders_in
total_sales_data = fact_orders_info['total_sales']
plt.figure(figsize=(10, 6))
plt.hist(total_sales_data, bins=20, color='blue', edgecolor='black')
plt.title('Histogram of Total Sales')
plt.xlabel('Total Sales')
plt.ylabel('Frequency (Number of Orders)')
plt.grid(True)
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop", "total_sales
plt.savefig(desktop_path)  # Save the histogram to the desktop
plt.tight_layout()
plt.show()
```

Loading [MathJax]/extensions/Safe.js



In [158…

```
import pandas as pd
import matplotlib.pyplot as plt
import os
fact_orders_info['total_sales'] = fact_orders_info['price'] * fact_orders_ir
bins = [0, 50, 100, 150, 200, 1000]
labels = ['0-50', '50-100', '100-150', '150-200', '200+']
fact_orders_info['price_range'] = pd.cut(fact_orders_info['price'], bins=bir
sales_by_price_range = fact_orders_info.groupby('price_range', observed=Fals
plt.figure(figsize=(10, 6))
plt.pie(sales_by_price_range, labels=sales_by_price_range.index, autopct='%1
plt.title('Total Sales Distribution by Price Range')
plt.axis('equal')
plt.tight_layout()
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop", "total_sales
plt.savefig(desktop_path)
plt.show()
```

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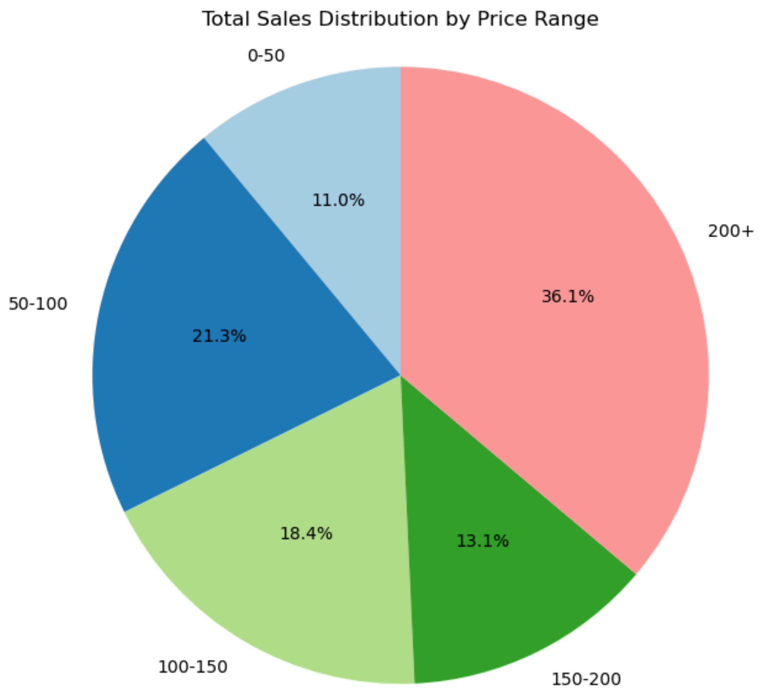

In [159…

```
import pandas as pd
import matplotlib.pyplot as plt
import os
def plot_pie_chart(data, column, title, bins=None, labels=None, save_path=No
    if bins and labels:
        data['binned'] = pd.cut(data[column], bins=bins, labels=labels, incl
        data_to_plot = data['binned'].value_counts()
    else:
        data_to_plot = data[column].value_counts()
    plt.figure(figsize=(10, 6))
    plt.pie(data_to_plot, labels=data_to_plot.index, autopct='%1.1f%%', star
    plt.title(title)
    plt.axis('equal')
    plt.tight_layout()
    if save_path:
        plt.savefig(save_path)

