```
import pandas as pd
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px

customer_feedback = pd.read_csv(r"C:\Users\Vineet\Desktop\
BlinkitSaleszip\blinkit_customer_feedback.csv")
customers = pd.read_csv(r"C:\Users\Vineet\Desktop\BlinkitSaleszip\
blinkit_customers.csv")
delivery_performance = pd.read_csv(r"C:\Users\Vineet\Desktop\
BlinkitSaleszip\blinkit_delivery_performance.csv")
inventory_date = pd.read_csv(r"C:\Users\Vineet\Desktop\
BlinkitSaleszip\blinkit_inventory.csv")
inventory_month_year = pd.read_csv(r"C:\Users\Vineet\Desktop\
BlinkitSaleszip\blinkit_inventoryNew.csv")
marketing_performance = pd.read_csv(r"C:\Users\Vineet\Desktop\
BlinkitSaleszip\blinkit_marketing_performance.csv")
order_items = pd.read_csv(r"C:\Users\Vineet\Desktop\BlinkitSaleszip\
blinkit_order_items.csv")
orders = pd.read_csv(r"C:\Users\Vineet\Desktop\BlinkitSaleszip\
blinkit_orders.csv")
products = pd.read_csv(r"C:\Users\Vineet\Desktop\BlinkitSaleszip\
blinkit_products.csv")
```

Delivery Performance Analysis

```
delivery_performance.head()
```

```
     order_id  delivery_partner_id        promised_time
actual_time  \
0  1961864118                63230  2024-07-17 08:52:01  2024-07-17
08:47:01
1  1549769649                14983  2024-05-28 13:25:29  2024-05-28
13:27:29
2  9185164487                39859  2024-09-23 13:25:12  2024-09-23
13:29:12
3  9644738826                61497  2023-11-24 16:34:56  2023-11-24
16:33:56
4  5427684290                84315  2023-11-20 05:17:39  2023-11-20
05:18:39

   delivery_time_minutes  distance_km delivery_status
reasons_if_delayed
0                   -5.0         0.96         On Time
NaN
1                    2.0         0.98         On Time
```

```
Traffic
2                    4.0         3.83         On Time
Traffic
3                   -1.0         2.76         On Time
NaN
4                    1.0         2.63         On Time
Traffic

delivery_performance.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 8 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   order_id               5000 non-null   int64
 1   delivery_partner_id    5000 non-null   int64
 2   promised_time          5000 non-null   object
 3   actual_time            5000 non-null   object
 4   delivery_time_minutes  5000 non-null   float64
 5   distance_km            5000 non-null   float64
 6   delivery_status        5000 non-null   object
 7   reasons_if_delayed     3098 non-null   object
dtypes: float64(2), int64(2), object(4)
memory usage: 312.6+ KB

orders

        order_id  customer_id           order_date
promised_delivery_time  \
0     1961864118     30065862  2024-07-17 08:34:01    2024-07-17
08:52:01
1     1549769649      9573071  2024-05-28 13:14:29    2024-05-28
13:25:29
2     9185164487     45477575  2024-09-23 13:07:12    2024-09-23
13:25:12
3     9644738826     88067569  2023-11-24 16:16:56    2023-11-24
16:34:56
4     5427684290     83298567  2023-11-20 05:00:39    2023-11-20
05:17:39
...          ...          ...                   ...
...
4995  1669690997     62600289  2023-12-25 15:46:20    2023-12-25
16:05:20
4996  8340761903     53640286  2023-11-27 09:18:43    2023-11-27
09:38:43
4997  5936301790     87059497  2024-06-21 19:09:09    2024-06-21
19:23:09
4998  5710579377     67310893  2024-06-06 14:58:13    2024-06-06
15:12:13
```

```
4999  2494813730     28663279  2023-08-23 12:04:18    2023-08-23
12:20:18

     actual_delivery_time delivery_status  order_total payment_method
\
0     2024-07-17 08:47:01         On Time      3197.07           Cash

1     2024-05-28 13:27:29         On Time       976.55           Cash

2     2024-09-23 13:29:12         On Time       839.05            UPI

3     2023-11-24 16:33:56         On Time       440.23           Card

4     2023-11-20 05:18:39         On Time      2526.68           Cash

...                   ...             ...          ...            ...

4995  2023-12-25 16:10:20         On Time      1132.33           Cash

4996  2023-11-27 09:36:43         On Time      2372.01           Cash

4997  2024-06-21 19:26:09         On Time      3158.35           Cash

4998  2024-06-06 15:10:13         On Time      1918.92            UPI

4999  2023-08-23 12:21:18         On Time      1879.46           Card


      delivery_partner_id  store_id
0                   63230      4771
1                   14983      7534
2                   39859      9886
3                   61497      7917
4                   84315      2741
...                   ...       ...
4995                90914      1587
4996                27952      3458
4997                 9590      7424
4998                29940      6128
4999                32851      5588

[5000 rows x 10 columns]

customers.head()

   customer_id  customer_name                      email         phone
\
0     97475543  Niharika Nagi    ektataneja@example.org  912987579691

1     22077605   Megha Sachar      vedant45@example.com  915123179717
```

```
2     47822591     Hema Bahri     samiazaan@example.com  910034076149

3     79726146     Zaitra Vig     ishanvi87@example.org  916264232390

4     57102800   Januja Verma  atideshpande@example.org  917293526596


                                address          area  pincode  \
0  23, Nayar Path, Bihar Sharif-154625         Udupi   321865
