Boxify Sales Analysis and Inventory Insights

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INTRODUCTION

Objectives-:

1. Cleaning Of the Data
2. Analyzing Sales Data to Drive-Insights
3. Calculated Inventory Key Performance Metrics
4. Provided Actionable Recommendations to optimize inventory management based on sales patterns.
5. Visualized Insights Effectively

Methodology

- **Data Preprocessing:**
- Checked for missing values and duplicates.
- Structured data for analysis.
- **Exploratory Data Analysis (EDA):**
- Sales trends, top products, low-stock items.
- **Metrics Calculated:**
- Inventory Turnover, Stock-to-Sales Ratio, Reorder Points.
- Recommendations based on findings.

DATA CLEANING

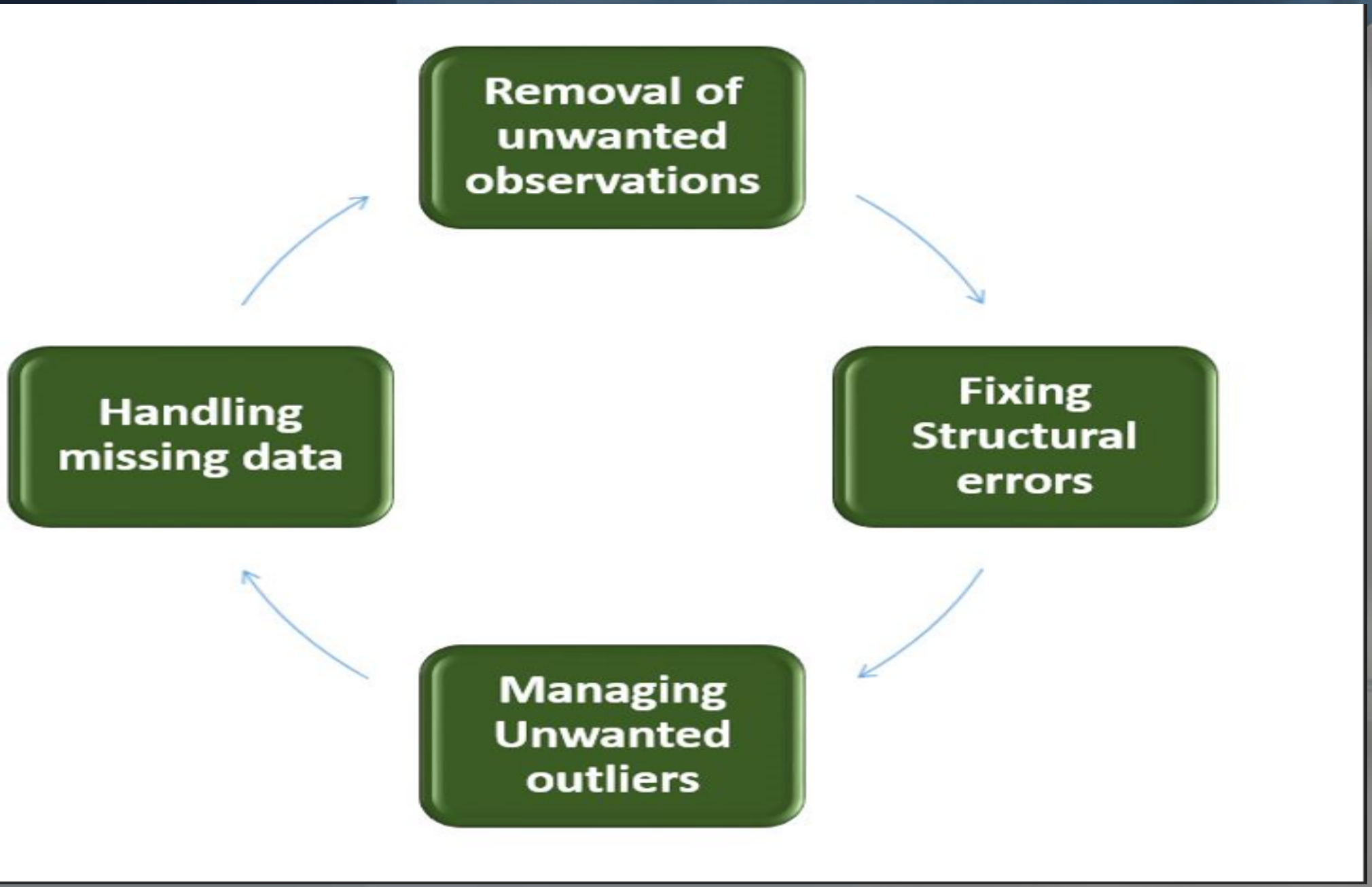
Data cleaning is a critical step in ensuring the accuracy and reliability of the analysis. For this project, the cleaning process involved the following key steps:

1. Checking the Duplicates in dataset.

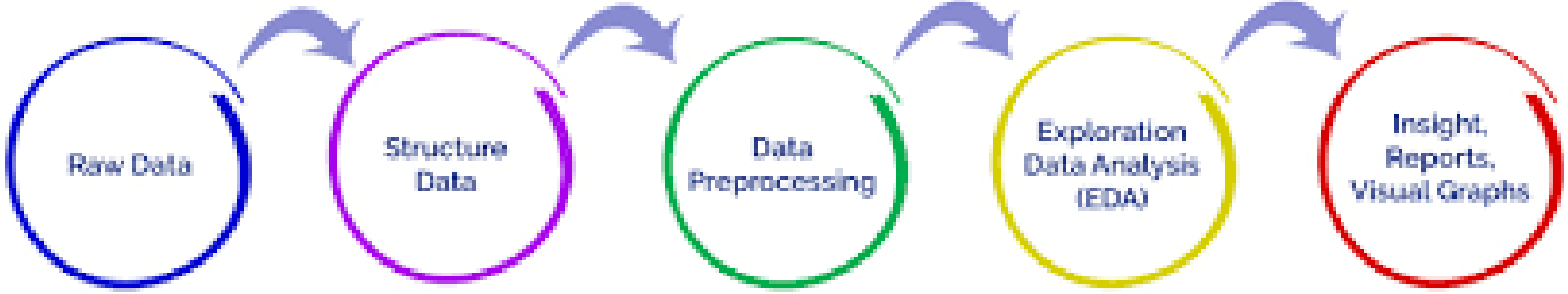
→ we checked for duplicates, if there are any duplicate rows, or matching rows are in the given dataset But in our dataset no duplicate values are found. If we got any duplicates, then we use **"dropna()"** function to handle it.

2. Checking the null values (missing values) and handle it.

→ After checking for all the duplicates, we checked that if there is any column consisting null values and after checking we got 2 columns that contains null values. So, we handle the null value by filling 0 at the place of null values.


Removal of unwanted observations
Fixing Structural errors
Managing Unwanted outliers
Handling missing data

