Sales Analysis Using Python

The dataset used is the superstore sales dataset.

OBJECTIVES

- What is the overall sales trend?
- which are the top products by sales numbers?
- Which are the most sold products?
- Which are the most used shipment methods?
- Which are the most profitable categories and sub-categories?

In [4]:
```
# Importing the libraries required for the analysis

import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [5]:
```
df = pd.read_excel("superstore_sales.xlsx")
```

In [6]:
```
#data checking

df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 51290 entries, 0 to 51289
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype         
---  ------         --------------  -----         
 0   order_id       51290 non-null  object        
 1   order_date     51290 non-null  datetime64[ns]
 2   ship_date      51290 non-null  datetime64[ns]
 3   ship_mode      51290 non-null  object        
 4   customer_name  51290 non-null  object        
 5   segment        51290 non-null  object        
 6   state          51290 non-null  object        
 7   country        51290 non-null  object        
 8   market         51290 non-null  object        
 9   region         51290 non-null  object        
 10  product_id     51290 non-null  object        
 11  category       51290 non-null  object        
 12  sub_category   51290 non-null  object        
 13  product_name   51290 non-null  object        
 14  sales          51290 non-null  float64       
 15  quantity       51290 non-null  int64         
 16  discount       51290 non-null  float64       
 17  profit         51290 non-null  float64       
 18  shipping_cost  51290 non-null  float64       
 19  order_priority 51290 non-null  object        
 20  year           51290 non-null  int64         
dtypes: datetime64[ns](2), float64(4), int64(2), object(13)
memory usage: 8.2+ MB
```

In [7]:
```
df.head()
```

Out[7]:

	order_id	order_date	ship_date	ship_mode	customer_name	segment	state	country	market	region	...	category	sub_cat
0	AG-2011-2040	2011-01-01	2011-01-06	Standard Class	Toby Braunhardt	Consumer	Constantine	Algeria	Africa	Africa	...	Office Supplies	St
1	IN-2011-47883	2011-01-01	2011-01-08	Standard Class	Joseph Holt	Consumer	New South Wales	Australia	APAC	Oceania	...	Office Supplies	Su
2	HU-2011-1220	2011-01-01	2011-01-05	Second Class	Annie Thurman	Consumer	Budapest	Hungary	EMEA	EMEA	...	Office Supplies	St
3	IT-2011-3647632	2011-01-01	2011-01-05	Second Class	Eugene Moren	Home Office	Stockholm	Sweden	EU	North	...	Office Supplies	
4	IN-2011-47883	2011-01-01	2011-01-08	Standard Class	Joseph Holt	Consumer	New South Wales	Australia	APAC	Oceania	...	Furniture	Furni

5 rows × 21 columns

In [8]:
```
df.shape
```

Out[8]:
```
(51290, 21)
```

In [9]:
```
df.columns
```

Out[9]:
```
Index(['order_id', 'order_date', 'ship_date', 'ship_mode', 'customer_name',
       'segment', 'state', 'country', 'market', 'region', 'product_id',
       'category', 'sub_category', 'product_name', 'sales', 'quantity',
       'discount', 'profit', 'shipping_cost', 'order_priority', 'year'],
      dtype='object')
```

In [10]:
```
#Checking for null values
df.isnull().sum()
```

Out[10]:
```
order_id         0
order_date       0
ship_date        0
ship_mode        0
customer_name    0
segment          0
state            0
country          0
market           0
region           0
product_id       0
category         0
sub_category     0
product_name     0
sales            0
quantity         0
discount         0
profit           0
shipping_cost    0
order_priority   0
year             0
dtype: int64
```

In [11]:
```
# Descriptive stats of the data

df.describe()
```

Out[11]:

	sales	quantity	discount	profit	shipping_cost	year
count	51290.000000	51290.000000	51290.000000	51290.000000	51290.000000	51290.000000
mean	246.490581	3.476545	0.142908	28.641740	26.375818	2012.777208
std	487.565361	2.278766	0.212280	174.424113	57.296810	1.098931
min	0.444000	1.000000	0.000000	-6599.978000	0.002000	2011.000000
25%	30.758625	2.000000	0.000000	0.000000	2.610000	2012.000000
50%	85.053000	3.000000	0.000000	9.240000	7.790000	2013.000000
75%	251.053200	5.000000	0.200000	36.810000	24.450000	2014.000000
max	22638.480000	14.000000	0.850000	8399.976000	933.570000	2014.000000

EXPLORATORY DATA ANALYSIS

Sales Trend

In [12]:
```
df['order_date'].min()
```

Out[12]:
```
Timestamp('2011-01-01 00:00:00')
```

In [13]:
```
df['order_date'].max()
```

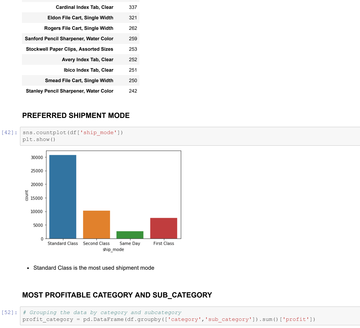
Out[13]:
```
Timestamp('2014-12-31 00:00:00')
```

In [14]:
```
# EXTRACTING MONTH & YEAR FROM DATE
df['month_year'] = df['order_date'].apply(lambda x: x.strftime('%Y-%m'))
df['month_year']
```

Out[14]:
```
0        2011-01
1        2011-01
2        2011-01
3        2011-01
4        2011-01
          ...   
51285    2014-12
51286    2014-12
51287    2014-12
51288    2014-12
51289    2014-12
Name: month_year, Length: 51290, dtype: object
```

In [17]:
```
# Month over month sales
df_sales_trend = df.groupby('month_year').sum()['sales'].reset_index()
```

In [22]:
```
#set fig size
plt.figure(figsize=(15,6))
plt.plot(df_sales_trend['month_year'],df_sales_trend['sales'],color='green')
plt.xticks(rotation = 'vertical',size = 8)
plt.show()
```



- initial 4 months of every year, sales seeems to be low
- Overall trend of sales indicate that the sales is growing

TOP 10 PRODUCTS BY SALES

In [24]:
```
# grouping product name column