    plt.show()
desktop_path = os.path.expanduser("~") + "/Desktop"
if 'product_category_name' in fact_orders_info.columns:
    plot_pie_chart(
        fact_orders_info,
        'product_category_name',
        'Total Orders by Product Category',
        save_path=os.path.join(desktop_path, "total_orders_by_product_catego
    )
bins = [0, 50, 100, 150, 200, 1000]
labels = ['0-50', '50-100', '100-150', '150-200', '200+']
if 'price' in fact_orders_info.columns:
    plot_pie_chart(
        fact_orders_info,
        'price',
        'Price Distribution',
```

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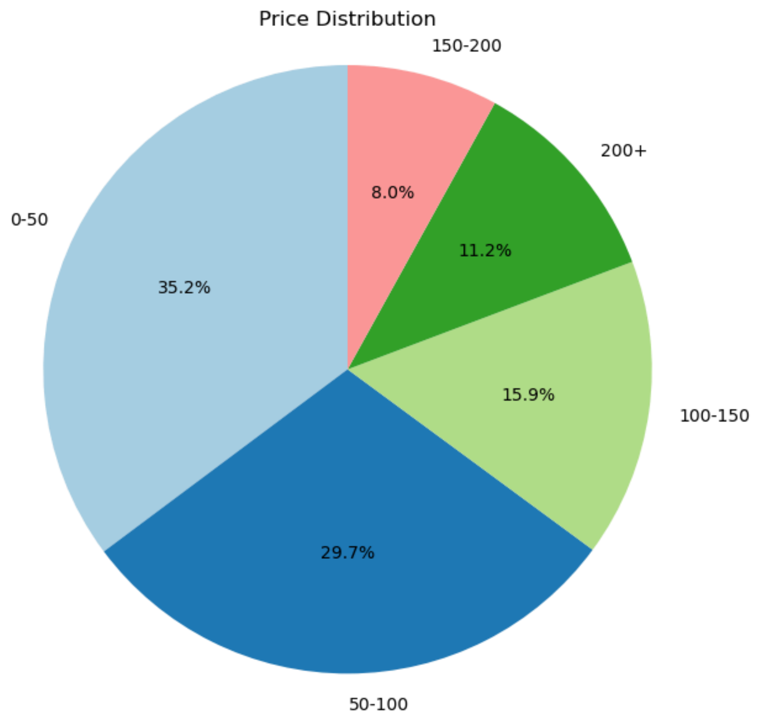
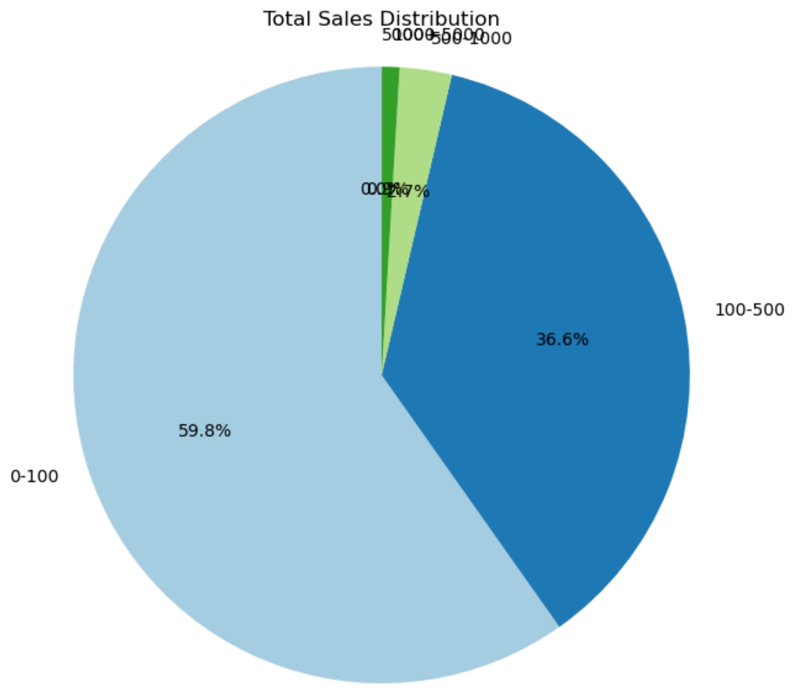
```
        bins=bins,
        labels=labels,
        save_path=os.path.join(desktop_path, "price_distribution.png")
    )
bins_sales = [0, 100, 500, 1000, 5000, 10000]
labels_sales = ['0-100', '100-500', '500-1000', '1000-5000', '5000+']
if 'total_sales' in fact_orders_info.columns:
    plot_pie_chart(
        fact_orders_info,
        'total_sales',
        'Total Sales Distribution',
        bins=bins_sales,
        labels=labels_sales,
        save_path=os.path.join(desktop_path, "total_sales_distribution.png")
    )
```





```
In [160…  import pandas as pd
          import matplotlib.pyplot as plt
          import seaborn as sns
          import os

          # Select numerical columns from fact_orders_info
          fact_orders_numerical = fact_orders_info.select_dtypes(include=['float64', '

          # Calculate the correlation matrix
          correlation_matrix = fact_orders_numerical.corr()

          # Plot the correlation heatmap
          plt.figure(figsize=(12, 8))
          sns.heatmap(correlation_matrix, annot=True, fmt=".2f", cmap='coolwarm', line
          plt.title('Correlation Heatmap of fact_orders_info (Numerical Columns)')
          plt.tight_layout()

          # Define path to save plot to the desktop
          desktop_path = os.path.join(os.path.expanduser("~"), "Desktop", "fact_orders
          plt.savefig(desktop_path)  # Save the heatmap to the desktop

