

## TP DATA VISUALIZATION – Data Science

### Part – 1 :

While executing the given code from ENT, I encountered multiple error messages:  
The following errors have been corrected in the code at line : 112 and 121

```
"C:\Users\irint\Desktop\TP Data Visualization\.venv\Scripts\python.exe" "C:\Users\irint\Desktop\TP Data Visualization\vizDFVerENT.py"
Traceback (most recent call last):
  File "C:\Users\irint\Desktop\TP Data Visualization\vizDFVerENT.py", line 112, in <module>
    df.plot(x='A', y=['B', 'C'], kind='pie', subplots=True, labels=df['A'], rot=45)
  File "C:\Users\irint\Desktop\TP Data Visualization\.venv\Lib\site-packages\pandas\plotting\_core.py", line 989, in __call__
    data.index.name = y
    ^^^^^^^^^^^^^^^^^
  File "C:\Users\irint\Desktop\TP Data Visualization\.venv\Lib\site-packages\pandas\core\indexes\base.py", line 1694, in name
    maybe_extract_name(value, None, type(self))
  File "C:\Users\irint\Desktop\TP Data Visualization\.venv\Lib\site-packages\pandas\core\indexes\base.py", line 7699, in maybe_extract_name
    raise TypeError(f"{cls.__name__}.name must be a hashable type")
TypeError: RangeIndex.name must be a hashable type

Process finished with exit code 1
```

Figure 1- Pycharm : Python 3.12

### Part - 2:

The program for part 2 of this TP is in the python file "Visualization.py".

The **Total Profit per Month** is best visualized using a **line plot**, as it effectively tracks trends over time and highlights fluctuations in profit across different months. From the plot, we observe an overall increasing trend in profit, though certain months experience noticeable dips. The highest profit is recorded in November followed, suggesting strong year-end sales, possibly due to holiday promotions or increased consumer spending. However, there is a significant dip in May and June, which may indicate seasonal effects or lower sales performance during that period.

For **Sales of Different Products per Month**, multiple **line plots** were chosen to allow for an easy comparison of various product sales trends over time. This visualization helps identify the best and worst-performing products throughout the year. The data reveals that **Toothpaste and Bathing Soap** are consistently the highest-selling products, while **Face Wash and Moisturizer** have the lowest sales, indicating potential areas for improvement or targeted marketing efforts. Although sales generally increase over time, some products, such as **Shampoo**, show fluctuations, which could be influenced by market demand, seasonal variations, or promotional strategies.

To compare **Face Cream and Toothpaste Sales**, a **bar plot** was used, as it is particularly effective for comparing two categories at different time points and makes month-over-month differences easy to visualize. The analysis shows that **Toothpaste consistently outsells Face Cream every month**, reinforcing the idea that it is a necessity product with steady demand. In contrast, Face Cream does not exhibit strong seasonal variations, whereas Toothpaste sales peak in **October**, possibly due to special promotions or increased consumer awareness. This indicates that **Face Cream might be a luxury or seasonal item**, whereas Toothpaste maintains stable, consistent demand throughout the year.

To analyze the **Distribution of Total Profits**, a **histogram** was used to show the frequency of different profit values, helping us understand whether profits are evenly distributed or

concentrated within specific ranges. The results indicate that most profits fall within the range of **200,000 to 400,000**, with a clear trend of increasing profits toward the end of the year. The distribution is skewed, suggesting that profits grow as the year progresses, which aligns with the overall trend observed in the **total profit line plot**.

Finally, a **stacked area plot** was chosen to illustrate **Cumulative Sales of All Products**, as this visualization effectively demonstrates how individual product sales contribute to total sales over time. The plot reveals a **steady increase in total sales throughout the year**, peaking in **December**. It also highlights that **Toothpaste and Bathing Soap** dominate total sales, making them key revenue drivers for the company. Meanwhile, other products like **Face Wash and Moisturizer** contribute relatively little to total sales. The consistent growth in cumulative sales suggests a combination of **increasing market demand and successful marketing strategies**, further emphasizing the need to focus on high-performing products while optimizing strategies for underperforming ones.