Data Glacier

Your Deep Learning Partner

Exploratory Data Analysis

Retail Forecasting for Inventory Management

16-Nov-2023

Data Glacier
Your Deep Learning Partner

Problem Statement

- Our beverage industry client is at a crucial crossroads, focusing on refining their demand forecasting strategies.
- The existing in-house tool has proven unreliable, causing disruptions in inventory management.
- Our mission is to explore AI/ML solutions that promise a more accurate and adaptable forecasting model.
- **The goal is clear:** to elevate operational efficiency and market responsiveness for our valued client.

Data Glacier
Your Deep Learning Partner

Dataset

February 5, 2017 - December 27, 2020 **1218 observations - No missing value**

- **Product:** Name of the product.

- **Date:** Weekly recording date for sales data.

- **Sales:** Weekly unit sales.

- **Price Discount (%):** Percentage discount applied to the product's price.

- **In-Store Promo:** Presence of in-store promotions (1 for yes, 0 for no) during the week.

- **Catalogue Promo:** Presence of catalogue promotions (1 for yes, 0 for no) during the week.

- **Store End Promo:** Presence of store end promotions (1 for yes, 0 for no) during the week.

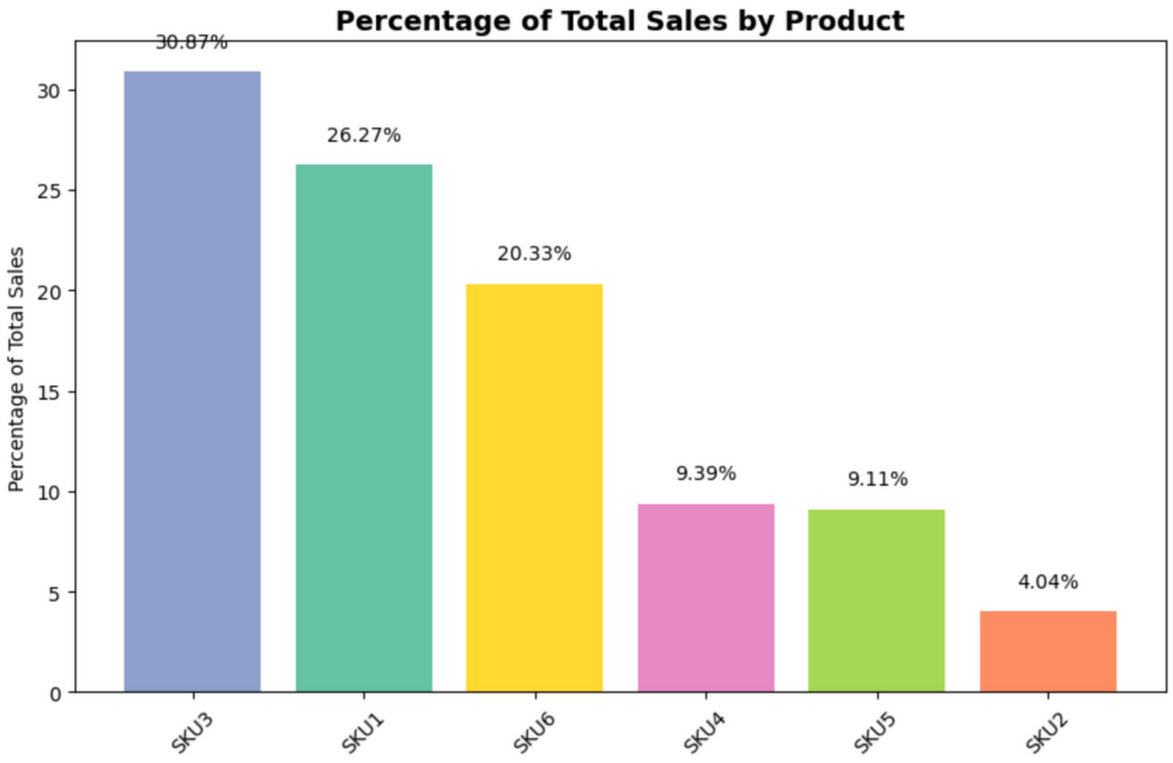
- **Google_Mobility:** Data indicating the impact of Google Mobility on sales.