1  51/302, Buch Chowk\nSrinagar-570271       Aligarh   149394
2   941\nAnne Street, Darbhanga 186125     Begusarai   621411
3       43/94, Ghosh, Alappuzha 635655     Kozhikode   826054
4             06\nOm, Ambarnath 477463  Ichalkaranji   730539

  registration_date customer_segment  total_orders  avg_order_value
0        2023-05-13          Premium            13           451.92
1        2024-06-18         Inactive             4           825.48
2        2024-09-25          Regular            17          1969.81
3        2023-10-04              New             4           220.09
4        2024-03-22         Inactive            14           578.14

merge_df = orders.merge(customers , on='customer_id',how='inner')
merge_df.head()

     order_id  customer_id           order_date promised_delivery_time
\
0  1961864118     30065862  2024-07-17 08:34:01    2024-07-17 08:52:01

1  1549769649      9573071  2024-05-28 13:14:29    2024-05-28 13:25:29

2  9185164487     45477575  2024-09-23 13:07:12    2024-09-23 13:25:12

3  9644738826     88067569  2023-11-24 16:16:56    2023-11-24 16:34:56

4  5427684290     83298567  2023-11-20 05:00:39    2023-11-20 05:17:39


  actual_delivery_time delivery_status  order_total payment_method  \
0  2024-07-17 08:47:01         On Time      3197.07           Cash
1  2024-05-28 13:27:29         On Time       976.55           Cash
2  2024-09-23 13:29:12         On Time       839.05            UPI
3  2023-11-24 16:33:56         On Time       440.23           Card
4  2023-11-20 05:18:39         On Time      2526.68           Cash

   delivery_partner_id  store_id     customer_name
email  \
0                63230      4771   Urishilla Hegde
ydeo@example.org
1                14983      7534     Ranveer Mahal
phegde@example.org
2                39859      9886        Aarna Bawa
```

```
kondajagdish@example.com
3                61497      7917   Aayush Sengupta
lekha10@example.com
4                84315      2741  Vansha Kuruvilla
xalak62@example.com

          phone                                     address       area
pincode  \
0  910400446367        H.No. 330\nRana Path, Sagar 712033  Allahabad
911359
1  912292591574       49, Sarkar Zila, Navi Mumbai-077374   Thrissur
856100
2  912719661653  14/351, Agarwal Path\nMedininagar 636193    Vellore
117423
3  913367647372        20/47\nRatta Chowk, Sonipat-022522       Gaya
288459
4  912910638833       H.No. 68, Gaba Road\nKhandwa 040880    Asansol
149383

  registration_date customer_segment  total_orders  avg_order_value
0        2024-09-02          Regular            13           749.95
1        2023-11-07              New             5           958.06
2        2024-01-05         Inactive             4           327.93
3        2023-12-25          Premium             5           273.38
4        2024-10-02          Premium            14           763.10

merge_df2 = merge_df.merge(delivery_performance ,
on='order_id',how='inner')
merge_df2.head()

     order_id  customer_id           order_date promised_delivery_time
\
0  1961864118     30065862  2024-07-17 08:34:01    2024-07-17 08:52:01

1  1549769649      9573071  2024-05-28 13:14:29    2024-05-28 13:25:29

2  9185164487     45477575  2024-09-23 13:07:12    2024-09-23 13:25:12

3  9644738826     88067569  2023-11-24 16:16:56    2023-11-24 16:34:56

4  5427684290     83298567  2023-11-20 05:00:39    2023-11-20 05:17:39


  actual_delivery_time delivery_status_x  order_total
payment_method  \
0  2024-07-17 08:47:01           On Time      3197.07           Cash

1  2024-05-28 13:27:29           On Time       976.55           Cash

2  2024-09-23 13:29:12           On Time       839.05            UPI
```

```
3  2023-11-24 16:33:56           On Time       440.23           Card

4  2023-11-20 05:18:39           On Time      2526.68           Cash


   delivery_partner_id_x  store_id  ... customer_segment total_orders
\
0                  63230      4771  ...          Regular            13

1                  14983      7534  ...              New             5

2                  39859      9886  ...         Inactive             4

3                  61497      7917  ...          Premium             5

4                  84315      2741  ...          Premium            14


   avg_order_value delivery_partner_id_y        promised_time  \
0           749.95                  63230  2024-07-17 08:52:01
1           958.06                  14983  2024-05-28 13:25:29
2           327.93                  39859  2024-09-23 13:25:12
3           273.38                  61497  2023-11-24 16:34:56
4           763.10                  84315  2023-11-20 05:17:39

           actual_time delivery_time_minutes distance_km
delivery_status_y  \
0  2024-07-17 08:47:01                  -5.0        0.96             On
Time
1  2024-05-28 13:27:29                   2.0        0.98             On
Time
2  2024-09-23 13:29:12                   4.0        3.83             On
Time
3  2023-11-24 16:33:56                  -1.0        2.76             On
Time
4  2023-11-20 05:18:39                   1.0        2.63             On
Time

   reasons_if_delayed
0                 NaN
1             Traffic
2             Traffic
3                 NaN
4             Traffic

[5 rows x 27 columns]
```