          # Show the plot
          plt.show()
```

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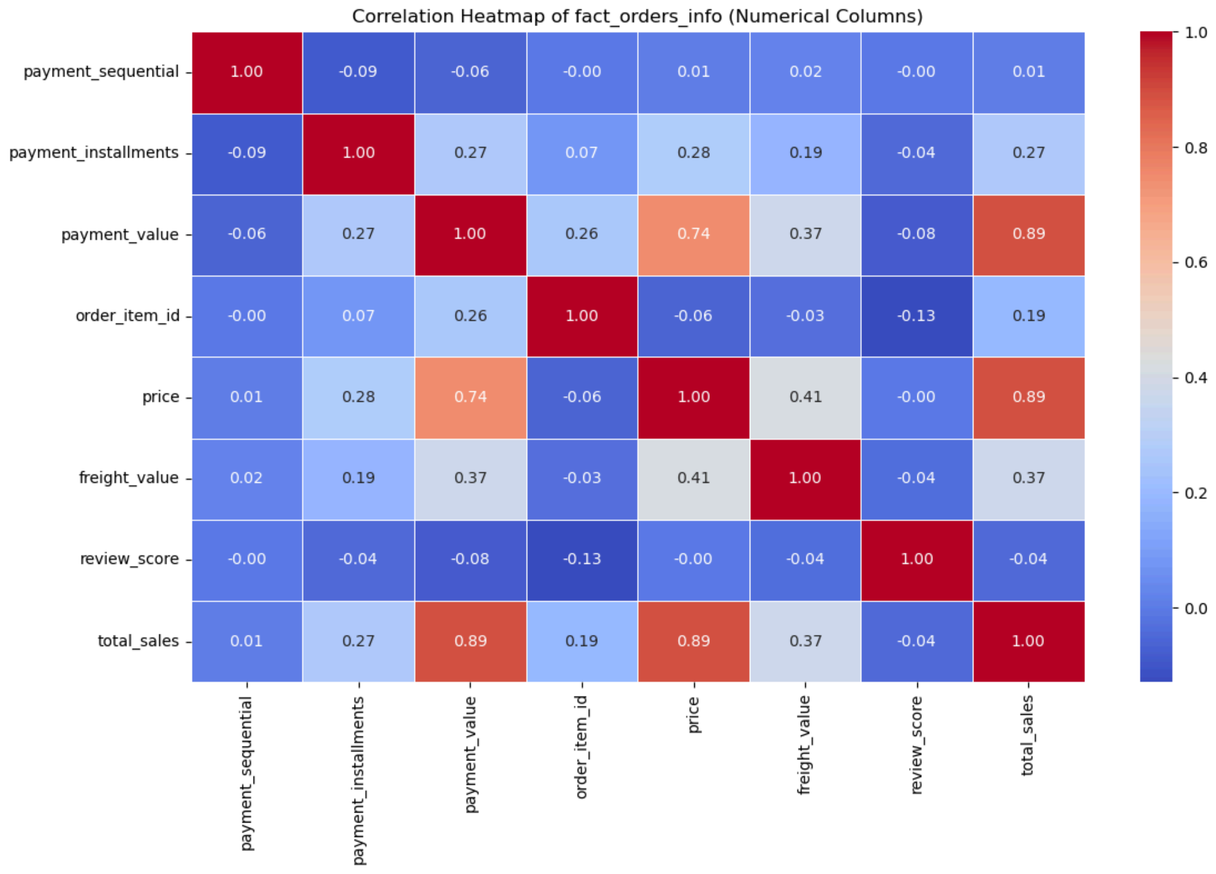

|  | payment_sequential | payment_installments | payment_value | order_item_id | price | freight_value | review_score | total_sales |
|---|---|---|---|---|---|---|---|---|
| payment_sequential | 1.00 | -0.09 | -0.06 | -0.00 | 0.01 | 0.02 | -0.00 | 0.01 |
| payment_installments | -0.09 | 1.00 | 0.27 | 0.07 | 0.28 | 0.19 | -0.04 | 0.27 |
| payment_value | -0.06 | 0.27 | 1.00 | 0.26 | 0.74 | 0.37 | -0.08 | 0.89 |
| order_item_id | -0.00 | 0.07 | 0.26 | 1.00 | -0.06 | -0.03 | -0.13 | 0.19 |
| price | 0.01 | 0.28 | 0.74 | -0.06 | 1.00 | 0.41 | -0.00 | 0.89 |
| freight_value | 0.02 | 0.19 | 0.37 | -0.03 | 0.41 | 1.00 | -0.04 | 0.37 |
| review_score | -0.00 | -0.04 | -0.08 | -0.13 | -0.00 | -0.04 | 1.00 | -0.04 |
| total_sales | 0.01 | 0.27 | 0.89 | 0.19 | 0.89 | 0.37 | -0.04 | 1.00 |

In [161…

