```
In [1]: import pandas as pd
```

```
In [2]: import plotly.express as px
```

```
In [3]: import plotly.graph_objects as go
```

```
In [4]: import plotly.io as pio
        import plotly.colors as colors
```

```
In [5]: pio.templates.default="plotly_white"
```

```
In [6]: data=pd.read_csv('ecommerce data.csv',encoding= 'latin-1')
```

```
In [7]: data
```

Out[7]:

| | Row ID | Order ID | Order Date | Ship Date | Ship Mode | Customer ID | Customer Name | Segment | Country | City | ... | Postal Code | Region | Product ID | Category | Sub-Category | Product Name | Sales | Quantity | Discount | Profit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | CA-2016-152156 | 11/8/2016 | 11/11/2016 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | 42420 | South | FUR-BO-10001798 | Furniture | Bookcases | Bush Somerset Collection Bookcase | 261.9600 | 2 | 0.00 | 41.9136 |
| 1 | 2 | CA-2016-152156 | 11/8/2016 | 11/11/2016 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | 42420 | South | FUR-CH-10000454 | Furniture | Chairs | Hon Deluxe Fabric Upholstered Stacking Chairs,... | 731.9400 | 3 | 0.00 | 219.5820 |
| 2 | 3 | CA-2016-138688 | 6/12/2016 | 6/16/2016 | Second Class | DV-13045 | Darrin Van Huff | Corporate | United States | Los Angeles | ... | 90036 | West | OFF-LA-10000240 | Office Supplies | Labels | Self-Adhesive Address Labels for Typewriters b... | 14.6200 | 2 | 0.00 | 6.8714 |
| 3 | 4 | US-2015-108966 | 10/11/2015 | 10/18/2015 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | 33311 | South | FUR-TA-10000577 | Furniture | Tables | Bretford CR4500 Series Slim Rectangular Table | 957.5775 | 5 | 0.45 | -383.0310 |
| 4 | 5 | US-2015-108966 | 10/11/2015 | 10/18/2015 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | 33311 | South | OFF-ST-10000760 | Office Supplies | Storage | Eldon Fold 'N Roll Cart System | 22.3680 | 2 | 0.20 | 2.5164 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 9989 | 9990 | CA-2014-110422 | 1/21/2014 | 1/23/2014 | Second Class | TB-21400 | Tom Boeckenhauer | Consumer | United States | Miami | ... | 33180 | South | FUR-FU-10001889 | Furniture | Furnishings | Ultra Door Pull Handle | 25.2480 | 3 | 0.20 | 4.1028 |
| 9990 | 9991 | CA-2017-121258 | 2/26/2017 | 3/3/2017 | Standard Class | DB-13060 | Dave Brooks | Consumer | United States | Costa Mesa | ... | 92627 | West | FUR-FU-10000747 | Furniture | Furnishings | Tenex B1-RE Series Chair Mats for Low Pile Car... | 91.9600 | 2 | 0.00 | 15.6332 |
| 9991 | 9992 | CA-2017-121258 | 2/26/2017 | 3/3/2017 | Standard Class | DB-13060 | Dave Brooks | Consumer | United States | Costa Mesa | ... | 92627 | West | TEC-PH-10003645 | Technology | Phones | Aastra 57i VoIP phone | 258.5760 | 2 | 0.20 | 19.3932 |
| 9992 | 9993 | CA-2017-121258 | 2/26/2017 | 3/3/2017 | Standard Class | DB-13060 | Dave Brooks | Consumer | United States | Costa Mesa | ... | 92627 | West | OFF-PA-10004041 | Office Supplies | Paper | It's Hot Message Books with Stickers, 2 3/4" x 5" | 29.6000 | 4 | 0.00 | 13.3200 |
| 9993 | 9994 | CA-2017-119914 | 5/4/2017 | 5/9/2017 | Second Class | CC-12220 | Chris Cortes | Consumer | United States | Westminster | ... | 92683 | West | OFF-AP-10002684 | Office Supplies | Appliances | Acco 7-Outlet Masterpiece Power Center, Wihtou... | 243.1600 | 2 | 0.00 | 72.9480 |

9994 rows × 21 columns

In [8]: data.head()