Data Preparation

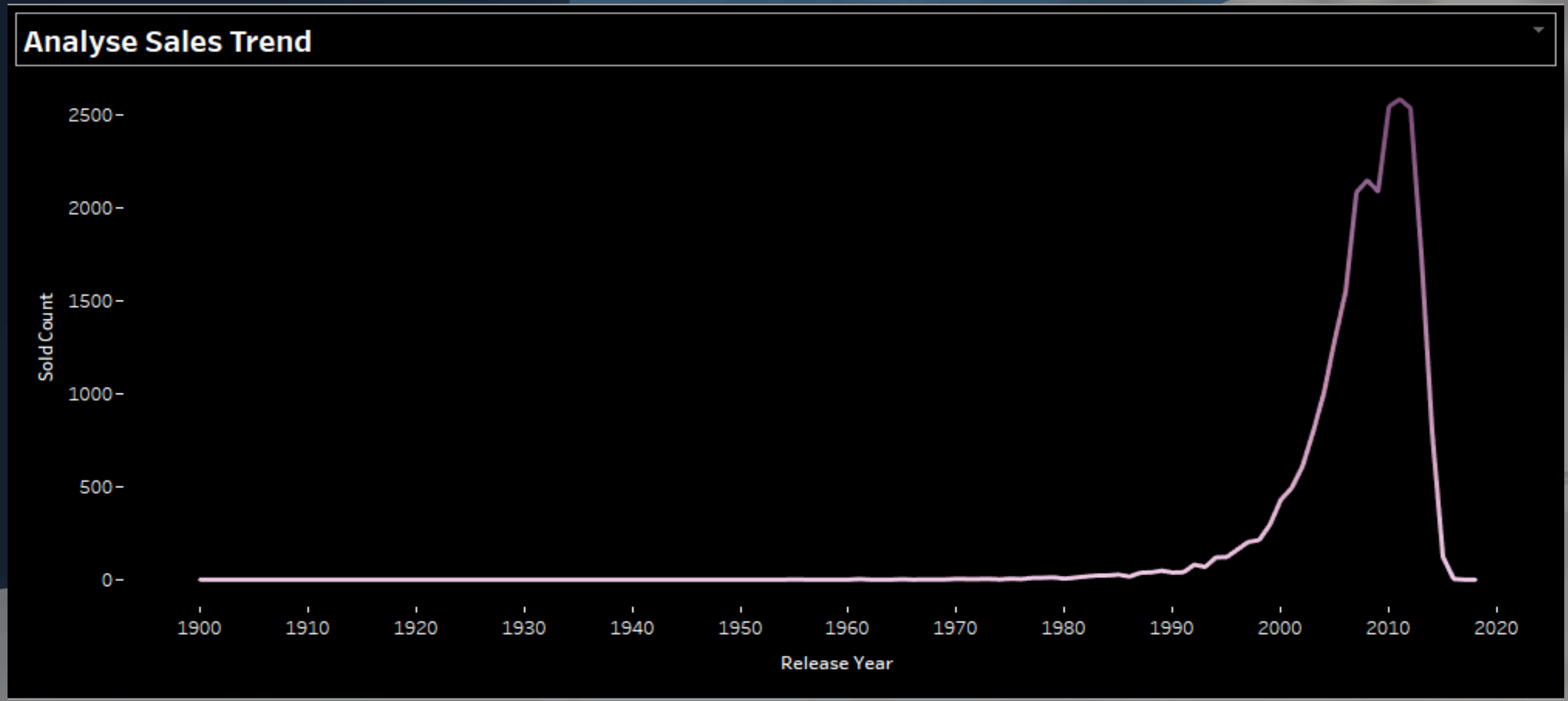


Analysing sales trend to drive-Insights

1.Examine sales trends over time to understand seasonal or long-term demand patterns.

→In this part, we found that how may items sold in which year and made a line chart to make it easier to understand and for the seasonal or long-term demand we made another column named seasonal trends in which we showed if the number of items sold per year is less than 20 then it is low sales year, and the no of items sold per year is greater than 20 and less than 200 then it is normal year, and the no of items sold in per year is more than 200 then peak year.