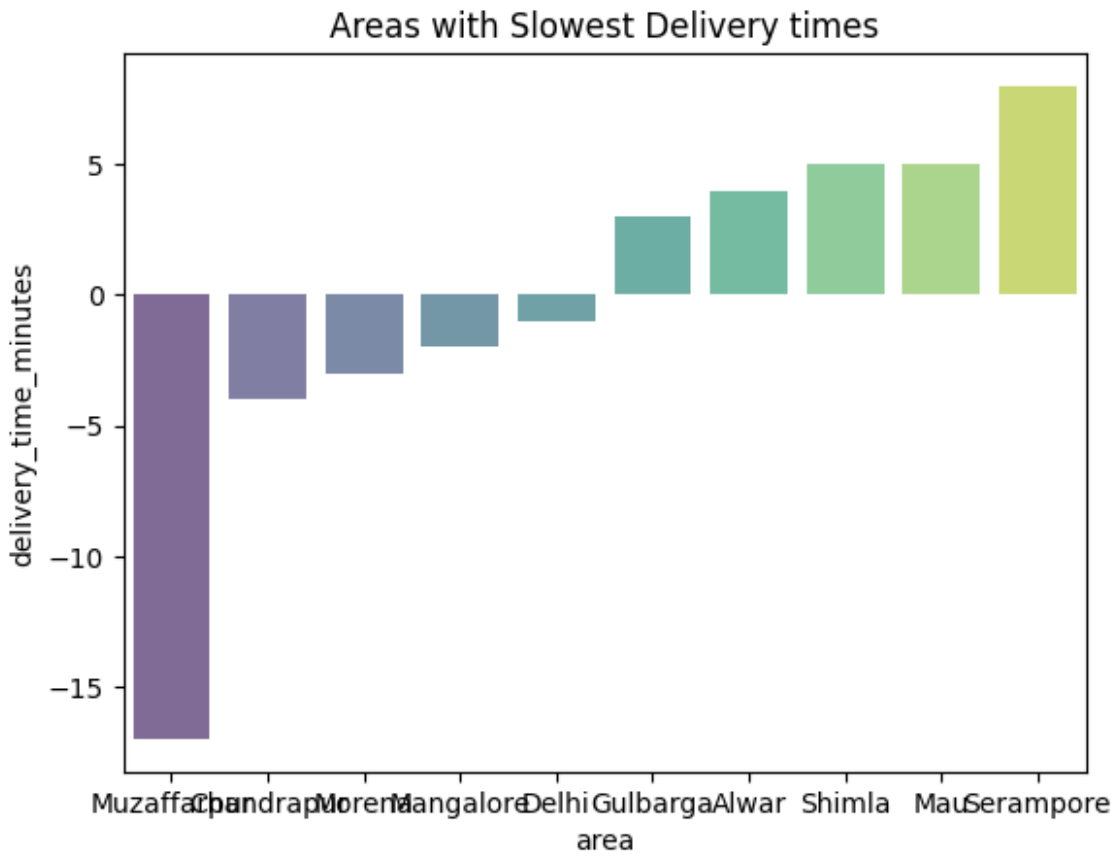
Areas with the slowest Deliveries

```
negative_deliveries = merge_df2.groupby('area')
[['delivery_time_minutes']].sum().sort_values(by='delivery_time_minute
s',ascending=True).reset_index().head(10)
negative_deliveries
```