Out[8]:

| | Row ID | Order ID | Order Date | Ship Date | Ship Mode | Customer ID | Customer Name | Segment | Country | City | ... | Postal Code | Region | Product ID | Category | Sub-Category | Product Name | Sales | Quantity | Discount | Profit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | CA-2016-152156 | 11/8/2016 | 11/11/2016 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | 42420 | South | FUR-BO-10001798 | Furniture | Bookcases | Bush Somerset Collection Bookcase | 261.9600 | 2 | 0.00 | 41.9136 |
| 1 | 2 | CA-2016-152156 | 11/8/2016 | 11/11/2016 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | 42420 | South | FUR-CH-10000454 | Furniture | Chairs | Hon Deluxe Fabric Upholstered Stacking Chairs,... | 731.9400 | 3 | 0.00 | 219.5820 |
| 2 | 3 | CA-2016-138688 | 6/12/2016 | 6/16/2016 | Second Class | DV-13045 | Darrin Van Huff | Corporate | United States | Los Angeles | ... | 90036 | West | OFF-LA-10000240 | Office Supplies | Labels | Self-Adhesive Address Labels for Typewriters b... | 14.6200 | 2 | 0.00 | 6.8714 |
| 3 | 4 | US-2015-108966 | 10/11/2015 | 10/18/2015 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | 33311 | South | FUR-TA-10000577 | Furniture | Tables | Bretford CR4500 Series Slim Rectangular Table | 957.5775 | 5 | 0.45 | -383.0310 |
| 4 | 5 | US-2015-108966 | 10/11/2015 | 10/18/2015 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | 33311 | South | OFF-ST-10000760 | Office Supplies | Storage | Eldon Fold 'N Roll Cart System | 22.3680 | 2 | 0.20 | 2.5164 |

5 rows × 21 columns

In [9]: data.describe()

Out[9]:

| | Row ID | Postal Code | Sales | Quantity | Discount | Profit |
|---|---|---|---|---|---|---|
| count | 9994.000000 | 9994.000000 | 9994.000000 | 9994.000000 | 9994.000000 | 9994.000000 |
| mean | 4997.500000 | 55190.379428 | 229.858001 | 3.789574 | 0.156203 | 28.656896 |
| std | 2885.163629 | 32063.693350 | 623.245101 | 2.225110 | 0.206452 | 234.260108 |
| min | 1.000000 | 1040.000000 | 0.444000 | 1.000000 | 0.000000 | -6599.978000 |
| 25% | 2499.250000 | 23223.000000 | 17.280000 | 2.000000 | 0.000000 | 1.728750 |
| 50% | 4997.500000 | 56430.500000 | 54.490000 | 3.000000 | 0.200000 | 8.666500 |
| 75% | 7495.750000 | 90008.000000 | 209.940000 | 5.000000 | 0.200000 | 29.364000 |
| max | 9994.000000 | 99301.000000 | 22638.480000 | 14.000000 | 0.800000 | 8399.976000 |

In [10]: data.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
 0   Row ID          9994 non-null    int64
 1   Order ID        9994 non-null    object
 2   Order Date      9994 non-null    object
 3   Ship Date       9994 non-null    object
 4   Ship Mode       9994 non-null    object
```

```
1    Order ID       9994 non-null    object
2    Order Date     9994 non-null    object
3    Ship Date      9994 non-null    object
4    Ship Mode      9994 non-null    object
5    Customer ID    9994 non-null    object
6    Customer Name  9994 non-null    object
7    Segment        9994 non-null    object
8    Country        9994 non-null    object
9    City           9994 non-null    object
10   State          9994 non-null    object
11   Postal Code    9994 non-null    int64
12   Region         9994 non-null    object
13   Product ID     9994 non-null    object
14   Category       9994 non-null    object
15   Sub-Category   9994 non-null    object
16   Product Name   9994 non-null    object
17   Sales          9994 non-null    float64
18   Quantity       9994 non-null    int64
19   Discount       9994 non-null    float64
20   Profit         9994 non-null    float64
dtypes: float64(3), int64(3), object(15)
memory usage: 1.6+ MB
```

convert date columns

In [11]: `data['Order Date']=pd.to_datetime(data['Order Date'])`

In [12]: `data.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #    Column         Non-Null Count   Dtype
---   ------         --------------   -----
 0    Row ID         9994 non-null    int64
 1    Order ID       9994 non-null    object
 2    Order Date     9994 non-null    datetime64[ns]
 3    Ship Date      9994 non-null    object
 4    Ship Mode      9994 non-null    object
 5    Customer ID    9994 non-null    object
 6    Customer Name  9994 non-null    object
 7    Segment        9994 non-null    object
 8    Country        9994 non-null    object
 9    City           9994 non-null    object
 10   State          9994 non-null    object
 11   Postal Code    9994 non-null    int64
 12   Region         9994 non-null    object
 13   Product ID     9994 non-null    object
 14   Category       9994 non-null    object
 15   Sub-Category   9994 non-null    object
 16   Product Name   9994 non-null    object
 17   Sales          9994 non-null    float64
 18   Quantity       9994 non-null    int64
 19   Discount       9994 non-null    float64
 20   Profit         9994 non-null    float64
dtypes: datetime64[ns](1), float64(3), int64(3), object(14)
memory usage: 1.6+ MB
```