Analysing sales trend using visualization



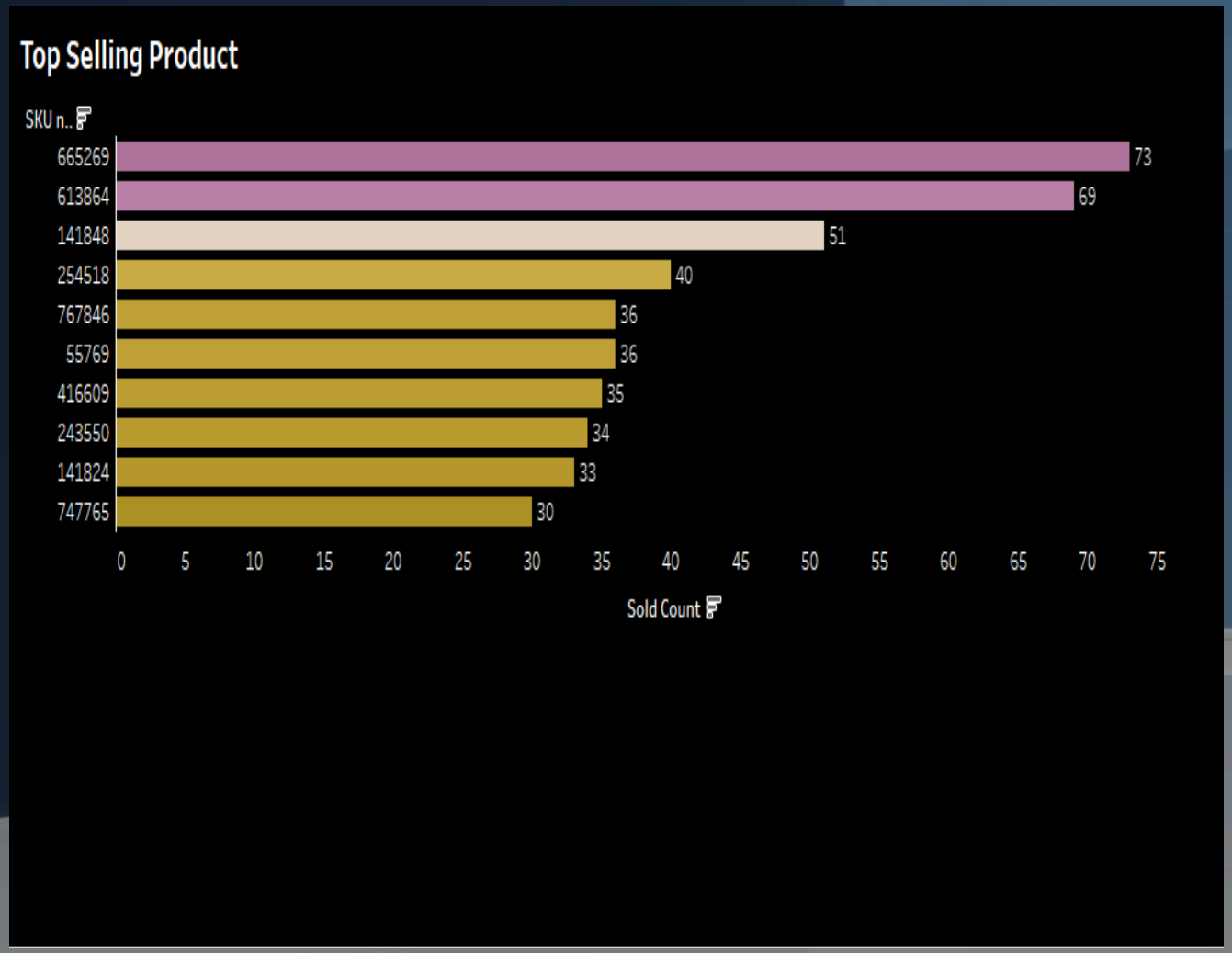
Analysing sales trend to drive-Insights

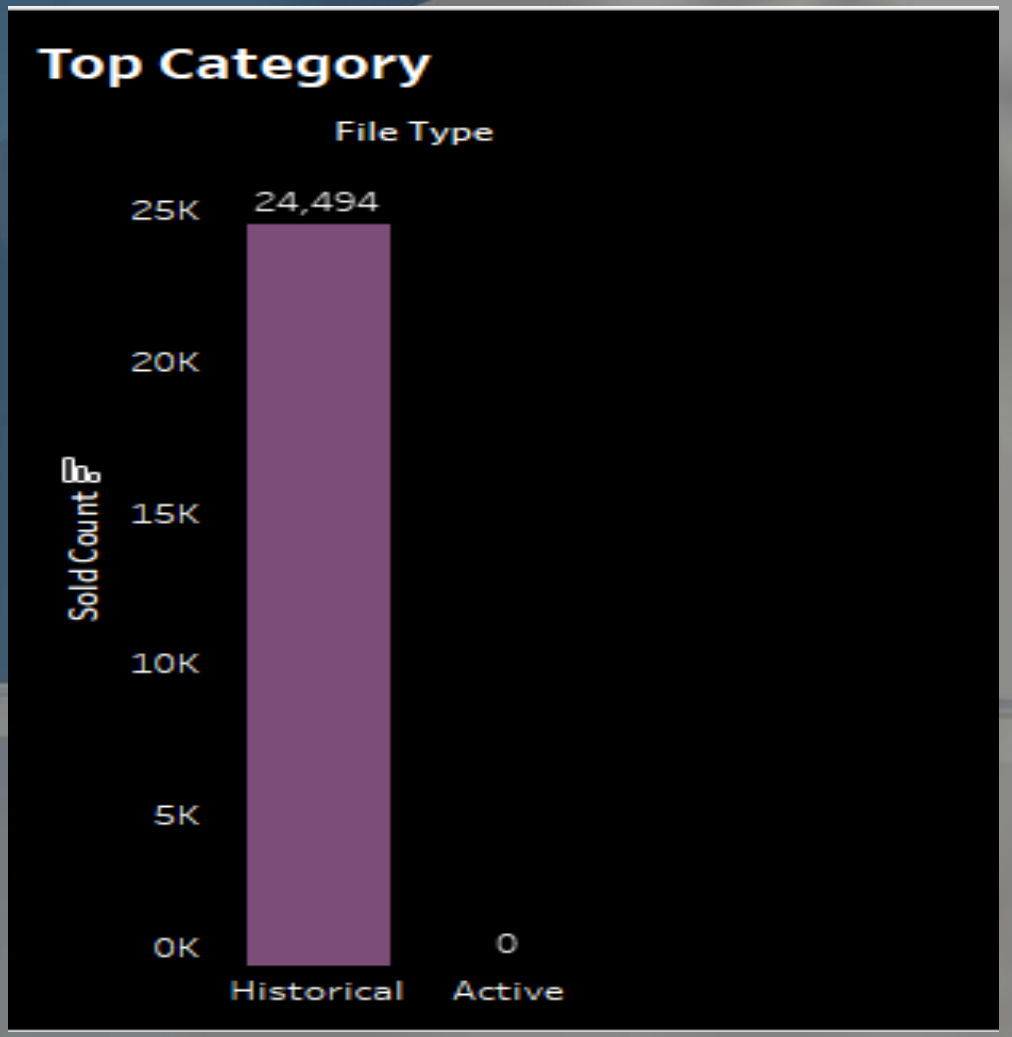
2. Top selling products and categories

→ In this we got to know that the item which were mostly sold for top 10 sku_number products are the most selling product while analyzing.

→ In top categories portion, we got to know that which category had the most item sold in the given dataset.

Top Products and categories charts Visualization





Analysing sales trend to drive-Insights

Stock level and Low stock items

→ In stock level portion, we got to know that which sku_numbers has total items that are available. To make it easier in a readable format sort it into descending order.