- **Covid_Flag:** Flag representing the influence of COVID-19 on sales.

- **V_DAY, EASTER, CHRISTMAS:** Indicators of specific holidays/events and their impact on weekly sales.

Data Glacier
Your Deep Learning Partner

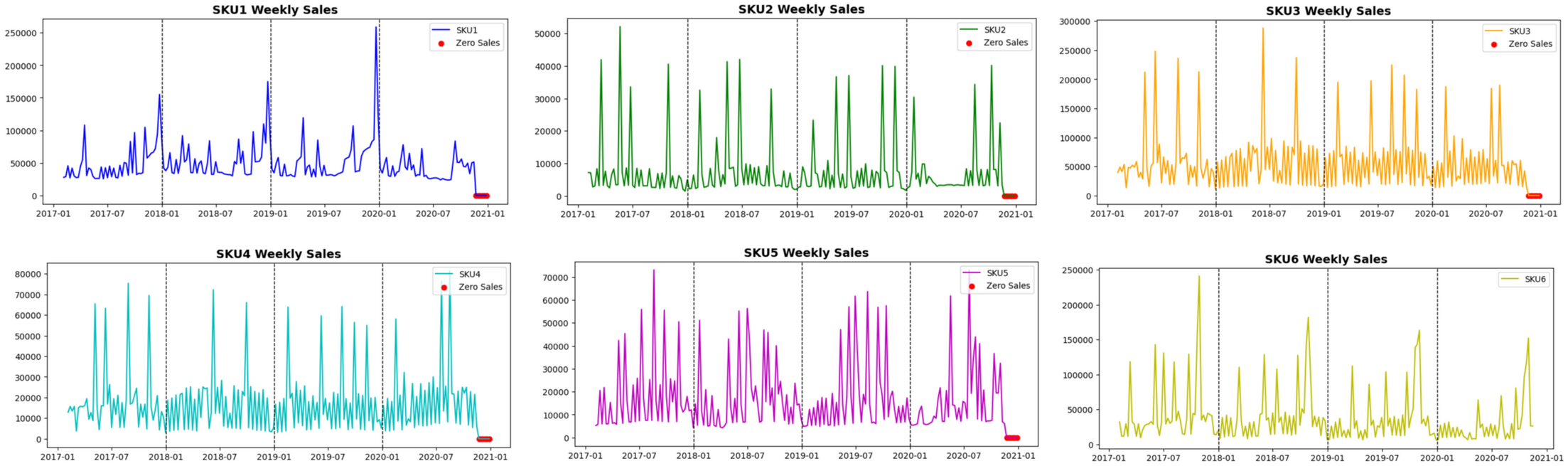
Sales by Product



- Six distinct products are available in the inventory.
- SKU3 accounts for roughly **31%** of the overall sales, followed by SKU1 and SKU6.
- SKU2 exhibits the smallest share of sales at approximately **4%**.

Data Glacier
Your Deep Learning Partner

Weekly Sales

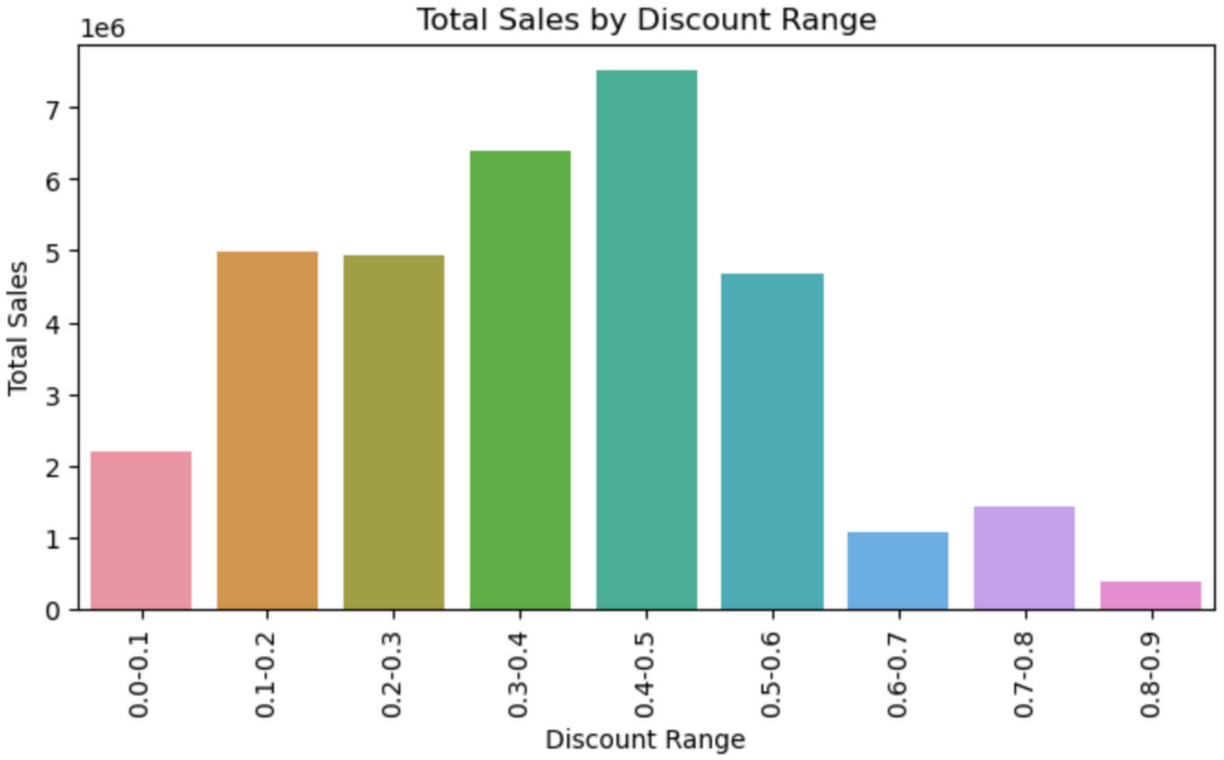


- During the weeks of **November 22, 2020**, to **December 27, 2020**, no sales were recorded for all products except the one with SKU6 code.

- Therefore, these weeks have been removed from the dataset. As a result, the last recorded date has been changed to **November 15, 2020.**

Data Glacier
Your Deep Learning Partner

Discounted Sales

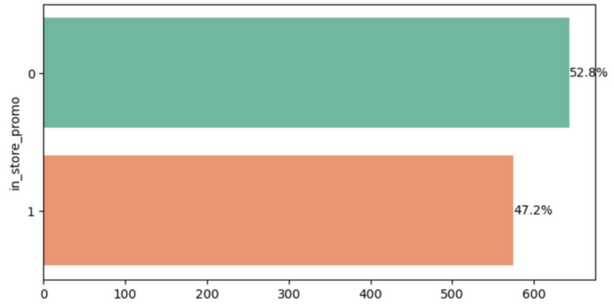


- The highest sales were achieved during the discount periods ranging from **40% to 50%.**
- There is a statistically significant difference between discounted and non-discounted sales ($p < 0.05$).

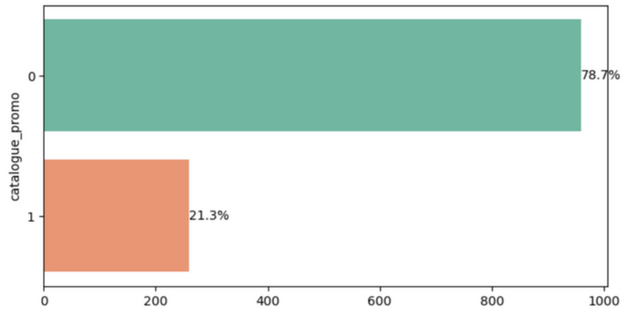
Data Glacier
Your Deep Learning Partner

Promotions

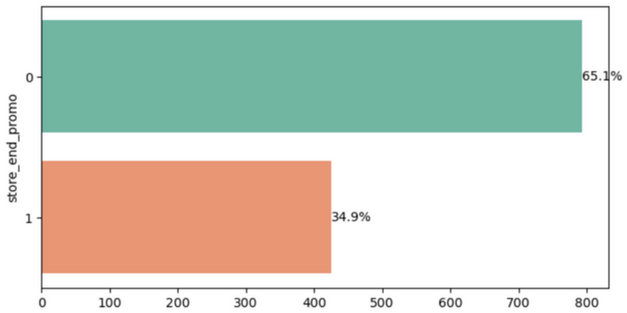
In-store



Catalogue



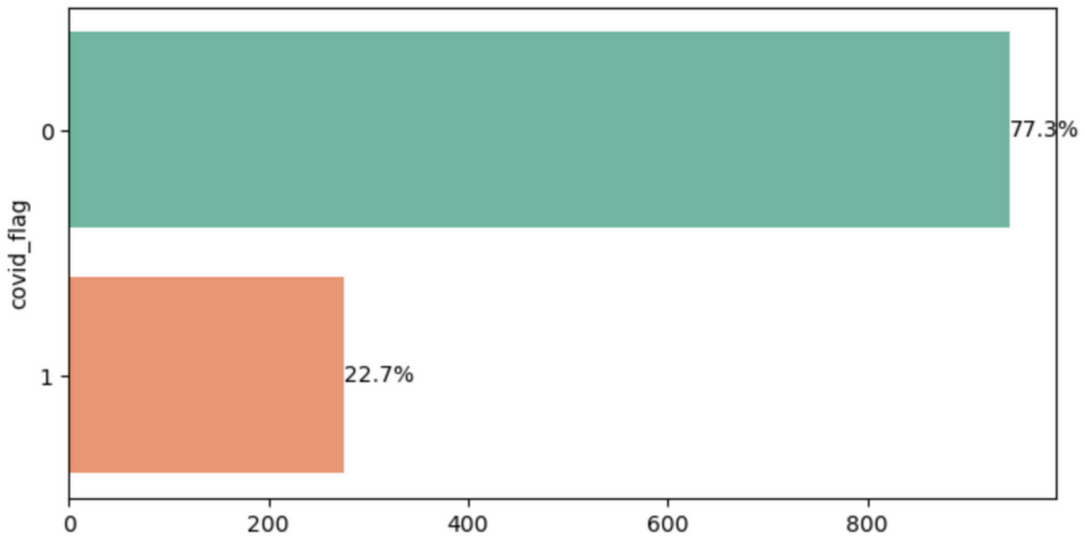
Store end



- In-store promotions were implemented in **47.2%** of the sales.
- Catalogue and store end promotions were applied in **21.3%** and **34.9%** of the sales, respectively.

Data Glacier
Your Deep Learning Partner

Pandemic Impact



- **22.7%** of the sales took place during the period affected by COVID.
- There is a statistically significant difference between covid sales and non-covid sales ($p > 0.05$).

Data Glacier
Your Deep Learning Partner

Recommendations

- **Sales by product:** SKU3 has the highest sales among the 6 products, whereas SKU2 has the lowest.
- **Weekly sales:** For products other than SKU6, there is no recorded data for the last 6 weeks within the date range of the dataset. Therefore, these weeks have been excluded from the dataset.
- **Discounted sales:** The highest sales were achieved during the discounts ranging from 40% to 50%.
- **Promotions:** Three different types of promotions have been applied to the products, with in-store promotions being the most frequently implemented.
- **Pandemic effect:** 22.7% of the sales in the dataset occurred during the COVID-19 period.

In the study, sales forecasting is planned to be performed using LightGBM, XGBoost, CatBoost, and Random Forest models."

Thank you.

Your Deep Learning Partner