In [13]: `data['Ship Date']=pd.to_datetime(data['Ship Date'])`

```
In [14]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Row ID         9994 non-null   int64
 1   Order ID       9994 non-null   object
 2   Order Date     9994 non-null   datetime64[ns]
 3   Ship Date      9994 non-null   datetime64[ns]
 4   Ship Mode      9994 non-null   object
 5   Customer ID    9994 non-null   object
 6   Customer Name  9994 non-null   object
 7   Segment        9994 non-null   object
 8   Country        9994 non-null   object
 9   City           9994 non-null   object
 10  State          9994 non-null   object
 11  Postal Code    9994 non-null   int64
 12  Region         9994 non-null   object
 13  Product ID     9994 non-null   object
 14  Category       9994 non-null   object
 15  Sub-Category   9994 non-null   object
 16  Product Name   9994 non-null   object
 17  Sales          9994 non-null   float64
 18  Quantity       9994 non-null   int64
 19  Discount       9994 non-null   float64
 20  Profit         9994 non-null   float64
dtypes: datetime64[ns](2), float64(3), int64(3), object(13)
memory usage: 1.6+ MB
```

```
In [15]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Row ID         9994 non-null   int64
 1   Order ID       9994 non-null   object
 2   Order Date     9994 non-null   datetime64[ns]
 3   Ship Date      9994 non-null   datetime64[ns]
 4   Ship Mode      9994 non-null   object
 5   Customer ID    9994 non-null   object
 6   Customer Name  9994 non-null   object
 7   Segment        9994 non-null   object
 8   Country        9994 non-null   object
 9   City           9994 non-null   object
 10  State          9994 non-null   object
 11  Postal Code    9994 non-null   int64
 12  Region         9994 non-null   object
 13  Product ID     9994 non-null   object
 14  Category       9994 non-null   object
 15  Sub-Category   9994 non-null   object
 16  Product Name   9994 non-null   object
 17  Sales          9994 non-null   float64
 18  Quantity       9994 non-null   int64
 19  Discount       9994 non-null   float64
 20  Profit         9994 non-null   float64
dtypes: datetime64[ns](2), float64(3), int64(3), object(13)
```

memory usage: 1.6+ MB

```
In [16]: data.head()
```

Out[16]:

| | Row ID | Order ID | Order Date | Ship Date | Ship Mode | Customer ID | Customer Name | Segment | Country | City | ... | Postal Code | Region | Product ID | Category | Sub-Category | Product Name | Sales | Quantity | Discount | Profit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | CA-2016-152156 | 2016-11-08 | 2016-11-11 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | 42420 | South | FUR-BO-10001798 | Furniture | Bookcases | Bush Somerset Collection Bookcase | 261.9600 | 2 | 0.00 | 41.9136 |
| 1 | 2 | CA-2016-152156 | 2016-11-08 | 2016-11-11 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | 42420 | South | FUR-CH-10000454 | Furniture | Chairs | Hon Deluxe Fabric Upholstered Stacking Chairs,... | 731.9400 | 3 | 0.00 | 219.5820 |
| 2 | 3 | CA-2016-138688 | 2016-06-12 | 2016-06-16 | Second Class | DV-13045 | Darrin Van Huff | Corporate | United States | Los Angeles | ... | 90036 | West | OFF-LA-10000240 | Office Supplies | Labels | Self-Adhesive Address Labels for Typewriters b... | 14.6200 | 2 | 0.00 | 6.8714 |
| 3 | 4 | US-2015-108966 | 2015-10-11 | 2015-10-18 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | 33311 | South | FUR-TA-10000577 | Furniture | Tables | Bretford CR4500 Series Slim Rectangular Table | 957.5775 | 5 | 0.45 | -383.0310 |
| 4 | 5 | US-2015-108966 | 2015-10-11 | 2015-10-18 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | 33311 | South | OFF-ST-10000760 | Office Supplies | Storage | Eldon Fold 'N Roll Cart System | 22.3680 | 2 | 0.20 | 2.5164 |