	area	delivery_time_minutes
0	Muzaffarpur	-17.0
1	Chandrapur	-4.0
2	Morena	-3.0
3	Mangalore	-2.0
4	Delhi	-1.0
5	Gulbarga	3.0
6	Alwar	4.0
7	Shimla	5.0
8	Mau	5.0
9	Serampore	8.0

```
plt.title('Areas with Slowest Delivery times')
sns.barplot(x='area',y='delivery_time_minutes',data
=negative_deliveries.head(10),alpha=0.7,hue='area',palette =
'viridis')
```

```
<Axes: title={'center': 'Areas with Slowest Delivery times'},
xlabel='area', ylabel='delivery_time_minutes'>
```



Order date and delivery time in peak and non peak hours

```
merge_df2['order_date']= pd.to_datetime(merge_df2['order_date'])
merge_df2['actual_delivery_time']=
pd.to_datetime(merge_df2['actual_delivery_time'])
merge_df2['delivery_time_minutes']=
pd.to_datetime(merge_df2['delivery_time_minutes'])

merge_df2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 28 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   order_id                5000 non-null   int64
 1   customer_id             5000 non-null   int64
 2   order_date              5000 non-null   datetime64[ns]
 3   promised_delivery_time  5000 non-null   object
 4   actual_delivery_time    5000 non-null   datetime64[ns]
 5   delivery_status_x       5000 non-null   object
 6   order_total             5000 non-null   float64
 7   payment_method          5000 non-null   object
```

```
 8   delivery_partner_id_x   5000 non-null   int64
 9   store_id                5000 non-null   int64
 10  customer_name           5000 non-null   object
 11  email                   5000 non-null   object
 12  phone                   5000 non-null   int64
 13  address                 5000 non-null   object
 14  area                    5000 non-null   object
 15  pincode                 5000 non-null   int64
 16  registration_date       5000 non-null   object
 17  customer_segment        5000 non-null   object
 18  total_orders            5000 non-null   int64
 19  avg_order_value         5000 non-null   float64
 20  delivery_partner_id_y   5000 non-null   int64
 21  promised_time           5000 non-null   object
 22  actual_time             5000 non-null   object
 23  delivery_time_minutes   5000 non-null   datetime64[ns]
 24  distance_km             5000 non-null   float64
 25  delivery_status_y       5000 non-null   object
 26  reasons_if_delayed      3098 non-null   object
 27  hour                    5000 non-null   int32
dtypes: datetime64[ns](3), float64(3), int32(1), int64(8), object(13)
memory usage: 1.0+ MB

merge_df2['order_hour'] = merge_df2['order_date'].dt.hour
merge_df2['delivery_time_minutes']=merge_df2['delivery_time_minutes'].
dt.minute

---------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
Cell In[83], line 2
      1 merge_df2['order_hour'] = merge_df2['order_date'].dt.hour
----> 2
merge_df2['delivery_time_minutes']=merge_df2['delivery_time_minutes'].
dt.minute

File ~\AppData\Local\Programs\Python\Python313\Lib\site-packages\
pandas\core\generic.py:6299, in NDFrame.__getattr__(self, name)
   6292 if (
   6293     name not in self._internal_names_set
   6294     and name not in self._metadata
   6295     and name not in self._accessors
   6296     and
self._info_axis._can_hold_identifiers_and_holds_name(name)
   6297 ):
   6298     return self[name]
-> 6299 return object.__getattribute__(self, name)

File ~\AppData\Local\Programs\Python\Python313\Lib\site-packages\
```

```
pandas\core\accessor.py:224, in CachedAccessor.__get__(self, obj, cls)
    221 if obj is None:
    222     # we're accessing the attribute of the class, i.e.,
Dataset.geo
    223     return self._accessor
--> 224 accessor_obj = self._accessor(obj)
    225 # Replace the property with the accessor object. Inspired by:
    226 # https://www.pydanny.com/cached-property.html
    227 # We need to use object.__setattr__ because we overwrite
__setattr__ on
    228 # NDFrame
    229 object.__setattr__(obj, self._name, accessor_obj)

File ~\AppData\Local\Programs\Python\Python313\Lib\site-packages\
pandas\core\indexes\accessors.py:643, in
CombinedDatetimelikeProperties.__new__(cls, data)
    640 elif isinstance(data.dtype, PeriodDtype):
    641     return PeriodProperties(data, orig)
--> 643 raise AttributeError("Can only use .dt accessor with
datetimelike values")

AttributeError: Can only use .dt accessor with datetimelike values
```

```
merge_df2['order_hour']
```

```
0        8
1       13
2       13
3       16
4        5
        ..
4995    15
4996     9
4997    19
4998    14
4999    12
Name: order_hour, Length: 5000, dtype: int32
```

```
peak_hours = list(range(12,15)) + list(range(16,22))
```

```
merge_df2['time_category']=merge_df2['order_hour'].apply (lambda x:
'Peak_hour' if x in peak_hours else 'Non_peak')
merge_df2['time_category']
```

```
0        Non_peak
1       Peak_hour
2       Peak_hour
3       Peak_hour
4        Non_peak
         ...
4995     Non_peak
```

```
4996     Non_peak
4997    Peak_hour
4998    Peak_hour
4999    Peak_hour
Name: time_category, Length: 5000, dtype: object

merge_df2.info()

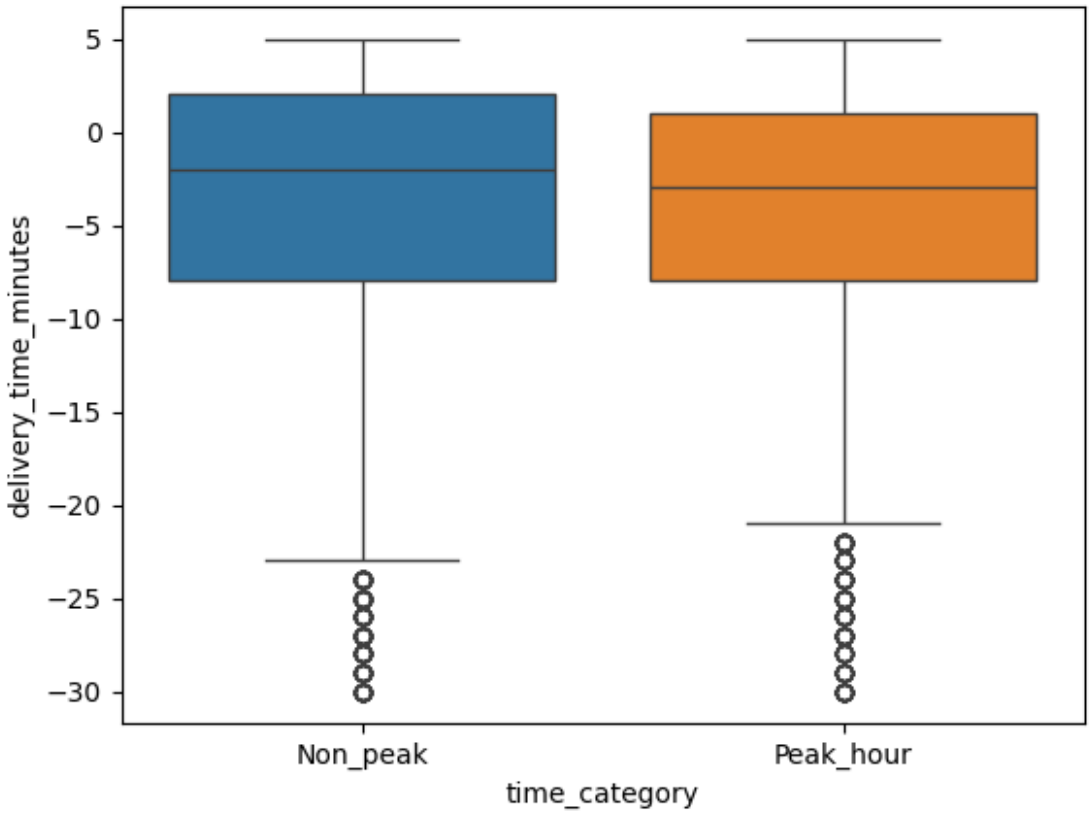
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 30 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   order_id                5000 non-null   int64
 1   customer_id             5000 non-null   int64
 2   order_date              5000 non-null   datetime64[ns]
 3   promised_delivery_time  5000 non-null   object
 4   actual_delivery_time    5000 non-null   datetime64[ns]
 5   delivery_status_x       5000 non-null   object
 6   order_total             5000 non-null   float64
 7   payment_method          5000 non-null   object
 8   delivery_partner_id_x   5000 non-null   int64
 9   store_id                5000 non-null   int64
 10  customer_name           5000 non-null   object
 11  email                   5000 non-null   object
 12  phone                   5000 non-null   int64
 13  address                 5000 non-null   object
 14  area                    5000 non-null   object
 15  pincode                 5000 non-null   int64
 16  registration_date       5000 non-null   object
 17  customer_segment        5000 non-null   object
 18  total_orders            5000 non-null   int64
 19  avg_order_value         5000 non-null   float64
 20  delivery_partner_id_y   5000 non-null   int64
 21  promised_time           5000 non-null   object
 22  actual_time             5000 non-null   object
 23  delivery_time_minutes   5000 non-null   int32
 24  distance_km             5000 non-null   float64
 25  delivery_status_y       5000 non-null   object
 26  reasons_if_delayed      3098 non-null   object
 27  hour                    5000 non-null   int32
 28  order_hour              5000 non-null   int32
 29  Peak/Non-Peak           5000 non-null   object
dtypes: datetime64[ns](2), float64(3), int32(3), int64(8), object(14)
memory usage: 1.1+ MB

merge_df2['promised_delivery_time'] =
pd.to_datetime(merge_df2['promised_delivery_time'])
```

```
merge_df2['delivery_time']=merge_df2['promised_delivery_time']-
merge_df2['actual_delivery_time']
merge_df2['delivery_time_minutes']=merge_df2['delivery_time'].dt.total
_seconds()/60

sns.boxplot(x='time_category',y='delivery_time_minutes',data=merge_df2
,hue='time_category')
```

```
<Axes: xlabel='time_category', ylabel='delivery_time_minutes'>
```