```
import pandas as pd
import matplotlib.pyplot as plt
import os

# Step 1: Calculate total sales by order
fact_orders_info['total_sales'] = fact_orders_info['price'] * fact_orders_ir

# Step 2: Merge with customer state data
merged_data = pd.merge(fact_orders_info,
                       dim_customers[['customer_id', 'customer_state']],
                       on='customer_id',
                       how='left',
                       suffixes=('', '_dup'))

# Step 3: Drop duplicate columns if any
for col in merged_data.columns:
    if '_dup' in col:
        merged_data.drop(col, axis=1, inplace=True)

# Step 4: Calculate total sales by state
total_sales_by_state = merged_data.groupby('customer_state')['total_sales'].

# Step 5: Get top 5 states by total sales
top_5_states = total_sales_by_state.sort_values(by='total_sales', ascending=

# Step 6: Plot the line chart
plt.figure(figsize=(12, 6))
plt.plot(top_5_states['customer_state'], top_5_states['total_sales'], marker
plt.xticks(rotation=90)
```

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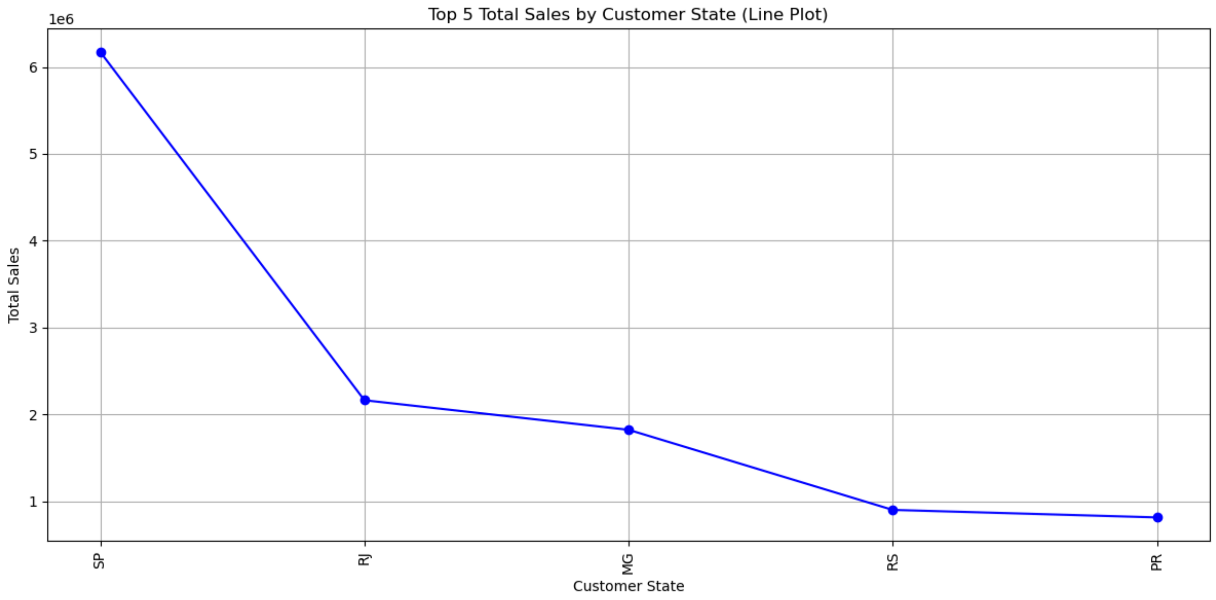
```
plt.title('Top 5 Total Sales by Customer State (Line Plot)')
plt.ylabel('Total Sales')
plt.xlabel('Customer State')
plt.grid(True)
plt.tight_layout()

# Define path to save plot to the desktop
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop", "total_sales
plt.savefig(desktop_path)  # Save the line plot to the desktop

# Show the plot
plt.show()
```



In [162…

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import os

def plot_violin_chart(data, column, title, x_label=None, y_label=None, save_
    plt.figure(figsize=(10, 6))
    sns.violinplot(data=data, y=column, inner="quartile")
    plt.title(title)
    plt.xlabel(x_label if x_label else '')
    plt.ylabel(y_label if y_label else column)
    plt.tight_layout()

    if save_path:
        plt.savefig(save_path)
    plt.show()

# Define the desktop path
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop")

# Violin plot for product price
if 'price' in fact_orders_info.columns:
    plot_violin_chart(
        fact_orders_info, 'price', 'Price Distribution', y_label='Price',
```