5 rows × 21 columns

```
In [17]: data['Order Month']=data['Order Date'].dt.month
         data['Order Year']=data['Order Date'].dt.year
         data['Day of week']=data['Order Date'].dt.dayofweek
```

```
In [18]: data.head()
```

Out[18]:

| | Row ID | Order ID | Order Date | Ship Date | Ship Mode | Customer ID | Customer Name | Segment | Country | City | ... | Category | Sub-Category | Product Name | Sales | Quantity | Discount | Profit | Order Month | Order Year | Day of week |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | CA-2016-152156 | 2016-11-08 | 2016-11-11 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | Furniture | Bookcases | Bush Somerset Collection Bookcase | 261.9600 | 2 | 0.00 | 41.9136 | 11 | 2016 | 1 |
| 1 | 2 | CA-2016-152156 | 2016-11-08 | 2016-11-11 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | Furniture | Chairs | Hon Deluxe Fabric Upholstered Stacking Chairs,... | 731.9400 | 3 | 0.00 | 219.5820 | 11 | 2016 | 1 |
| 2 | 3 | CA-2016-138688 | 2016-06-12 | 2016-06-16 | Second Class | DV-13045 | Darrin Van Huff | Corporate | United States | Los Angeles | ... | Office Supplies | Labels | Self-Adhesive Address Labels for Typewriters b... | 14.6200 | 2 | 0.00 | 6.8714 | 6 | 2016 | 6 |
| 3 | 4 | US-2015-108966 | 2015-10-11 | 2015-10-18 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | Furniture | Tables | Bretford CR4500 Series Slim Rectangular Table | 957.5775 | 5 | 0.45 | -383.0310 | 10 | 2015 | 6 |
| 4 | 5 | US-2015-108966 | 2015-10-11 | 2015-10-18 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | Office Supplies | Storage | Eldon Fold 'N Roll Cart System | 22.3680 | 2 | 0.20 | 2.5164 | 10 | 2015 | 6 |

5 rows × 24 columns

```
In [19]: sales_monthly= data.groupby('Order Month')['Sales'].sum().reset_index()
```

```
In [20]: sales_monthly
```

| | Order Month | Sales |
|---|---|---|
| 0 | 1 | 94924.8356 |
| 1 | 2 | 59751.2514 |
| 2 | 3 | 205005.4888 |
| 3 | 4 | 137762.1286 |
| 4 | 5 | 155028.8117 |
| 5 | 6 | 152718.6793 |
| 6 | 7 | 147238.0970 |
| 7 | 8 | 159044.0630 |
| 8 | 9 | 307649.9457 |
| 9 | 10 | 200322.9847 |
| 10 | 11 | 352461.0710 |
| 11 | 12 | 325293.5035 |

```
In [21]: fig=px.line(sales_monthly,
                x='Order Month',
                y='Sales',
                title='Monthly Sales Analysis')
         fig.show()
```

Monthly Sales Analysis

# Sales By Category

```
In [22]: sales_by_category=data.groupby('Category')['Sales'].sum().reset_index()
```
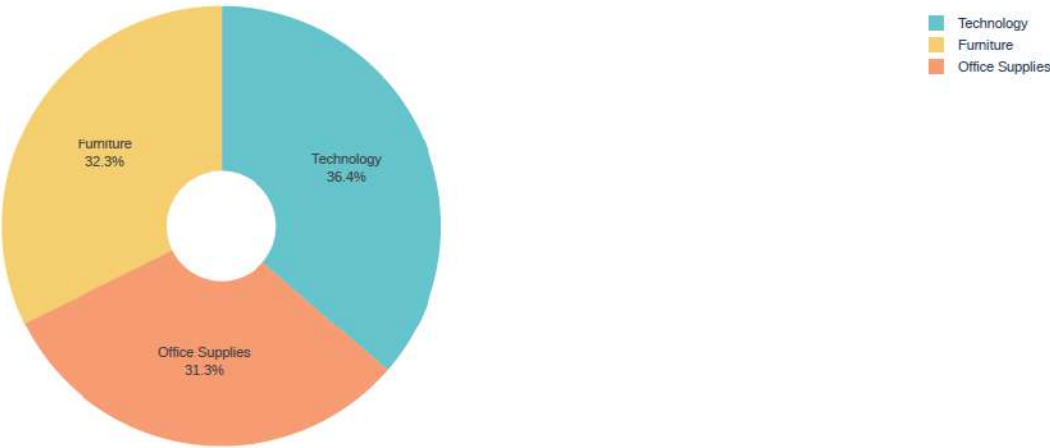
```
In [23]: sales_by_category
```