Identifying if certain products or locations cause delay in the delivery

```
products.head()
```

```
   product_id product_name             category
brand  \
0      153019       Onions  Fruits & Vegetables                Aurora
LLC
1       11422     Potatoes  Fruits & Vegetables            Ramaswamy-
Tata
2      669378     Potatoes  Fruits & Vegetables          Chadha and
Sons
3      848226     Tomatoes  Fruits & Vegetables            Barad and
```

```
Sons
4      890623       Onions  Fruits & Vegetables  Sangha, Nagar and
Varty

    price      mrp  margin_percentage  shelf_life_days
min_stock_level  \
0  947.95  1263.93               25.0                3
13
1  127.16   169.55               25.0                3
20
2  212.14   282.85               25.0                3
23
3  209.59   279.45               25.0                3
10
4  354.52   472.69               25.0                3
27

   max_stock_level
0               88
1               65
2               70
3               51
4               55

orders.head()

     order_id  customer_id           order_date promised_delivery_time
\
0  1961864118     30065862  2024-07-17 08:34:01    2024-07-17 08:52:01

1  1549769649      9573071  2024-05-28 13:14:29    2024-05-28 13:25:29

2  9185164487     45477575  2024-09-23 13:07:12    2024-09-23 13:25:12

3  9644738826     88067569  2023-11-24 16:16:56    2023-11-24 16:34:56

4  5427684290     83298567  2023-11-20 05:00:39    2023-11-20 05:17:39


  actual_delivery_time delivery_status  order_total payment_method  \
0  2024-07-17 08:47:01         On Time      3197.07           Cash
1  2024-05-28 13:27:29         On Time       976.55           Cash
2  2024-09-23 13:29:12         On Time       839.05            UPI
3  2023-11-24 16:33:56         On Time       440.23           Card
4  2023-11-20 05:18:39         On Time      2526.68           Cash

   delivery_partner_id  store_id
0                63230      4771
1                14983      7534
2                39859      9886
```

```
3                61497      7917
4                84315      2741
```

```
customers.head()
```

```
   customer_id  customer_name                      email          phone
\
0     97475543  Niharika Nagi    ektataneja@example.org  912987579691

1     22077605   Megha Sachar      vedant45@example.com  915123179717

2     47822591     Hema Bahri     samiazaan@example.com  910034076149

3     79726146     Zaitra Vig     ishanvi87@example.org  916264232390

4     57102800   Januja Verma  atideshpande@example.org  917293526596


                                address          area  pincode  \
0  23, Nayar Path, Bihar Sharif-154625         Udupi   321865
1  51/302, Buch Chowk\nSrinagar-570271       Aligarh   149394
2   941\nAnne Street, Darbhanga 186125     Begusarai   621411
3       43/94, Ghosh, Alappuzha 635655     Kozhikode   826054
4             06\nOm, Ambarnath 477463  Ichalkaranji   730539

  registration_date customer_segment  total_orders  avg_order_value
0        2023-05-13          Premium            13           451.92
1        2024-06-18         Inactive             4           825.48
2        2024-09-25          Regular            17          1969.81
3        2023-10-04              New             4           220.09
4        2024-03-22         Inactive            14           578.14


order_items.head()

     order_id  product_id  quantity  unit_price
0  1961864118      642612         3      517.03
1  1549769649      378676         1      881.42
2  9185164487      741341         2      923.84
3  9644738826      561860         1      874.78
4  5427684290      602241         2      976.55

merge_df3 = merge_df2.merge(order_items, on='order_id',how ='inner')
merge_df3
merge_df4 = merge_df3.merge(products, on='product_id',how ='inner')
merge_df4.head()

     order_id  customer_id          order_date promised_delivery_time
\
0  1961864118     30065862 2024-07-17 08:34:01    2024-07-17 08:52:01
```

```
1  1549769649      9573071 2024-05-28 13:14:29    2024-05-28 13:25:29

2  9185164487     45477575 2024-09-23 13:07:12    2024-09-23 13:25:12

3  9644738826     88067569 2023-11-24 16:16:56    2023-11-24 16:34:56

4  5427684290     83298567 2023-11-20 05:00:39    2023-11-20 05:17:39


  actual_delivery_time delivery_status_x  order_total
payment_method  \
0  2024-07-17 08:47:01           On Time      3197.07            Cash

1  2024-05-28 13:27:29           On Time       976.55            Cash

2  2024-09-23 13:29:12           On Time       839.05             UPI

3  2023-11-24 16:33:56           On Time       440.23            Card

4  2023-11-20 05:18:39           On Time      2526.68            Cash


   delivery_partner_id_x  store_id  ... unit_price  product_name  \
0                  63230      4771  ...     517.03    Pet Treats
1                  14983      7534  ...     881.42  Orange Juice
2                  39859      9886  ...     923.84          Eggs
3                  61497      7917  ...     874.78  Orange Juice
4                  84315      2741  ...     976.55          Nuts

                category         brand   price      mrp
margin_percentage  \
0              Pet Care  Pillay-Ahuja  517.03   795.43
35.0
1  Cold Drinks & Juices  Baral-Kamdar  881.42  1259.17
30.0
2     Dairy & Breakfast    Prasad LLC  923.84  1154.80
20.0
3  Cold Drinks & Juices     Gupta Ltd  874.78  1249.69
30.0
4     Snacks & Munchies      Bahl-Pau  976.55  1502.38
35.0

  shelf_life_days  min_stock_level  max_stock_level
0             365               16               57
1             180               19               65
2               7               13               62
3             180               21               90
4              90               12               75

[5 rows x 44 columns]
```

```
top_late_products = merge_df4.groupby(['product_name'])
[['delivery_time_minutes','max_stock_level']].sum().sort_values(by='de
livery_time_minutes',ascending=True).reset_index().head(10)
top_late_products
```

```
     product_name  delivery_time_minutes  max_stock_level
0      Pet Treats                -1139.0            17929
1          Lotion                 -900.0            13655
2        Vitamins                 -889.0            12826
3       Dish Soap                 -875.0            14871
4  Toilet Cleaner                 -873.0            14749
5     Cough Syrup                 -817.0            14489
6          Pulses                 -680.0             9635
7        Cat Food                 -672.0            13147
8      Baby Wipes                 -644.0            13424
9        Biscuits                 -633.0             9028
```

```
merge_df4.info()
```

```
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RangeIndex: 5000 entries, 0 to 4999
Data columns (total 44 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   order_id                5000 non-null   int64
 1   customer_id             5000 non-null   int64
 2   order_date              5000 non-null   datetime64[ns]
 3   promised_delivery_time  5000 non-null   datetime64[ns]
 4   actual_delivery_time    5000 non-null   datetime64[ns]
 5   delivery_status_x       5000 non-null   object
 6   order_total             5000 non-null   float64
 7   payment_method          5000 non-null   object
 8   delivery_partner_id_x   5000 non-null   int64
 9   store_id                5000 non-null   int64
 10  customer_name           5000 non-null   object
 11  email                   5000 non-null   object
 12  phone                   5000 non-null   int64
 13  address                 5000 non-null   object
 14  area                    5000 non-null   object
 15  pincode                 5000 non-null   int64
 16  registration_date       5000 non-null   object
 17  customer_segment        5000 non-null   object
 18  total_orders            5000 non-null   int64
 19  avg_order_value         5000 non-null   float64
 20  delivery_partner_id_y   5000 non-null   int64
 21  promised_time           5000 non-null   object
 22  actual_time             5000 non-null   object
 23  delivery_time_minutes   5000 non-null   float64
 24  distance_km             5000 non-null   float64
 25  delivery_status_y       5000 non-null   object
```

```
 26  reasons_if_delayed      3098 non-null   object
 27  hour                    5000 non-null   int32
 28  order_hour              5000 non-null   int32
 29  Peak/Non-Peak           5000 non-null   object
 30  delivery_time           5000 non-null   timedelta64[ns]
 31  time_category           5000 non-null   object
 32  product_id              5000 non-null   int64
 33  quantity                5000 non-null   int64
 34  unit_price              5000 non-null   float64
 35  product_name            5000 non-null   object
 36  category                5000 non-null   object
 37  brand                   5000 non-null   object
 38  price                   5000 non-null   float64
 39  mrp                     5000 non-null   float64
 40  margin_percentage       5000 non-null   float64
 41  shelf_life_days         5000 non-null   int64
 42  min_stock_level         5000 non-null   int64
 43  max_stock_level         5000 non-null   int64
dtypes: datetime64[ns](3), float64(8), int32(2), int64(13),
object(17), timedelta64[ns](1)
memory usage: 1.6+ MB
```

```
px.bar(top_late_products,x='product_name',y='delivery_time_minutes',co
lor='product_name',title='Delayed Products')
```