Low stock items

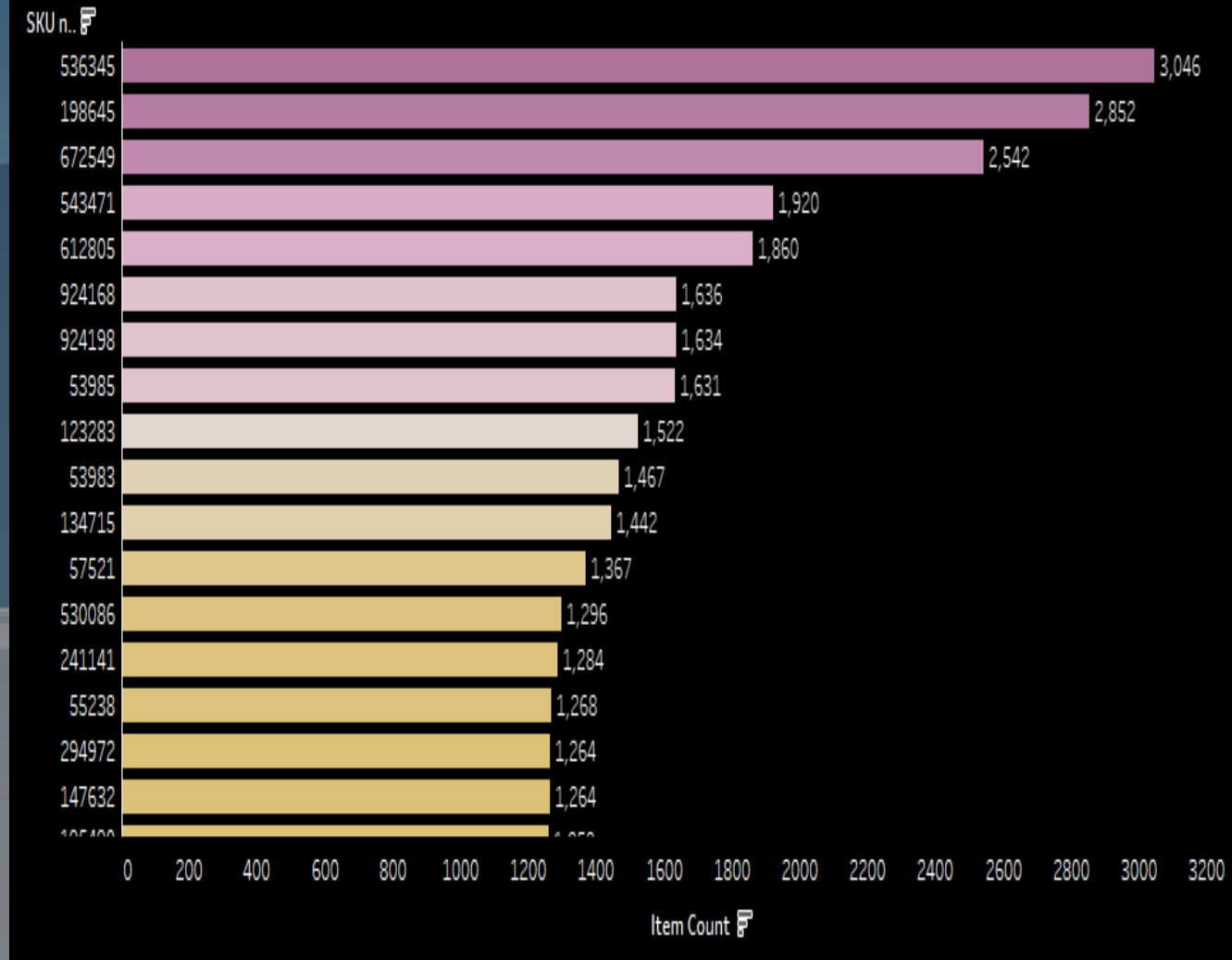
→ In this portion, we got to know that low item count for per SKU_number a limit was set (threshold) which is 10 and after analyzing it gave a command to know- if item count is less than my limit then it is low stock item and shown in the chart and if it's out of the limit it will not show in the chart.