Out[23]:

|   | Category | Sales |
|---|----------|-------|
| 0 | Furniture | 741999.7953 |
| 1 | Office Supplies | 719047.0320 |
| 2 | Technology | 836154.0330 |

```
In [24]: fig_pie=px.pie(sales_by_category,
                        values='Sales',
                        names='Category',
                        hole=0.25,
                        color_discrete_sequence=px.colors.qualitative.Pastel)

         fig_pie.update_traces(textposition='inside', textinfo ='percent+label')
         fig_pie.update_layout(title_text='Sales Analysis by Category',title_font=dict(size=24))

         fig_pie.show()
```



Sales Analysis by Category

# sales anaylysis by sub category

```
In [25]:   sales_by_sub=data.groupby('Sub-Category')['Sales'].sum().reset_index()
```
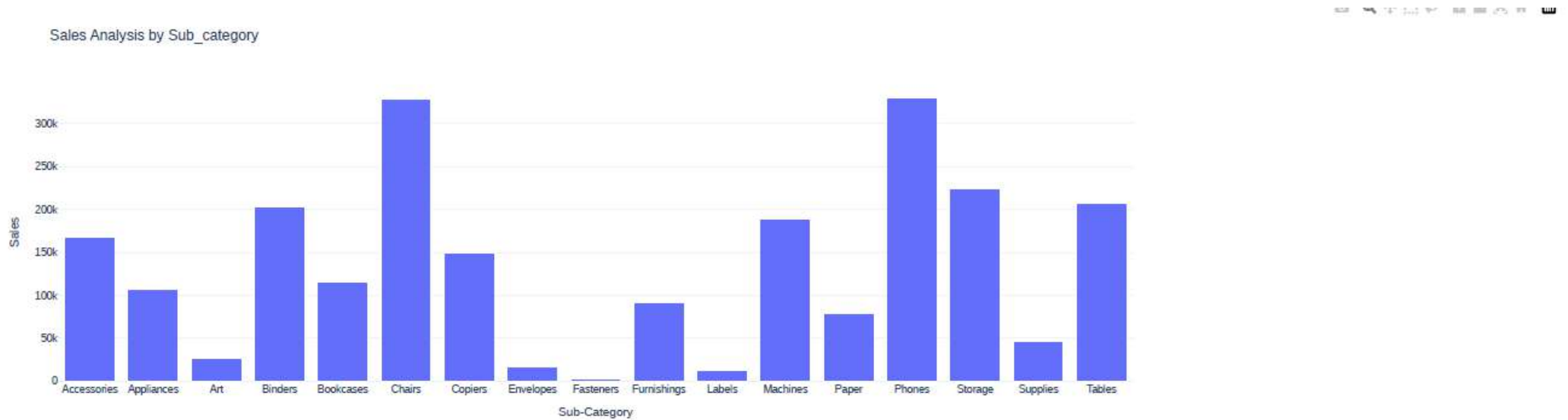
```
In [26]:   sales_by_sub
```

Out [26]:

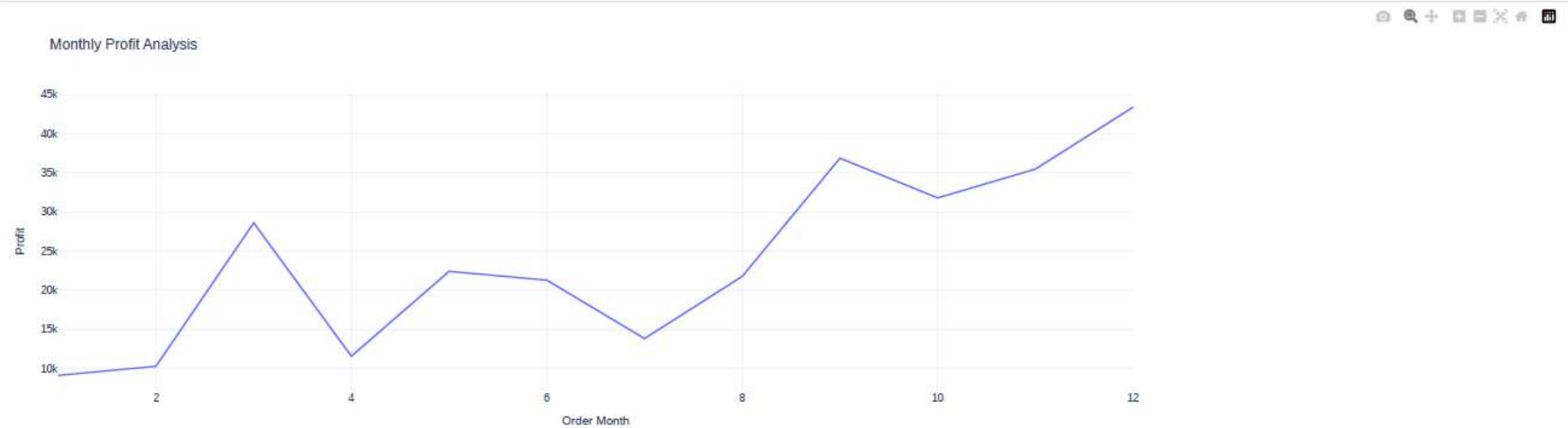|    | Sub-Category | Sales      |
|----|--------------|------------|
| 0  | Accessories  | 167380.3180 |
| 1  | Appliances   | 107532.1610 |
| 2  | Art          | 27118.7920  |
| 3  | Binders      | 203412.7330 |
| 4  | Bookcases    | 114879.9963 |
| 5  | Chairs       | 328449.1030 |
| 6  | Copiers      | 149528.0300 |
| 7  | Envelopes    | 16476.4020  |
| 8  | Fasteners    | 3024.2800   |
| 9  | Furnishings  | 91705.1640  |
| 10 | Labels       | 12486.3120  |
| 11 | Machines     | 189238.6310 |
| 12 | Paper        | 78479.2060  |
| 13 | Phones       | 330007.0540 |
| 14 | Storage      | 223843.6080 |
| 15 | Supplies     | 46673.5380  |
| 16 | Tables       | 206965.5320 |

```
In [27]:   fig_bar=px.bar(sales_by_sub,x='Sub-Category',y='Sales',title='Sales Analysis by Sub_category')
```

```
In [28]:   fig_bar.show()
```

## Sales Analysis by Sub_category



## Monthly profit Analysis

```
In [29]: profit_by_month = data.groupby('Order Month')['Profit'].sum().reset_index()
fig_profit = px.line(profit_by_month,
                     x='Order Month',
                     y='Profit',
                     title='Monthly Profit Analysis')
fig_profit.show()
```