product_sales = df.groupby('product_name').sum()['sales'].reset_index()
```

In [25]:
```
product_sales.head()
```

Out[25]:

	product_name	sales
0	"While you Were Out" Message Book, One Form pe...	25.228
1	#10 Gummed Flap White Envelopes, 100/Box	41.300
2	#10 Self-Seal White Envelopes	108.682
3	#10 White Business Envelopes,4 1/8 x 9 1/2	488.904
4	#10- 4 1/8" x 9 1/2" Recycled Envelopes	286.672

In [33]:
```
#sorting by sales
product_sales = product_sales.sort_values(by='sales',ascending=False,ignore_index=True)
```

In [34]:
```
product_sales.head()
```

Out[34]:

	product_name	sales
0	Apple Smart Phone, Full Size	86935.7786
1	Cisco Smart Phone, Full Size	76441.5306
2	Motorola Smart Phone, Full Size	73156.3030
3	Nokia Smart Phone, Full Size	71904.5555
4	Canon imageCLASS 2200 Advanced Copier	61899.8240

In [35]:
```
# Top 10 products by sales

product_sales[:10]
```

Out[35]:

	product_name	sales
0	Apple Smart Phone, Full Size	86935.7786
1	Cisco Smart Phone, Full Size	76441.5306
2	Motorola Smart Phone, Full Size	73156.3030
3	Nokia Smart Phone, Full Size	71904.5555
4	Canon imageCLASS 2200 Advanced Copier	61899.8240
5	Hon Executive Leather Armchair, Adjustable	58193.4841
6	Office Star Executive Leather Armchair, Adjust...	50661.6840
7	Harbour Creations Executive Leather Armchair, ...	50121.5160
8	Samsung Smart Phone, Cordless	48653.4600
9	Nokia Smart Phone, with Caller ID	47877.7857

- Most selling products

In [39]:
```
# group product names
product_quantity_sold = pd.DataFrame(df.groupby('product_name').sum()['quantity'])
```

In [40]:
```
product_quantity_sold = product_quantity_sold.sort_values(by='quantity',ascending=False)
#TOP 10 SELLING PRODUCTS
product_quantity_sold[:10]
```

Out[40]:

	quantity
product_name	
Staples	876
Cardinal Index Tab, Clear	337
Eldon File Cart, Single Width	321
Rogers File Cart, Single Width	262
Sanford Pencil Sharpener, Water Color	259
Stockwell Paper Clips, Assorted Sizes	253
Avery Index Tab, Clear	252
Ibico Index Tab, Clear	251
Smead File Cart, Single Width	250
Stanley Pencil Sharpener, Water Color	242

PREFERRED SHIPMENT MODE

In [42]:
```
sns.countplot(df['ship_mode'])
plt.show()
```

- Standard Class is the most used shipment mode

MOST PROFITABLE CATEGORY AND SUB_CATEGORY

In [52]:
```
# Grouping the data by category and subcategory
profit_category = pd.DataFrame(df.groupby(['category','sub_category']).sum()['profit'])
```

In [53]:
```
#sorting by the profit and category
profit_category = profit_category.sort_values(by=['category','profit'],ascending=False)
profit_category
```

Out[53]:

		profit
category	**sub_category**	
Technology	**Copiers**	258567.54818
	Phones	216717.00580
	Accessories	129626.30620
	Machines	58867.87300
Office Supplies	**Appliances**	141680.58940
	Storage	108461.48980
	Binders	72449.84600
	Paper	59207.68270
	Art	57953.91090
	Envelopes	29601.11630
	Supplies	22583.26310
	Labels	15010.51200
	Fasteners	11525.42410
Furniture	**Bookcases**	161924.41950
	Chairs	141973.79750
	Furnishings	46967.42550
	Tables	-64083.38870

- Technology is the most profitable category and among them copiers bring in the most profit followed by Phones
- Furniture is the least profitable category and among them Tables have a negative profit.