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Customer Complaints on late deliveries

```
delivery_issues = customer_feedback[customer_feedback['feedback_category']=='Delivery']
delivery_issues
```

	feedback_id	order_id	customer_id	rating	feedback_text	feedback_category
0	2234710	1961864118	30065862	4	It was okay, nothing special.	Delivery
4	3537464	5427684290	83298567	3	Product was damaged during delivery.	Delivery
8	7380970	6006693867	24496983	3	Product was damaged during delivery.	Delivery
10	1837573	4455336265	43431724	2	Taste was not as expected.	
11	258023	3539286337	77559557	3		
...	...	...	...	...		
4980	8068149	7147677361	97475543	1		
4983	2088066	4989511905	41972994	2		
4985	3325366	4753989820	81500385	4		
4993	4172796	448732557	80952275	3		
4998	1134095	5710579377	67310893	4		

```
Delivery
11    Delivery was fine, but the product could be be...
Delivery
...                                                 ...
...
4980                          Taste was not as expected.
Delivery
4983                         Not worth the price I paid.
Delivery
4985                       Great prices and fast delivery!
Delivery
4993                              I had a bad experience.
Delivery
4998                    Average experience, could improve.
Delivery

     sentiment feedback_date
0      Neutral    2024-07-17
4     Negative    2023-11-20
8     Negative    2023-07-14
10    Negative    2023-08-30
11     Neutral    2023-04-25
...        ...           ...
4980  Negative    2024-07-12
4983  Negative    2023-04-03
4985  Positive    2023-10-06
4993  Negative    2023-11-30
4998   Neutral    2024-06-06

[1271 rows x 8 columns]
```

```
sentiment_analysis =
delivery_issues.groupby(['feedback_category','sentiment']).size().rese
t_index(name='count')
sentiment_analysis
```

```
  feedback_category sentiment  count
0          Delivery  Negative    405
1          Delivery   Neutral    446
2          Delivery  Positive    420
```

```
px.bar(sentiment_analysis,x='sentiment',y='count')
```


```
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Product Demand and Inventory Optimizations

```
How can Blinkit manage inventory to meet demand and avoid wastage?
```

Prouct Id which received the highest stock and damaged stock

```
inventory_month_year.head()
```

	product_id	date	stock_received	damaged_stock
0	153019	Mar-23	4	1
1	848226	Mar-23	4	1
2	965755	Mar-23	1	0
3	39154	Mar-23	4	0
4	34186	Mar-23	3	1

```
inventory_import = inventory_month_year.groupby(['product_id'])
[['stock_received','damaged_stock']].sum().sort_values(by=['stock_rece
ived','damaged_stock'],ascending=False).reset_index().head(10)
inventory_import
```

	product_id	stock_received	damaged_stock
0	490602	140	8
1	131136	137	5
2	287070	136	8
3	945635	134	7
4	903336	133	6
5	540618	132	4
6	712003	129	2
7	39154	128	4
8	937542	127	4
9	661577	126	12