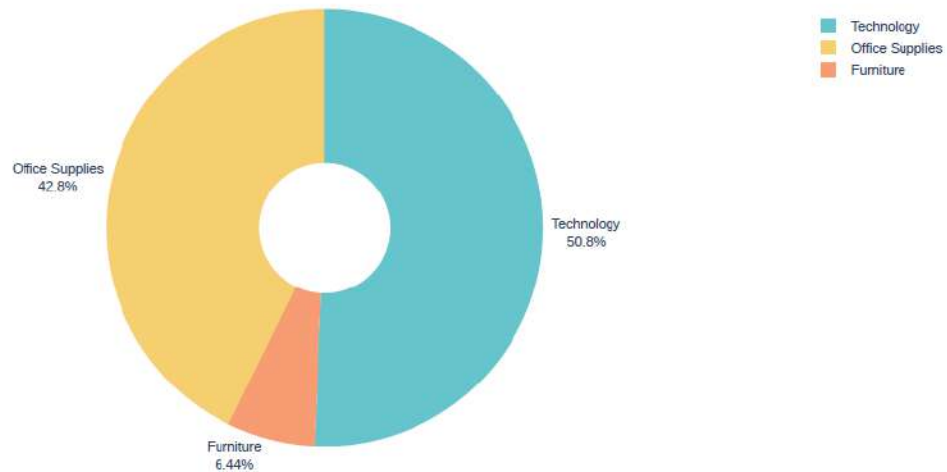### Monthly Profit Analysis

# Profit by Category

```
In [30]: profit_by_category = data.groupby('Category')['Profit'].sum().reset_index()

         fig = px.pie(profit_by_category,
                      values='Profit',
                      names='Category',
                      hole=0.3,
                      color_discrete_sequence=px.colors.qualitative.Pastel)

         fig.update_traces(textposition='outside', textinfo='percent+label')
         fig.update_layout(title_text='Profit Analysis by Category', title_font=dict(size=24))

         fig.show()
```
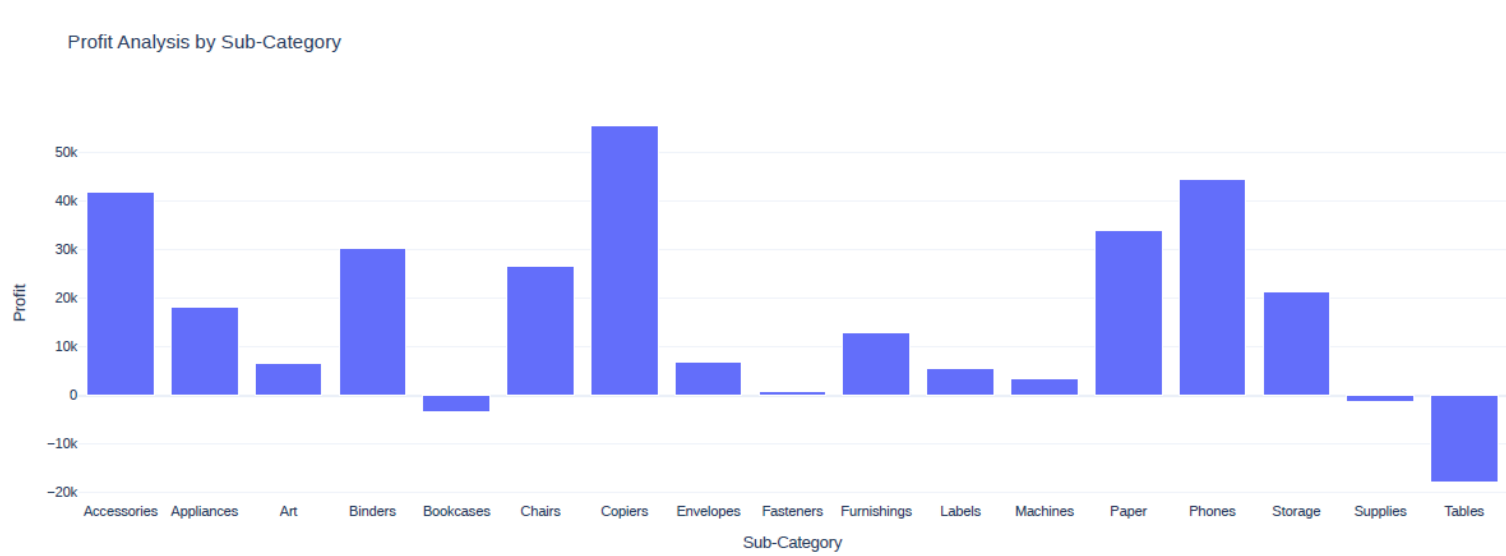


Profit Analysis by Category

# Profit Analysis by Sub-category

```
In [31]: profit_by_subcategory = data.groupby('Sub-Category')['Profit'].sum().reset_index()
         fig = px.bar(profit_by_subcategory, x='Sub-Category',
                      y='Profit',
                      title='Profit Analysis by Sub-Category')
         fig.show()
```

# Profit Analysis by Sub-Category

Profit (y-axis) vs Sub-Category (x-axis): Accessories, Appliances, Art, Binders, Bookcases, Chairs, Copiers, Envelopes, Fasteners, Furnishings, Labels, Machines, Paper, Phones, Storage, Supplies, Tables

```
In [32]: data.head()
```

Out[32]:

| | Row ID | Order ID | Order Date | Ship Date | Ship Mode | Customer ID | Customer Name | Segment | Country | City | ... | Category | Sub-Category | Product Name | Sales | Quantity | Discount | Profit | Order Month | Order Year | Day of week |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | CA-2016-152156 | 2016-11-08 | 2016-11-11 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | Furniture | Bookcases | Bush Somerset Collection Bookcase | 261.9600 | 2 | 0.00 | 41.9136 | 11 | 2016 | 1 |
| 1 | 2 | CA-2016-152156 | 2016-11-08 | 2016-11-11 | Second Class | CG-12520 | Claire Gute | Consumer | United States | Henderson | ... | Furniture | Chairs | Hon Deluxe Fabric Upholstered Stacking Chairs,... | 731.9400 | 3 | 0.00 | 219.5820 | 11 | 2016 | 1 |
| 2 | 3 | CA-2016-138688 | 2016-06-12 | 2016-06-16 | Second Class | DV-13045 | Darrin Van Huff | Corporate | United States | Los Angeles | ... | Office Supplies | Labels | Self-Adhesive Address Labels for Typewriters b... | 14.6200 | 2 | 0.00 | 6.8714 | 6 | 2016 | 6 |
| 3 | 4 | US-2015-108966 | 2015-10-11 | 2015-10-18 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | Furniture | Tables | Bretford CR4500 Series Slim Rectangular Table | 957.5775 | 5 | 0.45 | -383.0310 | 10 | 2015 | 6 |
| 4 | 5 | US-2015-108966 | 2015-10-11 | 2015-10-18 | Standard Class | SO-20335 | Sean O'Donnell | Consumer | United States | Fort Lauderdale | ... | Office Supplies | Storage | Eldon Fold 'N Roll Cart System | 22.3680 | 2 | 0.20 | 2.5164 | 10 | 2015 | 6 |