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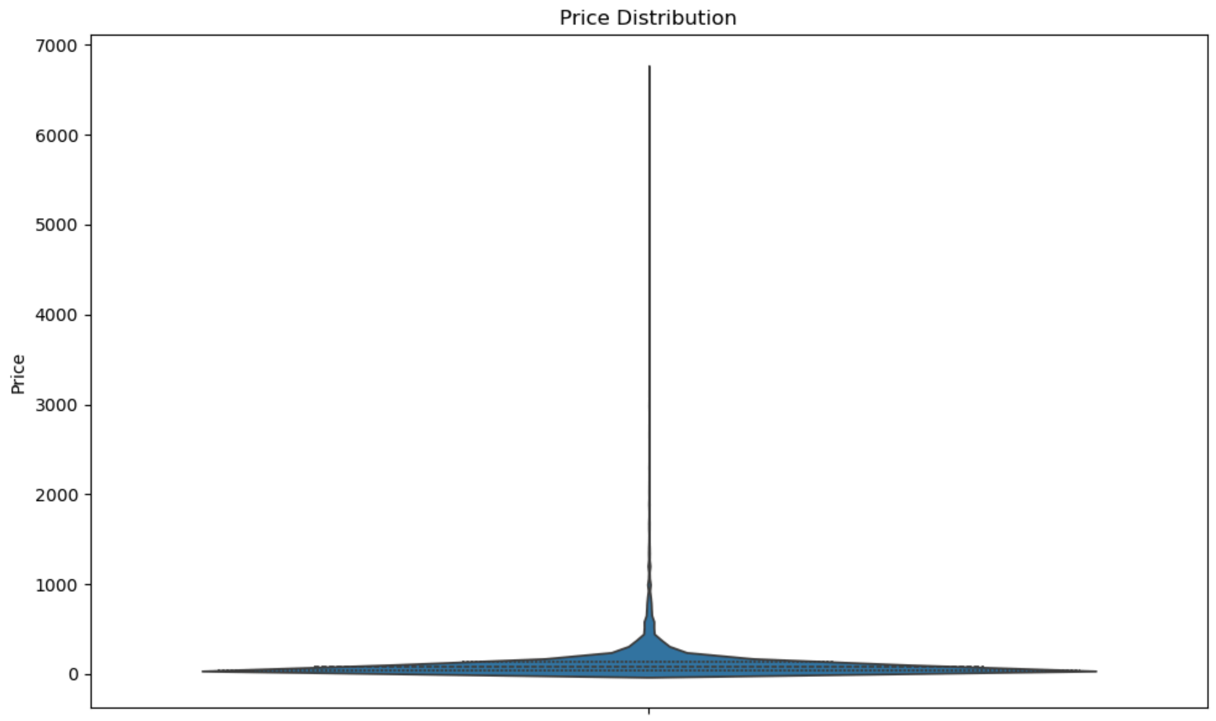
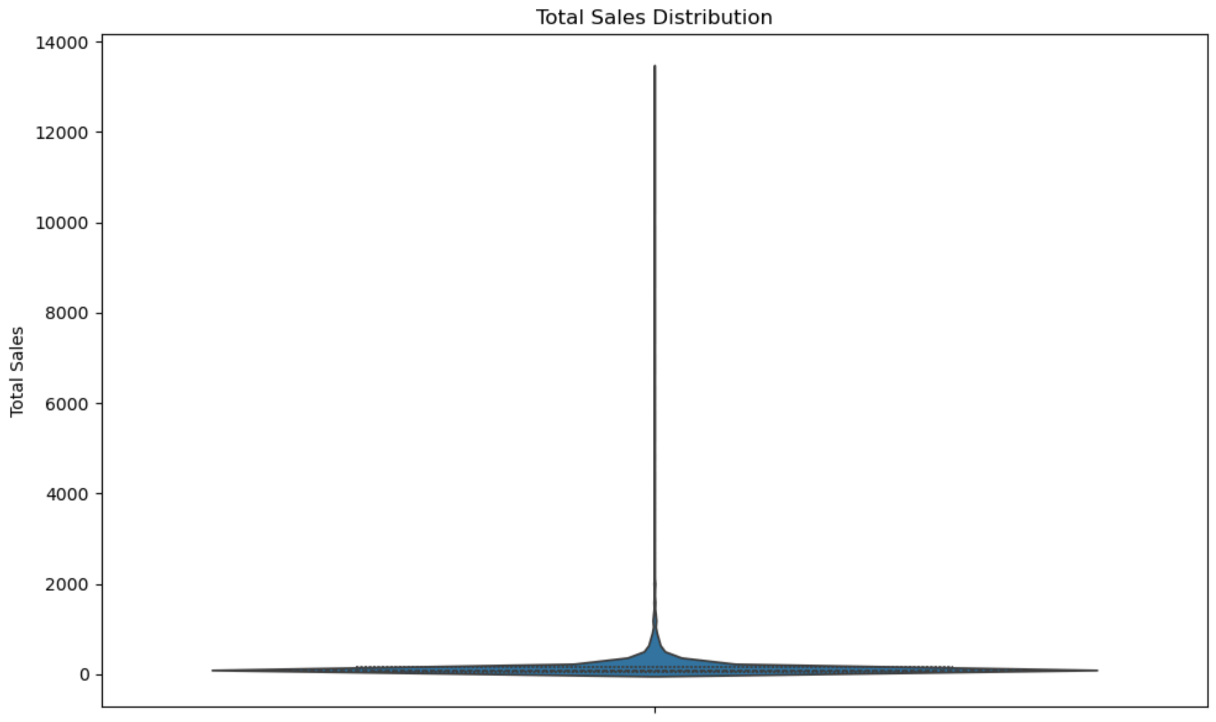
```
        save_path=os.path.join(desktop_path, "price_distribution.png")
    )

# Violin plot for total sales
if 'total_sales' in fact_orders_info.columns:
    plot_violin_chart(
        fact_orders_info, 'total_sales', 'Total Sales Distribution', y_label
        save_path=os.path.join(desktop_path, "total_sales_distribution.png")
    )
```