```
sales_df = order_items.merge(products,on='product_id', how ='inner')

sales_df['Net_price'] = sales_df['quantity']*sales_df['unit_price']
sales_total = sales_df.groupby(['product_name'])
[['Net_price']].sum().sort_values(by='Net_price',ascending=False).rese
t_index().head(50)

fig = px.treemap(sales_total, path=['product_name'],
values='Net_price', title="Net Price Distribution by Product",
color='Net_price', color_continuous_scale='viridis')
fig.show()
```


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Flour","Cheese","Curd","Iced Tea","Mango
Drink","Nuts","Detergent","Frozen Vegetables","Ice
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fig.show()
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Biryani","Soap","Butter","Orange
Juice","Sugar","Toothpaste","Pulses","Mangoes","Potatoes","Wheat
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```


Stock of the items vs their actual sales

```
sales_stock_total = sales_df.groupby(['product_name'])
[['Net_price','max_stock_level']].sum().sort_values(by='Net_price',asc
ending=False).reset_index().head(10)
sales_stock_total
```

```
     product_name  Net_price  max_stock_level
0        Vitamins  260822.01            12826
1      Pet Treats  252007.37            17929
2     Cough Syrup  203569.98            14489
3  Toilet Cleaner  199837.48            14749
4           Bread  184851.10            10186
5       Dish Soap  184441.21            14871
6         Cat Food  166596.39            13147
7      Baby Wipes  158768.41            13424
8          Onions  138858.42             8108
9       Baby Food  137442.79             8669
```

```
sales_df.head()
```

```
     order_id  product_id  quantity  unit_price  product_name  \
0  1961864118      642612         3      517.03    Pet Treats
1  1549769649      378676         1      881.42  Orange Juice
2  9185164487      741341         2      923.84          Eggs
3  9644738826      561860         1      874.78  Orange Juice
4  5427684290      602241         2      976.55          Nuts

                category         brand   price      mrp
margin_percentage  \
0             Pet Care  Pillay-Ahuja  517.03   795.43
35.0
1  Cold Drinks & Juices  Baral-Kamdar  881.42  1259.17
30.0
```

```
2     Dairy & Breakfast    Prasad LLC  923.84  1154.80
20.0
3  Cold Drinks & Juices     Gupta Ltd  874.78  1249.69
30.0
4     Snacks & Munchies      Bahl-Pau  976.55  1502.38
35.0
```

```
   shelf_life_days  min_stock_level  max_stock_level  Net_price
0              365               16               57    1551.09
1              180               19               65     881.42
2                7               13               62    1847.68
3              180               21               90     874.78
4               90               12               75    1953.10
```

```
pd.to_datetime(inventory_date['date'],dayfirst=True)
```

```
0       2023-03-17
1       2023-03-17
2       2023-03-17
3       2023-03-17
4       2023-03-17
           ...
75167   2024-11-05
75168   2024-11-05
75169   2024-11-05
75170   2024-11-05
75171   2024-11-05
Name: date, Length: 75172, dtype: datetime64[ns]
```

```
inventory_date['date']
```

```
0        17-03-2023
1        17-03-2023
2        17-03-2023
3        17-03-2023
4        17-03-2023
            ...
75167    05-11-2024
75168    05-11-2024
75169    05-11-2024
75170    05-11-2024
75171    05-11-2024
Name: date, Length: 75172, dtype: object
```

```
invent_sales=inventory_month_year.merge(sales_df ,on='product_id',how=
'inner')
invent_sales
```

```
        product_id    date  stock_received  damaged_stock    order_id
\
0           153019  Mar-23               4              1  7169974633
```

```
1           153019  Mar-23               4              1  1409944718
2           153019  Mar-23               4              1  5388191488
3           153019  Mar-23               4              1  8441505853
4           153019  Mar-23               4              1   271744331
...            ...     ...             ...            ...         ...
338114      114414  Nov-24               3              0  7543192113
338115      114414  Nov-24               3              0  2399383238
338116      114414  Nov-24               3              0  2211459584
338117      114414  Nov-24               3              0   576571858
338118      114414  Nov-24               3              0  9087426355

        quantity  unit_price product_name             category
brand  \
0              2      947.95       Onions  Fruits & Vegetables  Aurora
LLC
1              3      947.95       Onions  Fruits & Vegetables  Aurora
LLC
2              3      947.95       Onions  Fruits & Vegetables  Aurora
LLC
3              3      947.95       Onions  Fruits & Vegetables  Aurora
LLC
4              3      947.95       Onions  Fruits & Vegetables  Aurora
LLC
...          ...         ...          ...                  ...
...
338114         1      832.06     Vitamins             Pharmacy  Kara-
Golla
338115         1      832.06     Vitamins             Pharmacy  Kara-
Golla
338116         1      832.06     Vitamins             Pharmacy  Kara-
Golla
338117         3      832.06     Vitamins             Pharmacy  Kara-
Golla
338118         2      832.06     Vitamins             Pharmacy  Kara-
Golla

         price      mrp  margin_percentage  shelf_life_days
min_stock_level  \
0       947.95  1263.93               25.0                3
```

```
13
1       947.95  1263.93               25.0                 3
13
2       947.95  1263.93               25.0                 3
13
3       947.95  1263.93               25.0                 3
13
4       947.95  1263.93               25.0                 3
13
...        ...      ...                 ...               ...
...
338114  832.06  1040.07               20.0               365
26
338115  832.06  1040.07               20.0               365
26
338116  832.06  1040.07               20.0               365
26
338117  832.06  1040.07               20.0               365
26
338118  832.06  1040.07               20.0               365
26
```

```
        max_stock_level  Net_price
0                    88    1895.90
1                    88    2843.85
2                    88    2843.85
3                    88    2843.85
4                    88    2843.85
...                 ...        ...
338114               66     832.06
338115               66     832.06
338116               66     832.06
338117               66    2496.18
338118               66    1664.12

[338119 rows x 17 columns]
```

```
invent_sales_yearly = invent_sales.groupby(['date','category'])
[['Net_price']].sum().sort_values(by='date',ascending=True).reset_inde
x()
invent_sales_yearly
```