5 rows × 24 columns

# Sales and Profit Analysis by Customer Segment

```python
sales_profit_by_segment = data.groupby('Segment').agg({'Sales': 'sum', 'Profit': 'sum'}).reset_index()

color_palette = colors.qualitative.Pastel

fig = go.Figure()
fig.add_trace(go.Bar(x=sales_profit_by_segment['Segment'],
                     y=sales_profit_by_segment['Sales'],
                     name='Sales',
                     marker_color=color_palette[0]))

fig.add_trace(go.Bar(x=sales_profit_by_segment['Segment'],
                     y=sales_profit_by_segment['Profit'],
                     name='Profit',
                     marker_color=color_palette[1]))

fig.update_layout(title='Sales and Profit Analysis by Customer Segment',
                  xaxis_title='Customer Segment', yaxis_title='Amount')

fig.show()
```
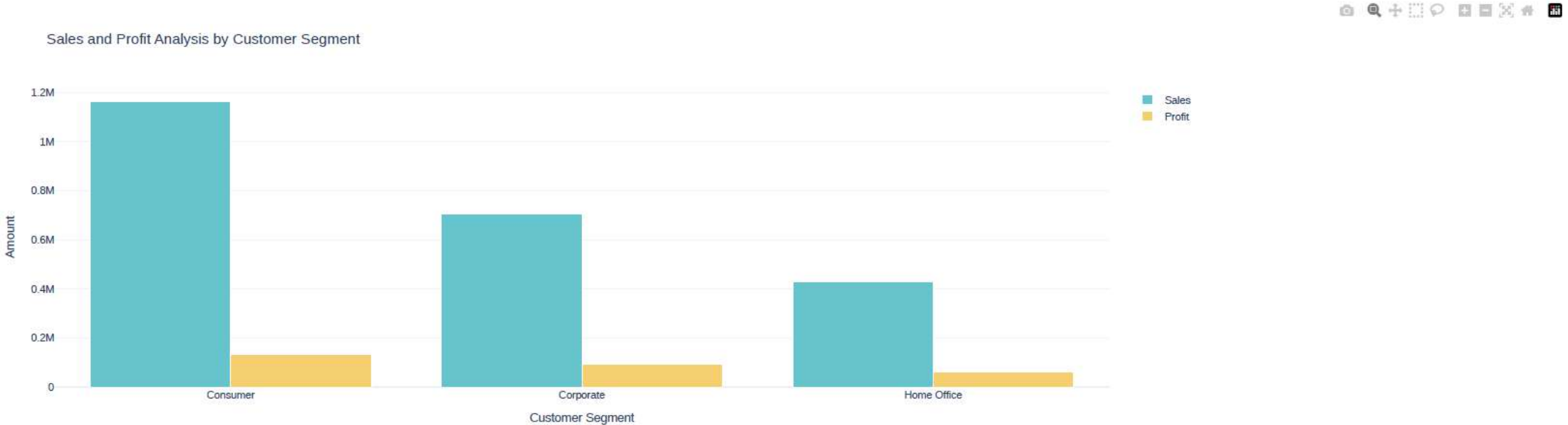


Sales and Profit Analysis by Customer Segment

# Sales to Profit ratio

```
sales_profit_by_segment = data.groupby('Segment').agg({'Sales': 'sum', 'Profit': 'sum'}).reset_index()
```

```
sales_profit_by_segment['Sales_to_Profit_Ratio'] = sales_profit_by_segment['Sales'] / sales_profit_by_segment['Profit']
print(sales_profit_by_segment[['Segment', 'Sales_to_Profit_Ratio']])
```

```
      Segment  Sales_to_Profit_Ratio
0    Consumer               8.659471
1   Corporate               7.677245
2  Home Office              7.125416
```