In [163…

```
import matplotlib.pyplot as plt
import pandas as pd
```

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```python
import os

def plot_bubble_chart(data, x_column, y_column, size_column, title, x_label=
    plt.figure(figsize=(10, 8))

    # Scatter plot for the bubble chart
    plt.scatter(data[x_column], data[y_column],
                s=data[size_column] * size_factor,  # Bubble size is proport
                alpha=0.5, color='blue')

    # Title and axis labels
    plt.title(title)
    plt.xlabel(x_label if x_label else x_column)
    plt.ylabel(y_label if y_label else y_column)

    # Ensure the layout is neat
    plt.tight_layout()

    # Save the plot if a save path is provided
    if save_path:
        plt.savefig(save_path)
    plt.show()

# Define the desktop path
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop")

# Check if columns exist in the DataFrame
if 'price' in fact_orders_info.columns and 'total_sales' in fact_orders_info
    plot_bubble_chart(fact_orders_info,
                      x_column='price',
                      y_column='total_sales',
                      size_column='order_item_id',
                      title='Bubble Chart: Price vs Total Sales',
                      x_label='Price',
                      y_label='Total Sales',
                      size_factor=50,
                      save_path=os.path.join(desktop_path, "price_vs_total_s
```

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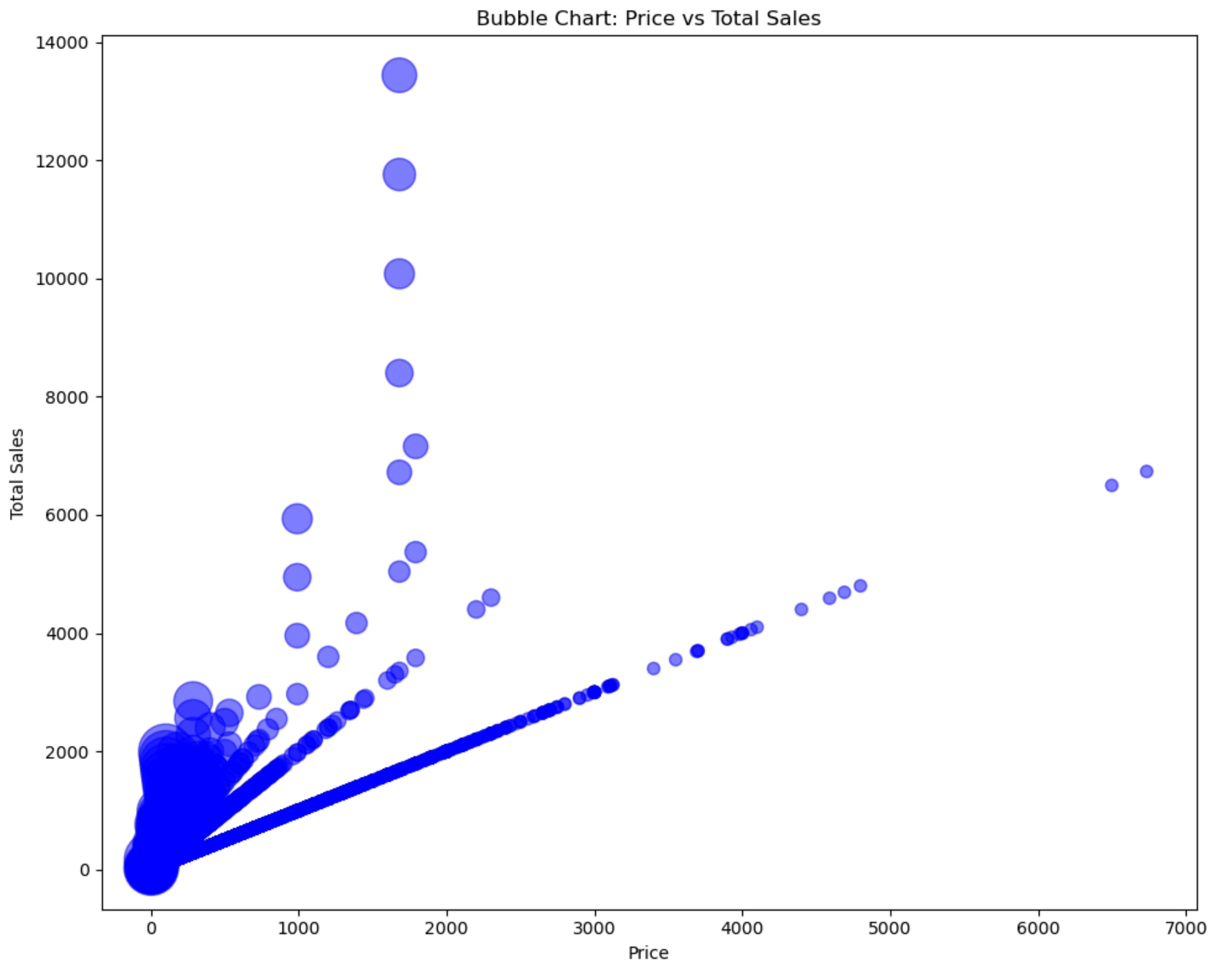


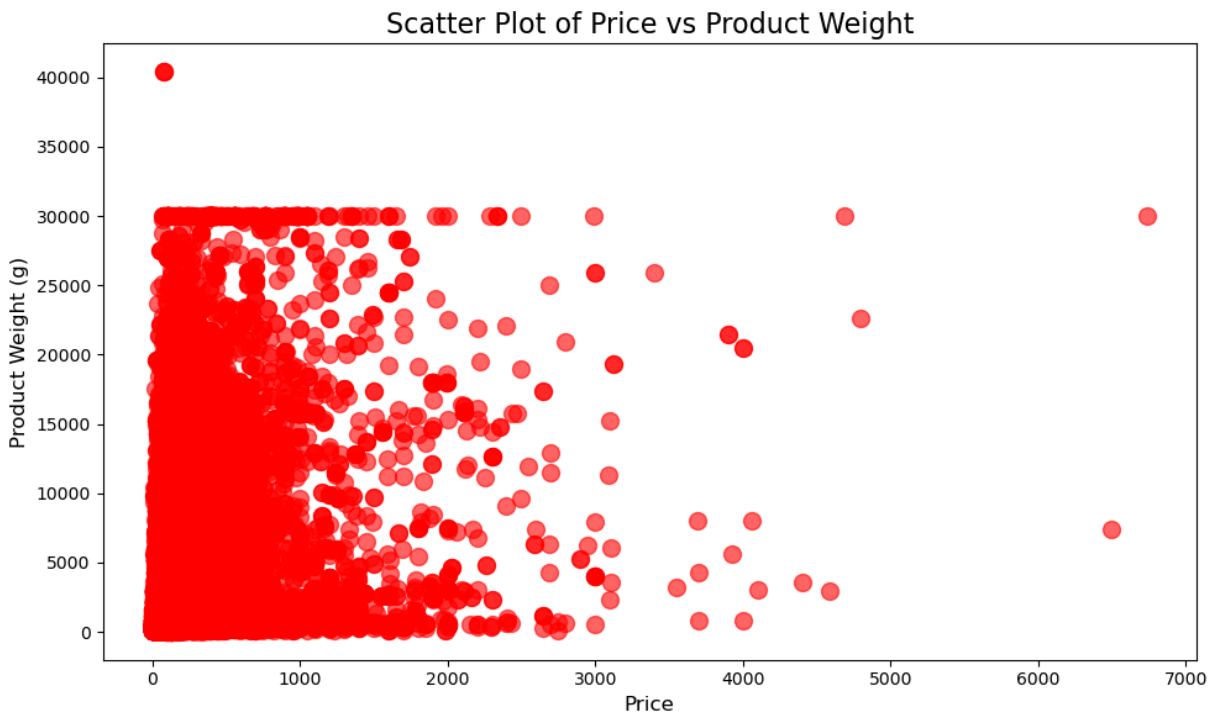
In [164…