```
       date               category   Net_price
0    Apr-23             Baby Care   973575.36
1    Apr-23   Cold Drinks & Juices  1615923.77
2    Apr-23      Dairy & Breakfast  2656712.16
3    Apr-23    Fruits & Vegetables  2101229.29
4    Apr-23      Grocery & Staples  1693191.27
..      ...                    ...         ...
226  Sep-24         Household Care  1005323.00
```

```
227  Sep-24  Instant & Frozen Food   909488.15
228  Sep-24          Personal Care   988403.94
229  Sep-24               Pet Care  1557501.26
230  Sep-24      Snacks & Munchies  1119297.62

[231 rows x 3 columns]
```

```
px.area(invent_sales_yearly,x='date',y='Net_price',color =
'category',title='Products booming every year')
```


```
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```


Marketing Performance Analysis

```
marketing_performance.head()
```

```
   campaign_id      campaign_name        date target_audience channel
\
0       548299  New User Discount  2024-11-05         Premium     App

1       390914    Weekend Special  2024-11-05        Inactive     App

2       834385     Festival Offer  2024-11-05        Inactive   Email

3       241523         Flash Sale  2024-11-05        Inactive     SMS

4       595111   Membership Drive  2024-11-05       New Users   Email


   impressions  clicks  conversions    spend  revenue_generated  roas

0         3130     163           78  1431.85            4777.75  3.60

1         3925     494           45  4506.34            6238.11  2.98

2         7012     370           78  4524.23            2621.00  2.95

3         1115     579           86  3622.79            2955.00  2.84

4         7172     795           54  2888.99            8951.81  2.22
```

Marketing campaign which generated the highest amount of revenue

```
marketing_performance.groupby('campaign_name')
[['revenue_generated']].sum().sort_values(by='revenue_generated',ascen
ding=False).reset_index()
```

```
           campaign_name  revenue_generated
0       Referral Program         3691382.60
1      New User Discount         3603860.17
2         Email Campaign         3601785.22
3     Category Promotion         3582455.37
4        Weekend Special         3571451.83
5             Flash Sale         3556087.02
6  App Push Notification         3554370.00
7       Membership Drive         3524951.25
8         Festival Offer         3507063.91
```

```
revenue_spend = marketing_performance.groupby('campaign_name')
[['revenue_generated','spend']].sum().sort_values(by=['revenue_generat
ed','spend'],ascending=False).reset_index()
revenue_spend
```

```
           campaign_name  revenue_generated       spend
0       Referral Program         3691382.60  1818025.51
1      New User Discount         3603860.17  1833454.81
```

```
2          Email Campaign          3601785.22  1810729.67
3      Category Promotion          3582455.37  1850583.00
4         Weekend Special          3571451.83  1799611.29
5               Flash Sale          3556087.02  1831687.82
6  App Push Notification          3554370.00  1788989.20
7        Membership Drive          3524951.25  1790069.80
8          Festival Offer          3507063.91  1796687.14
```

```
px.line(revenue_spend,x='campaign_name',y=['revenue_generated','spend'
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fig.show()
```

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```


Conversions from each channel

```
marketing_performance.groupby('channel')
[['spend','conversions']].sum()
```

```
                    spend  conversions
channel
App           4213378.75        75192
Email         3997488.04        74671
SMS           3998607.54        73235
Social Media  4110363.91        74940
```

```
marketing_performance.head()
```

```
   campaign_id      campaign_name        date target_audience channel
\
0       548299  New User Discount  2024-11-05         Premium     App

1       390914    Weekend Special  2024-11-05        Inactive     App

2       834385     Festival Offer  2024-11-05        Inactive   Email

3       241523         Flash Sale  2024-11-05        Inactive     SMS

4       595111   Membership Drive  2024-11-05       New Users   Email
```

```
   impressions  clicks  conversions    spend  revenue_generated  roas
0         3130     163           78  1431.85            4777.75  3.60
1         3925     494           45  4506.34            6238.11  2.98
2         7012     370           78  4524.23            2621.00  2.95
3         1115     579           86  3622.79            2955.00  2.84
4         7172     795           54  2888.99            8951.81  2.22
```

```
customer_types = pd.merge(marketing_performance,customers , left_on
='target_audience',right_on='customer_segment',how='inner')
customer_types.head()
```

```
   campaign_id      campaign_name        date target_audience channel
\
0       548299  New User Discount  2024-11-05         Premium     App
1       548299  New User Discount  2024-11-05         Premium     App
2       548299  New User Discount  2024-11-05         Premium     App
3       548299  New User Discount  2024-11-05         Premium     App
4       548299  New User Discount  2024-11-05         Premium     App
```

```
   impressions  clicks  conversions    spend
revenue_generated  ...  \
0         3130     163           78  1431.85            4777.75  ...
1         3130     163           78  1431.85            4777.75  ...
2         3130     163           78  1431.85            4777.75  ...
3         3130     163           78  1431.85            4777.75  ...
4         3130     163           78  1431.85            4777.75  ...
```

```
    customer_name                          email         phone  \
0   Niharika Nagi          ektataneja@example.org  912987579691
1  Patrick Sandhu       zehaanmahajan@example.org  912413014420
2     Wahab Borah        bhattlakshit@example.com  912286009144
3    Vrinda Lalla  balakrishnanyutika@example.net  917567554265
4   Janani Prasad         abhirambabu@example.com  918550270063

                                  address           area pincode  \
```

```
0       23, Nayar Path, Bihar Sharif-154625          Udupi  321865
1        304\nTara Road, Gandhinagar-559930        Gwalior  649817
2  H.No. 739, Dewan Marg\nJamshedpur 475311  Hubli–Dharwad  509163
3      H.No. 73\nGupta Road, Barasat 506282          Alwar  595920
4         149\nPall Path, Aurangabad-876025      Bardhaman  125846

  registration_date  customer_segment total_orders avg_order_value
0        2023-05-13          Premium           13          451.92
1        2024-09-13          Premium            4          973.62
2        2024-10-14          Premium           10         1054.12
3        2024-06-21          Premium           10          615.86
4        2024-09-04          Premium            3         1474.04

[5 rows x 22 columns]
```