Stock level and low stock charts

Investigate Low Stock Item

SKU number	
53310	9
105240	9
105414	7
107240	7
107511	8
108014	9
118970	9
138220	8
145863	7
145912	9
146207	6
146749	8
146770	8
147323	6
147350	9
147654	8
147681	1
149592	8
169415	5
183410	8

Low Stock Level



Calculated Inventory Key Performance Metrics

1. Inventory Turnover

→ It is a key performance metric that measures how efficiently a company sells and replaces its inventory over a given period. It indicates the number of times inventory is sold or used during that timeframe.

:→ To find the inventory turnover

Inventory turnover = Total Sales / Average Inventory

Average inventory = Average of total item count

Calculated Inventory Key Performance Metrics

Stock to Sales ratio

→ It measures the amount of inventory a business holds compared to the volume of sales it generates. This ratio helps businesses evaluate whether their inventory levels are aligned with sales performance.

:→ To find stock to sales ratio

Stock to sales ratio = Average Inventory / Total sales

Calculated Inventory Key Performance Metrics

3. Reorder Point

→ It is the inventory level at which a business should reorder stock to avoid running out of inventory. It ensures that new stock arrives before existing stock is depleted, considering demand during the replenishment period.

I set the lead days as 7 and in our data set sales show in year wise so we get the daily average sales by dividing total sales by 365.

→ To get reorder point(ROP)

ROP = Average daily sales * Lead days

Average daily sales = Total Sales/ 365

Provided Actionable Recommendations to optimize inventory management based on sales patterns.

1. Adjust Safety Stock Levels

Insight: Identify products with fluctuating or high demand using historical sales trends.

Action: Maintain higher safety stock levels for these items to prevent stockouts during demand spikes.

Benefit: Improved customer satisfaction and reduced lost sales opportunities.

2. Focus on Top-Performing Products

Insight: Top-selling products contribute significantly to revenue.

Action: Allocate more inventory to these products and prioritize their availability.

Benefit: Higher sales and improved profitability.

Provided Actionable Recommendations to optimize inventory management based on sales patterns.

3. Automate Low-Stock Alerts

Insight: Track low-stock items frequently and automate alerts when inventory reaches reorder points.

Action: Set up an automated inventory management system to trigger restocking notifications.

Benefit: Proactive replenishment prevents interruptions in the supply chain.

4. Optimize Inventory Turnover

Insight: Calculate and monitor inventory turnover rates to assess efficiency.

Action: Rotate inventory regularly, focusing on products with slower turnover rates.

Benefit: Reduced holding costs and minimized risk of obsolescence.

Provided Actionable Recommendations to optimize inventory management based on sales patterns.

1. In first part, top products were taken for high demand products and then converted top products into a sentence like “Ensure sufficient stock levels for SKU XXXXXX is high Demand Products” to make into a readable format.

2. In second part , low stock items were taken and give recommendation by using SKU_numbers and item count and make a sentence like “Reorder SKU XXXXXX as current stock (no of items which is below to the threshold) is low demand product” for easy to understand.

Visualized Insights Effectively

For Visualization to this project tableau visualization tool were used to make a chart to compare all the things which were given in questions.

1. **Sales Trends and variation over time**

Visualization Type: Line Chart

Purpose: sales trends over years.

Example:

x- axis: Years

y- axis: Sold Count

Visualized Insights Effectively

2. Top Selling Products and Categories

Visualization Type: Bar chart(top Products), Column Chart(Categories)

Purpose: Identify top-performing products or categories.

Top Products

x- axis: Sold Count

y- axis: SKU_number

Top Categories

x- axis: File Type

y-axis: Sold Count

Visualized Insights Effectively

3. Stock levels and Low-stock items

Visualization Type: Bar Chart

Purpose: To find the no of items are available.

x-axis: Item Count

y-axis: SKU_number

:: For Low Stock item I make a table and colored it by in increasing order

Visualized Insights Effectively

An Interactive dashboard is shown to visualize all the charts and all the values which is needed for this project.