```
import pandas as pd
import matplotlib.pyplot as plt
import os

# Merge data
merged_data = pd.merge(fact_orders_info, dim_products, on='product_id')

# Plot settings
plt.figure(figsize=(10, 6))
plt.scatter(merged_data['price'], merged_data['product_weight_g'],
            color='red', alpha=0.6, s=100)
plt.title('Scatter Plot of Price vs Product Weight', fontsize=16)
plt.xlabel('Price', fontsize=12)
plt.ylabel('Product Weight (g)', fontsize=12)
plt.tight_layout()

# Define the desktop path and save the plot
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop")
plt.savefig(os.path.join(desktop_path, "price_vs_product_weight_scatter.png"
plt.show()
```



In [165…

```
import pandas as pd
import matplotlib.pyplot as plt
import os
merged_data = pd.merge(fact_orders_info, dim_products, on='product_id')

plt.figure(figsize=(10, 6))
plt.scatter(merged_data['price'], merged_data['product_weight_g'],
            color='red', alpha=0.6, s=100)
plt.title('Scatter Plot of Price vs Product Weight', fontsize=16)
plt.xlabel('Price', fontsize=12)
plt.ylabel('Product Weight (g)', fontsize=12)

for i, txt in enumerate(merged_data['product_id']):  # Assuming product_id i
    plt.annotate('*', (merged_data['price'].iloc[i], merged_data['product_we
                 fontsize=12, color='blue')
plt.tight_layout()
desktop_path = os.path.join(os.path.expanduser("~"), "Desktop")
plt.savefig(os.path.join(desktop_path, "price_vs_product_weight_scatter_anno
plt.show()
```

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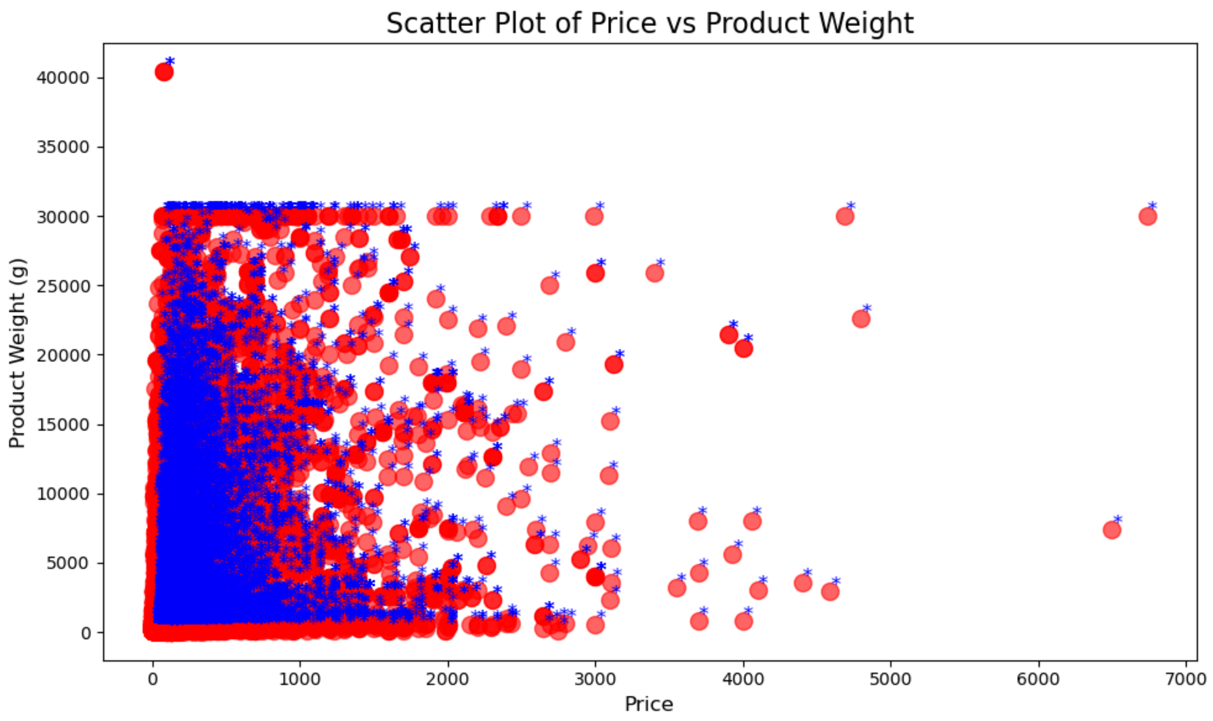
Scatter Plot of Price vs Product Weight
Product Weight (g)
Price
40000
35000
30000
25000
20000
15000
10000
5000
0
0
1000
2000
3000
4000
5000
6000
7000

In [ ]:

In [ ]: