

Team
2025110

Understanding The Problem Statement

- **ElectroMart** is an Ontario-based e-commerce company specializing in electronic products, including categories such as camera accessories, home audio, and gaming accessories.
- As the marketing team prepares to establish the marketing budget for the upcoming year, there is a critical need to analyze **historical marketing performance** comprehensively.
- Understand the effectiveness of past marketing spend, identify **key performance drivers**, quantify the impact of different marketing channels on revenue, and ultimately optimize the budget to maximize future returns

- **Performance Driver Analysis**
 - Identify key performance indicators (**KPIs**) impacting revenue
 - Analyze relationships among variables including ad spend, discounts, NPS scores, payment methods, holidays, and payday sales effects.
- **Marketing ROI Impact Analysis:**
 - Conduct a quantitative assessment of the impact each marketing channel (commercials, online campaigns, promotions) has on revenue

Executive Summary

Overview of the Year

 **4.0 billion**

Total Sales

jul'23 - jun'24

 **2695**

Avg. GMV

 **1.64 million**

Anual Unit Sold

Selling Prospectus

Average
Discount **41.2%**

Sale day
impact **22.9%**

Annual
Repeat
Rate **13.5%**

Expenditure

Media
Investment

**3.03
billion**

Average
NPS

49.6

Average
Stock Value

1159

Data Preparation

Special days like Pay days, Holidays & Sale days might influence Sales.



- Didn't have any column to account for this data



- Created new columns to indicate if it's a pay day, holiday or sale day

Added new columns such as List price and Discount



- Didn't have any columns to account for this data



- Calculated and added new columns for List price and Discount

Dealing with outliers



- SLA column had extreme values found to be outliers



- Capped SLA (Service Level Agreement) values at 16

Dealing with unrealistic data and null values



- There were rows where GMV or MRP were missing or less than 0



- Removed such rows since they don't reflect practical market conditions

Classification of Product types



- Products range across a wide spectrum of prices



- Classified products into Luxury and Mass Market, based on percentile of list price

Integrating Product Categories into the dataset



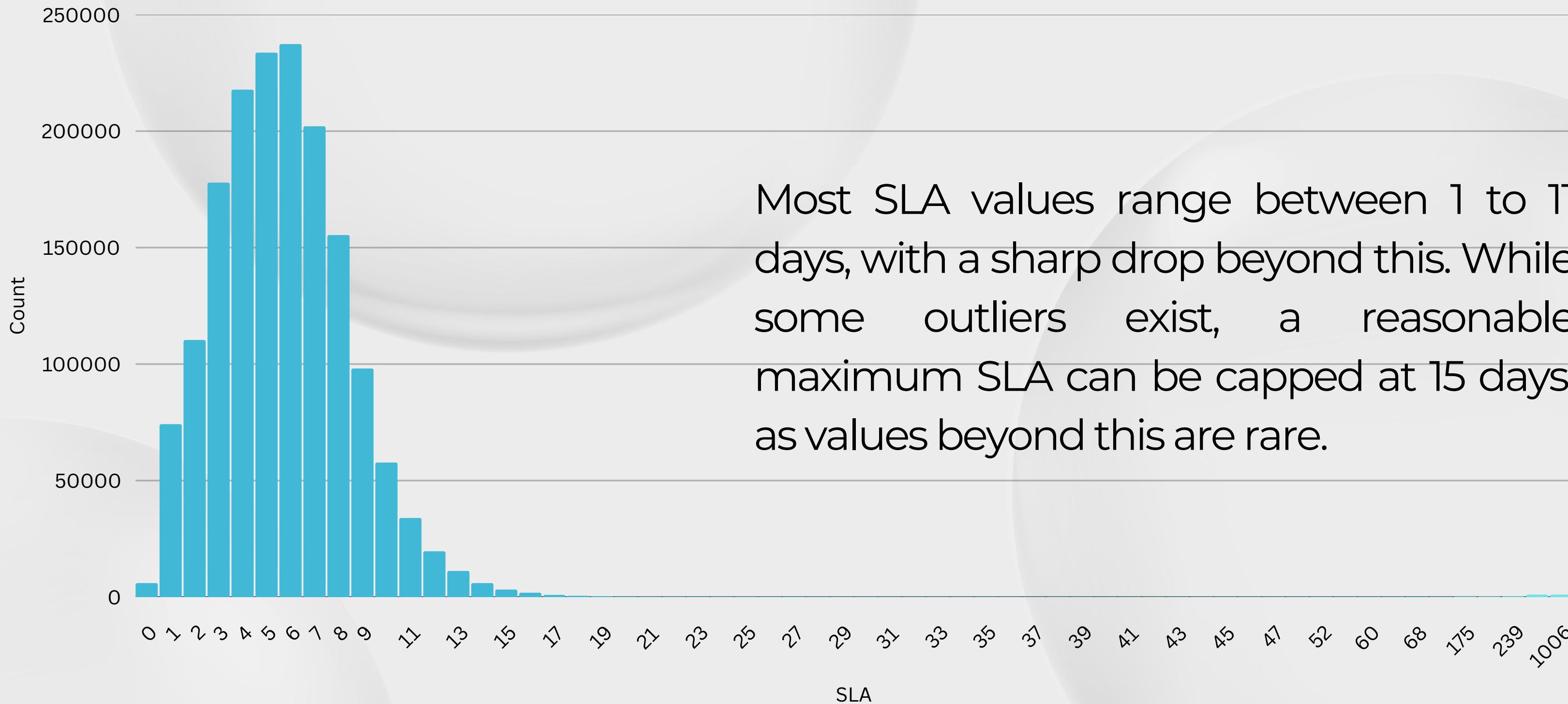
- Product categories were not mentioned in the sales data



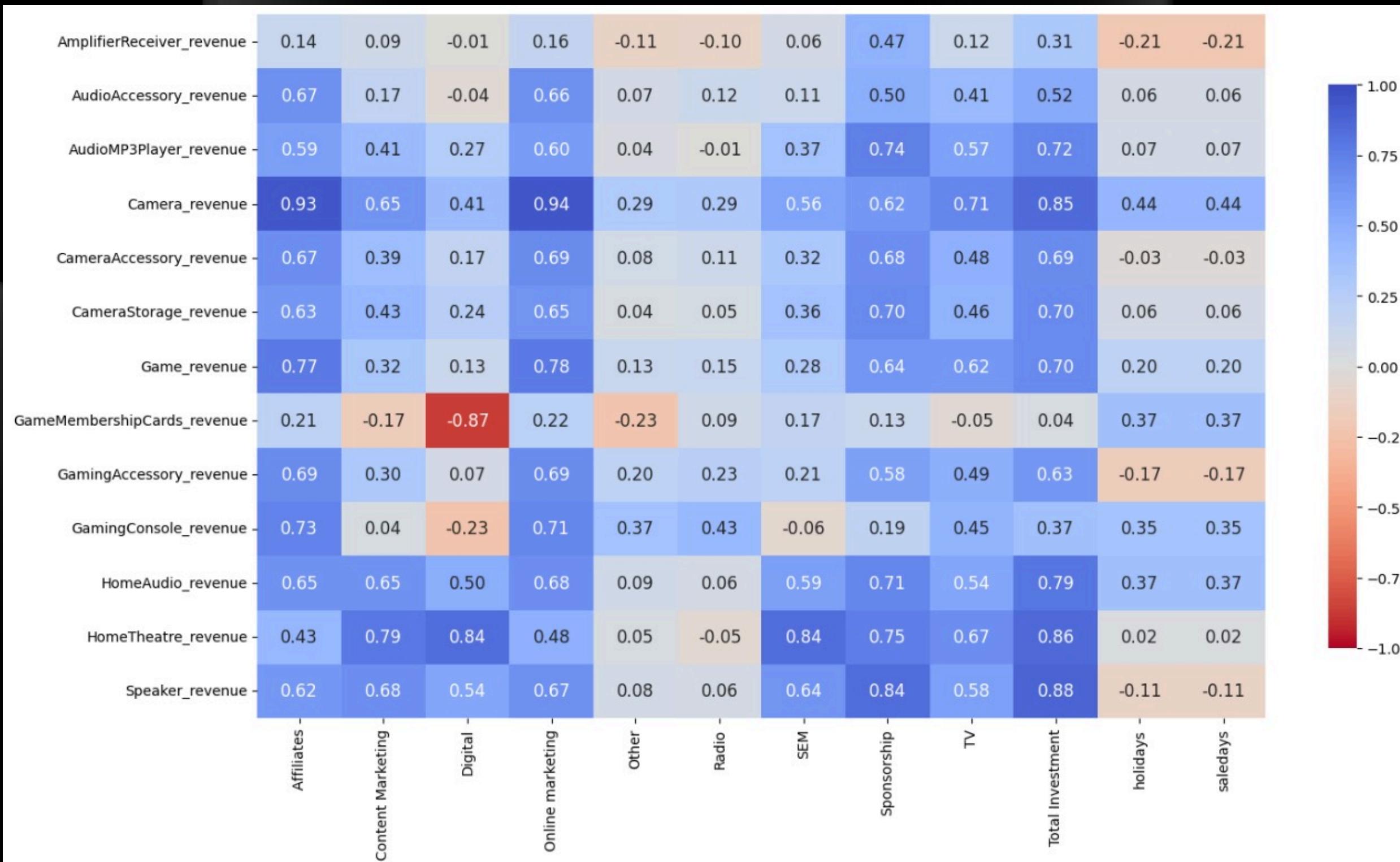
- Leveraged FSN ID to include Product categories, sub-categories and verticals

Exploratory Data Analysis (EDA)

SLA Frequency Distribution

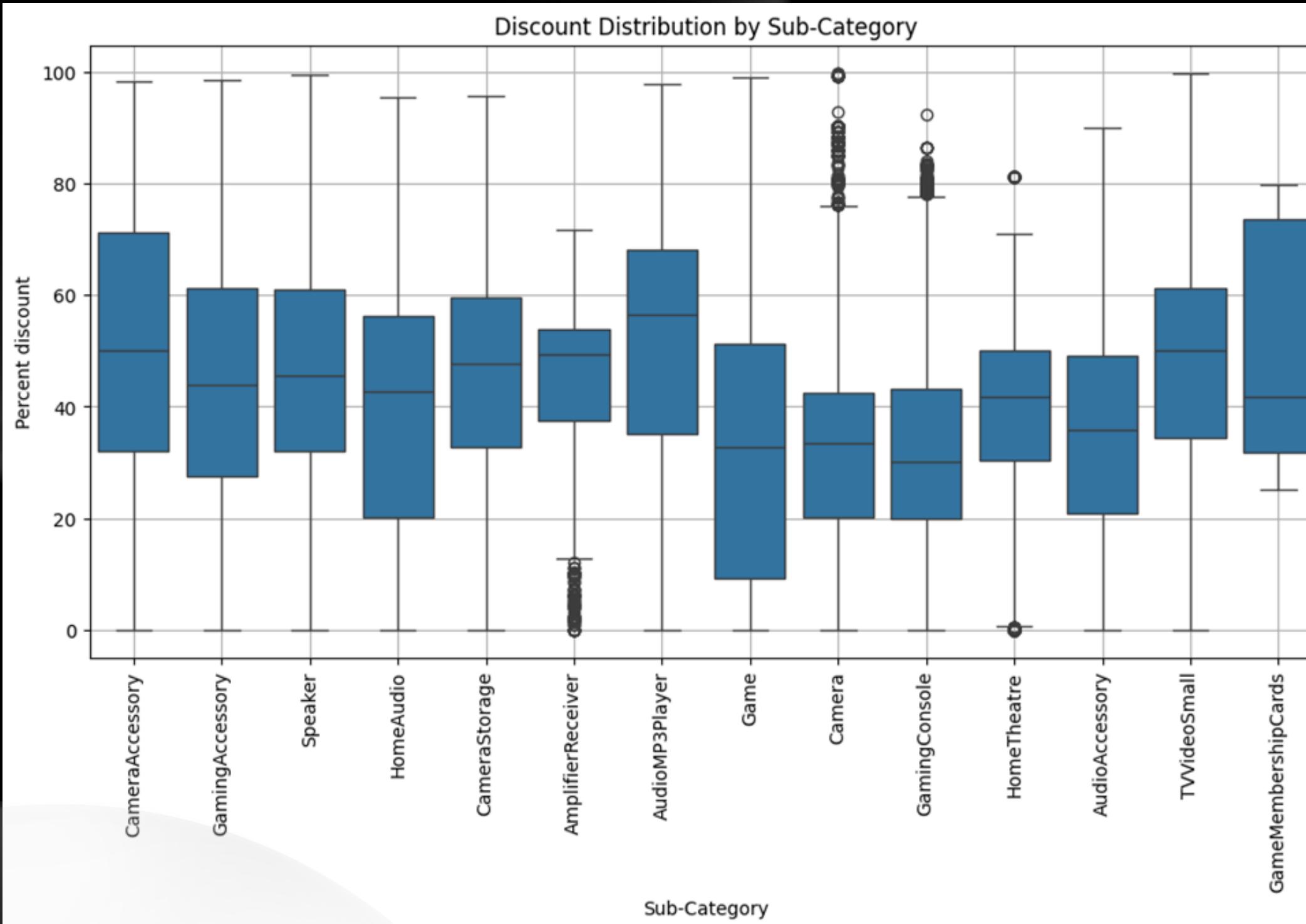


Exploratory Data Analysis (EDA)



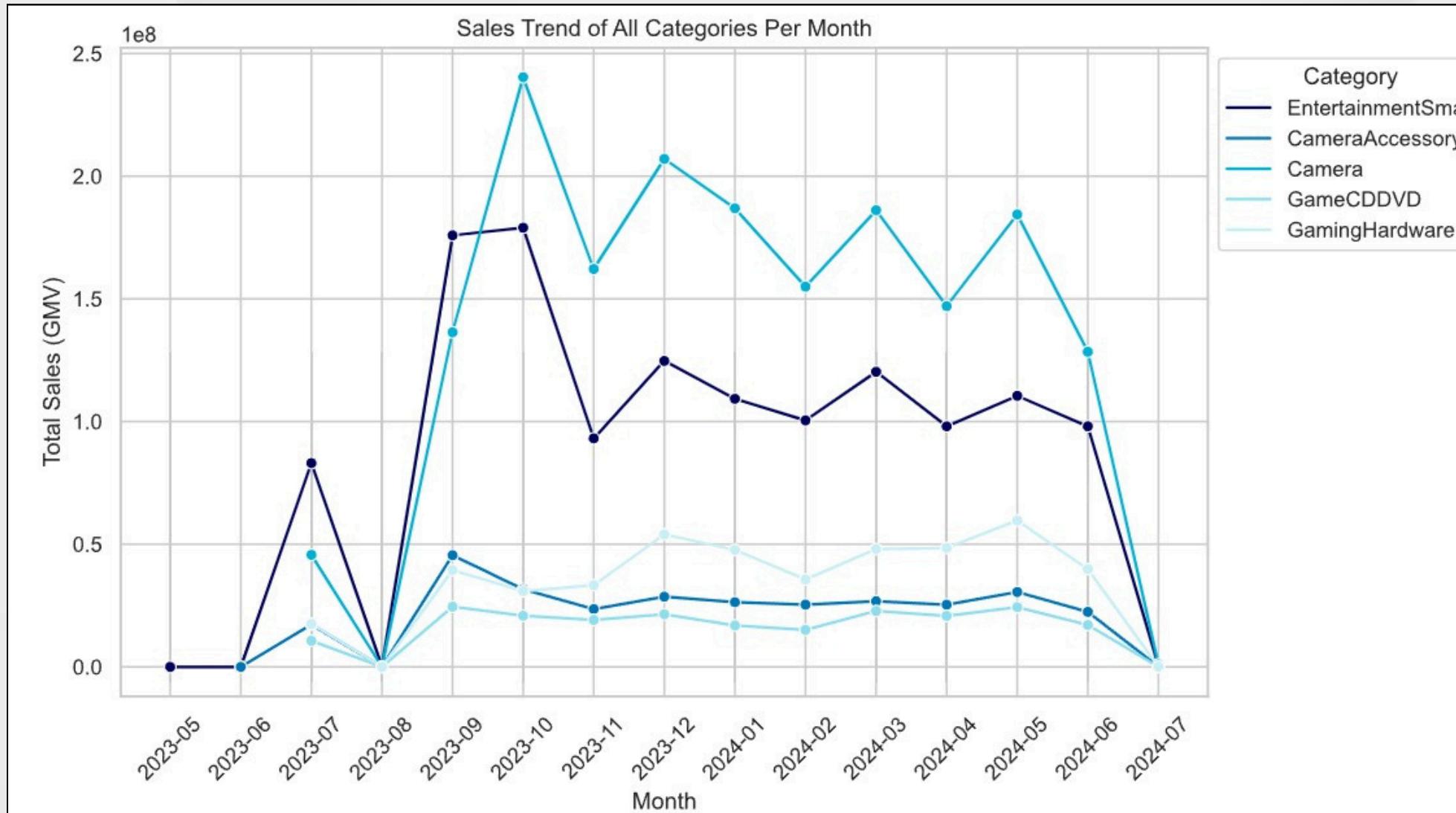
This correlation plot visually represents the impact of advertising spends on various marketing channels on revenue across different product sub-categories.

Exploratory Data Analysis (EDA)



The box plot shows how discounts vary across sub-categories. Game Membership Cards, Audio MP3 Players, and Camera Accessories receive the highest median discounts, while Cameras, Gaming Consoles, and Home Theatres have lower discounts but wider ranges. Game and Camera Storage show high variability with extreme outliers, whereas Amplifier/Receivers have the lowest discount range, indicating minimal price reductions.

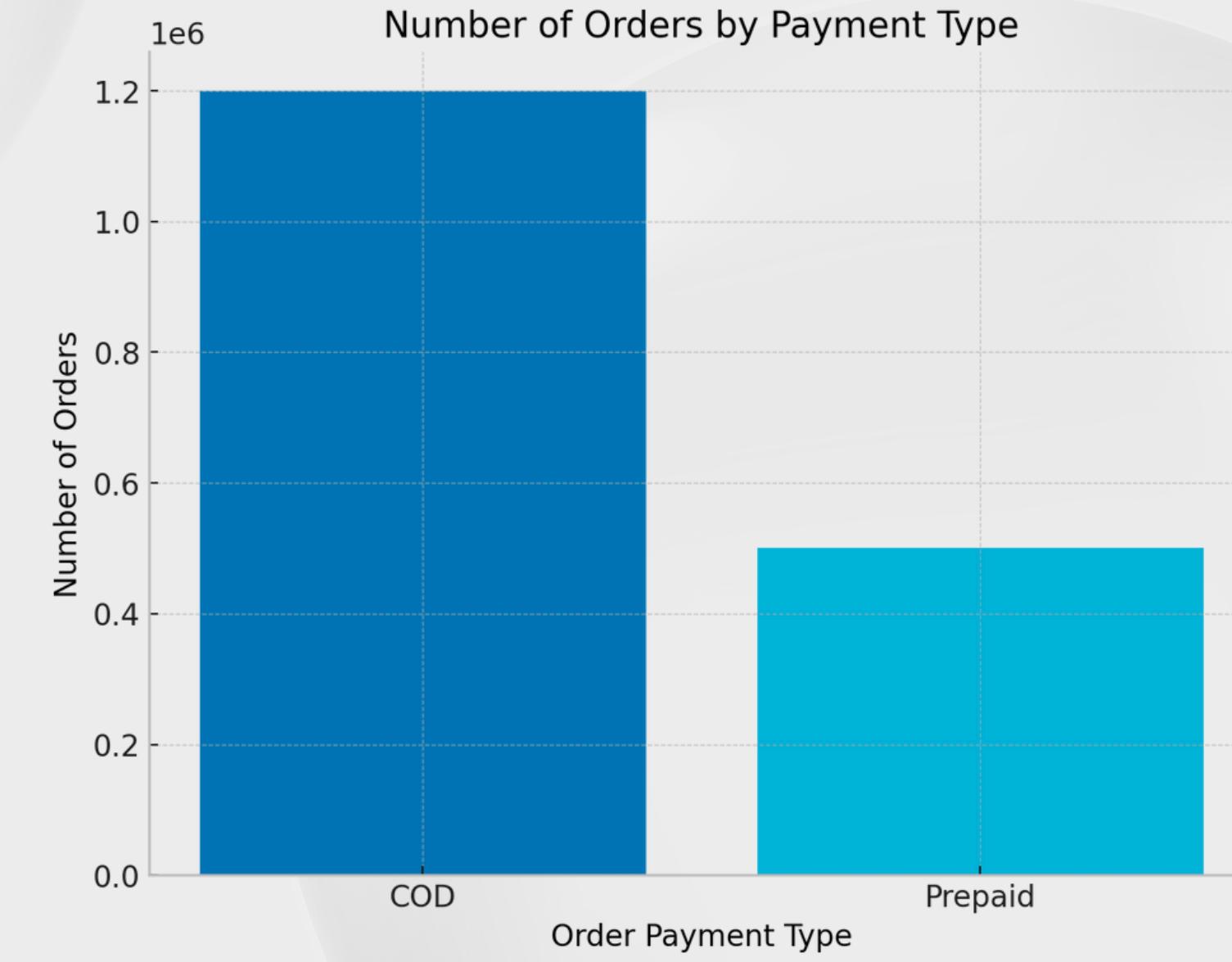
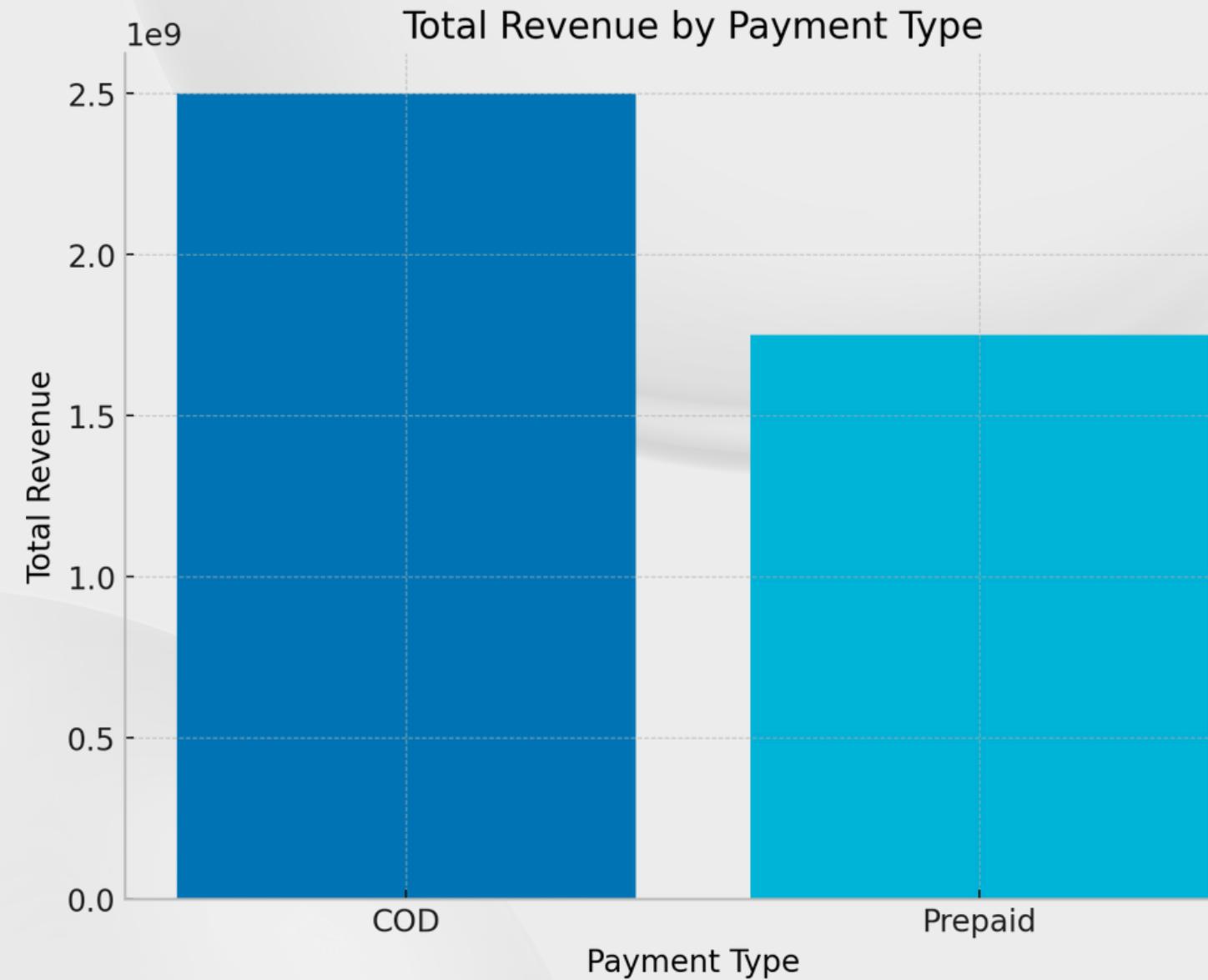
Exploratory Data Analysis (EDA)



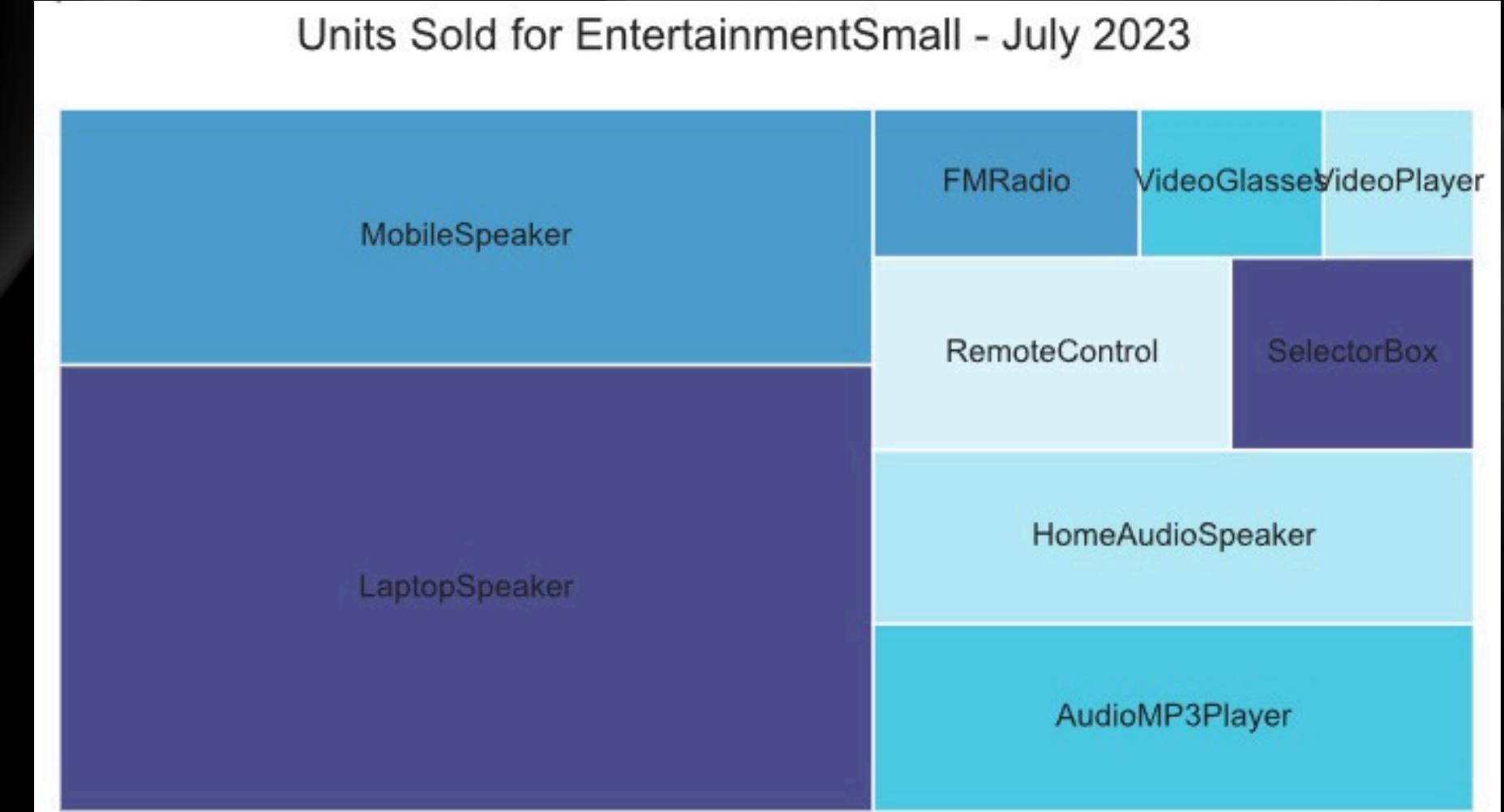
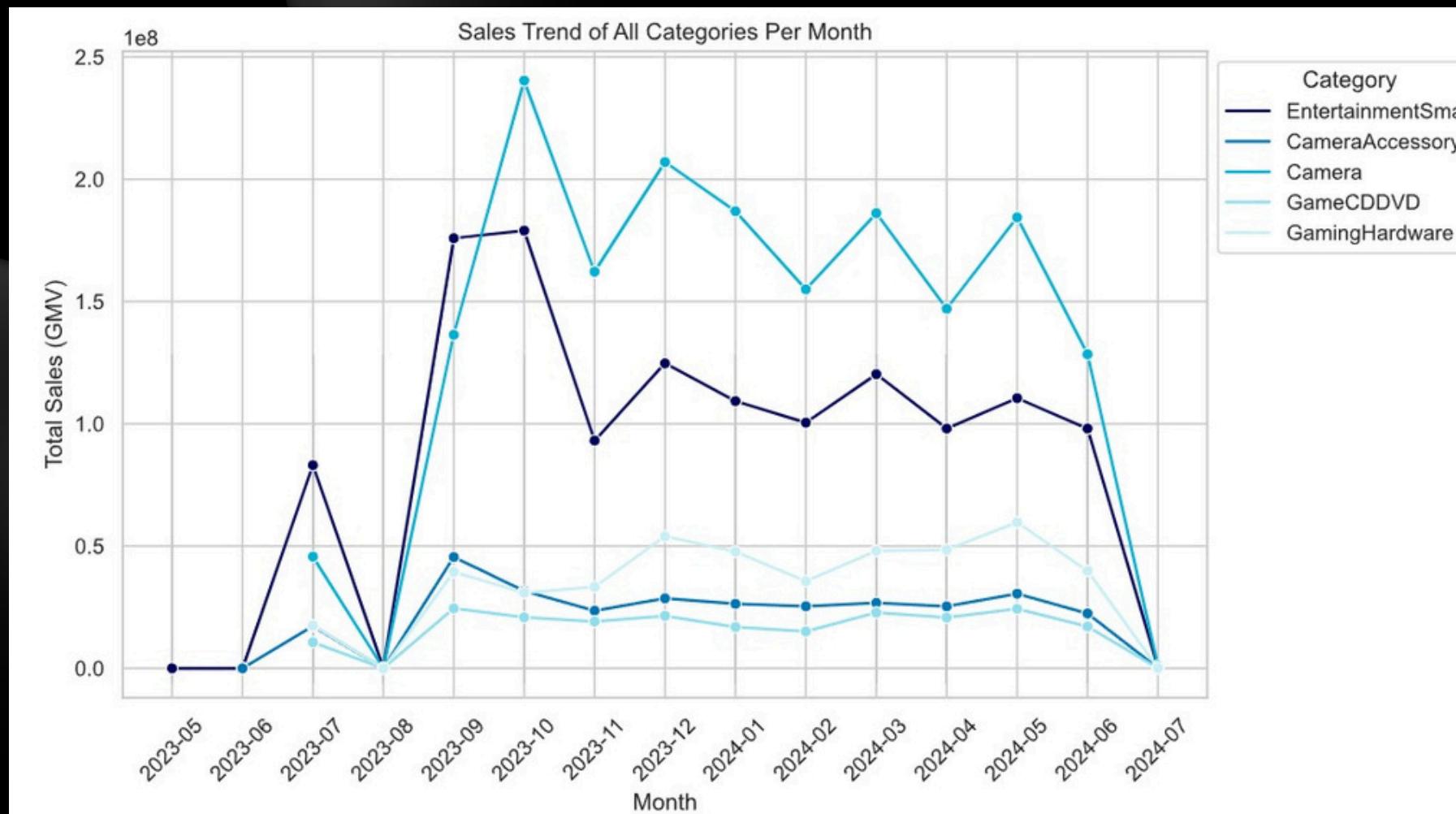
- The highest selling category over the year is EntertainmentSmall and CameraAccessory
- Within the EntertainmentSmall category, Laptop speakers and Mobile speakers are in high demand.
- Within the CameraAccessory category, Camera battery and Lens are highest selling products, followed by Camera tripod.

Exploratory Data Analysis (EDA)

Relationship between revenue and Payment Types

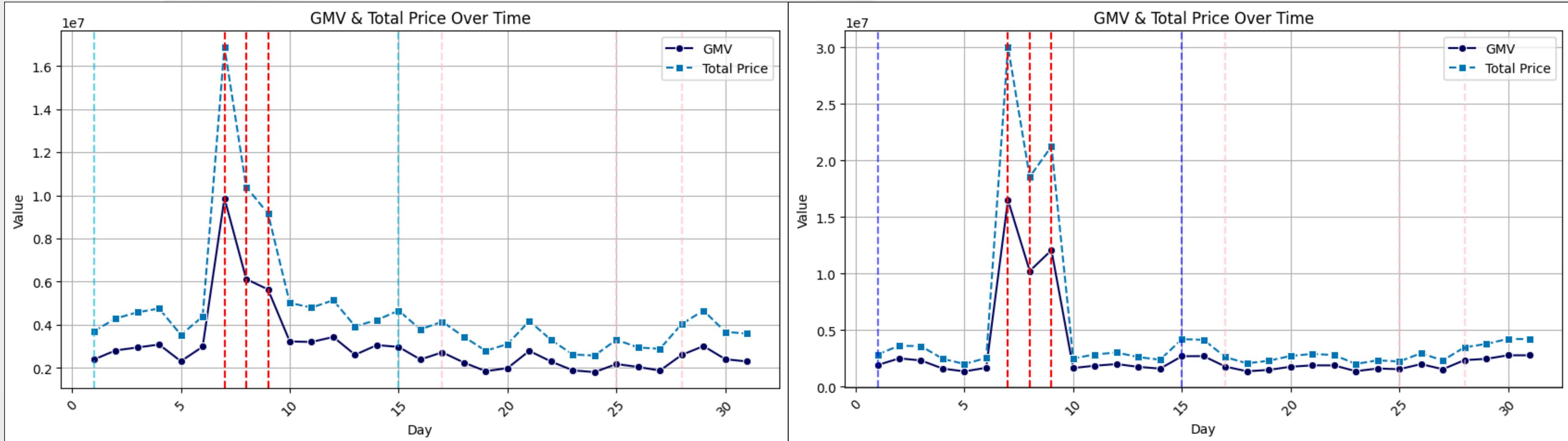


Exploratory Data Analysis (EDA)



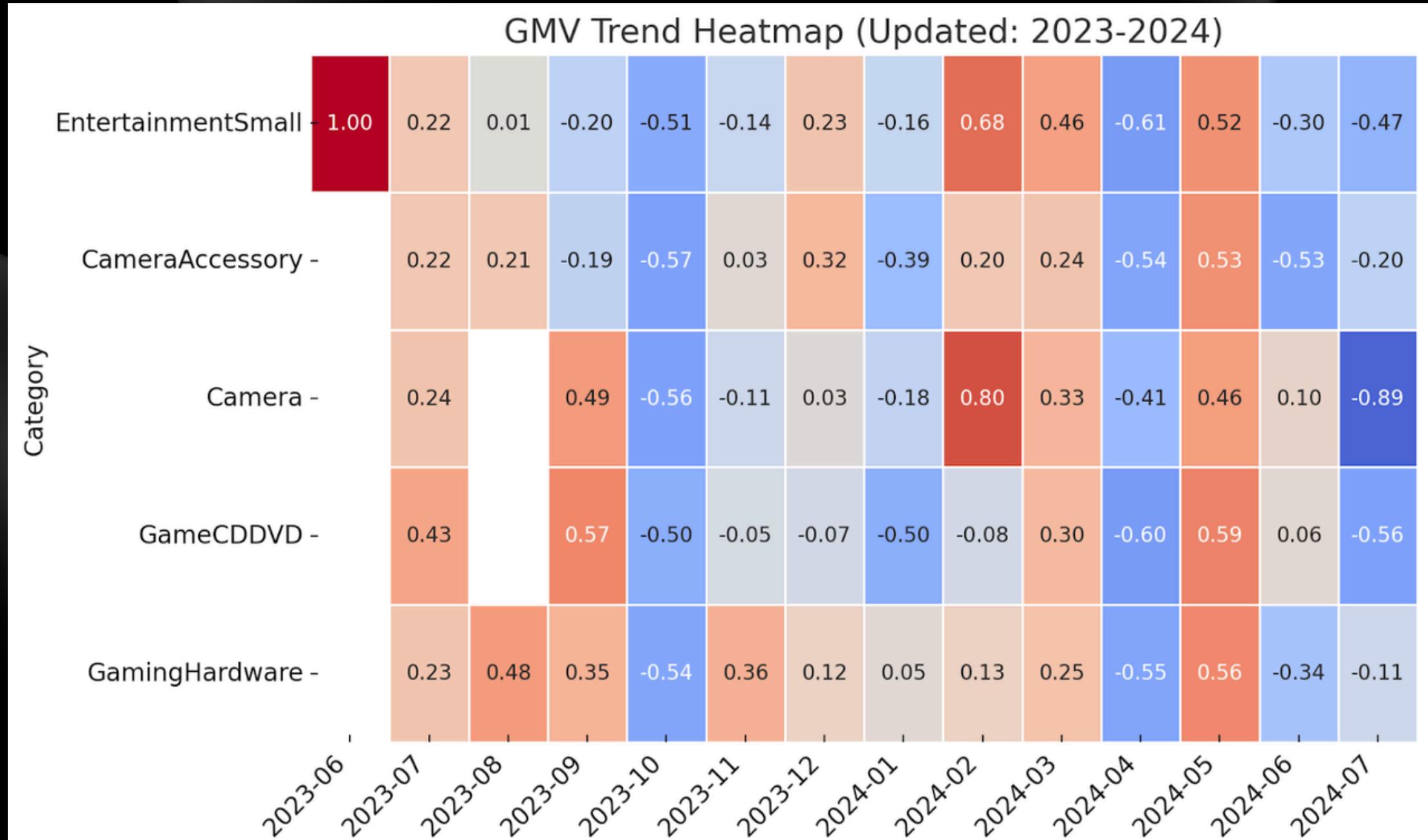
These Plot tell the how sales day affect the sales directly while pay day affects indirectly

Exploratory Data Analysis (EDA)



These Plot tell the how sales day affect the sales directly while pay day affects indirectly

Exploratory Data Analysis (EDA)



Key Takeaways:

- **Warmer months** boost sales for **EntertainmentSmall**, **Cameras**, and **GameCDDVD**.
- **GamingHardware & CameraAccessory** show mixed trends, but still favor **warm weather**.
- **Winter months** (October–February) **negatively impact most categories**.
- April is consistently a low-sales month across multiple categories.

Exploratory Data Analysis (EDA)

Category	Best Months (High Correlation)	Worst Months (Low Correlation)	Seasonality Impact
EntertainmentSmall	Jun, Feb, May	Apr, Oct, Jul	High
CameraAccessory	May, Dec, Jul	Oct, Apr, Jun	Moderate
Camera	Feb, May, Sept	Jul, Oct, Apr	High
GameCDDVD	July Sept, May	Apr, Oct, Jul	High
GamingHardware	Aug, May, Nov	Apr, Oct, Jun	Moderate

Key performance indicators

KPI	Description
Average GMV	Mean revenue per order or time period, assessing overall sales performance.
Ad-stock for 5 Categories	Measures advertising impact on future sales for product analytic category $\text{Ad_stock}_t = \text{Ad_Spend}_t + \lambda \times \text{Ad_stock}_{t-1}$
Moving Average (Last 3 Weeks)	Rolling average of GMV per unit and discount percentage over the last three weeks to smooth out short-term fluctuations.
Lag Variables (3 Weeks)	Tracks delayed impact of GMV per unit and discount percentage on current sales to identify long-term pricing effects.

Key performance indicators

KPI	Description
Average Discount	Represents the mean discount percentage offered across all sales, helping evaluate pricing strategies and promotional effectiveness.
Customer Repeat Rate	Percentage of customers who make multiple purchases within a given time frame, indicating customer retention and loyalty.
Sale Day Impact	Evaluates how major sales events (e.g., Black Friday, seasonal discounts) affect revenue, customer traffic, and purchasing behavior.

ML Model Performance

We have used 6 model for our prediction : **Linear Model**,
Multiplicative Model,**Koyck Model**,
Lasso Regression,**Ridge Regression**,**Polynomial Regression**

Linear Model

R-Square :
-0.89

Lasso Regression

R-Square :
0.05

Ridge Regression

R-Square
0.87

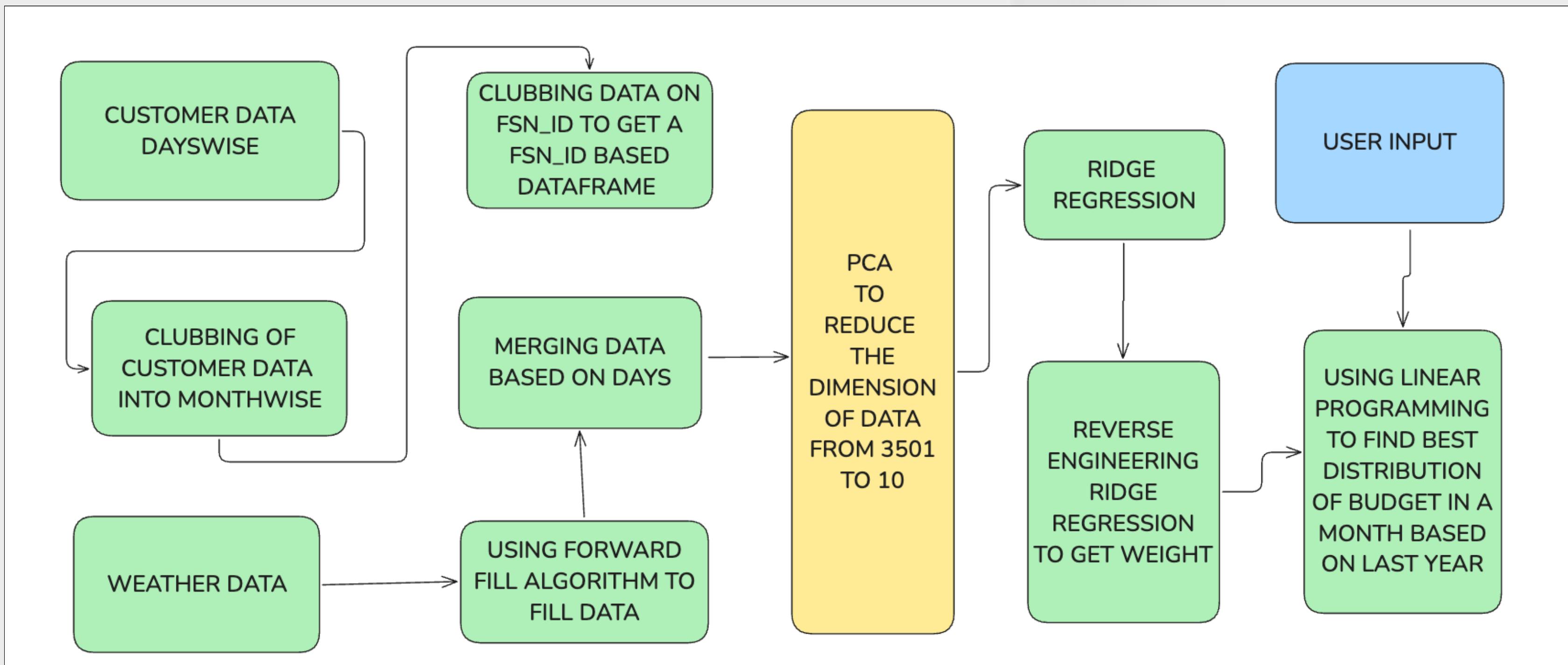
Koyck Model

R-Square
0.11

Polynomial Regression

R-Square
0.1

ML Model Pipeline



Application Design

BackEnd

Backend in Python using Flask Library

Packed using Docker

Build for Linux/AMD chip

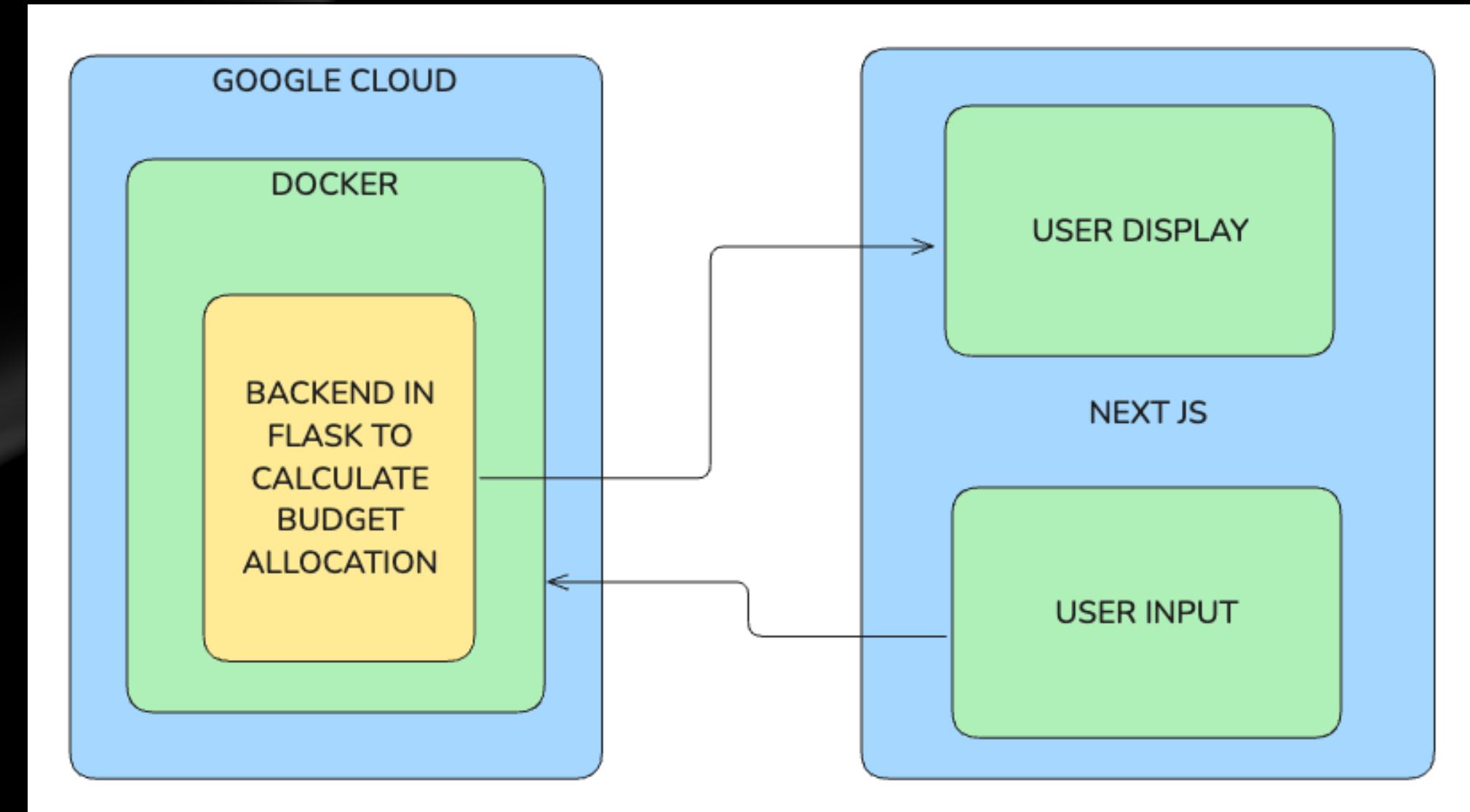
Deployed as google cloud function for faster performance

FrontEnd

Front End is created using Next js

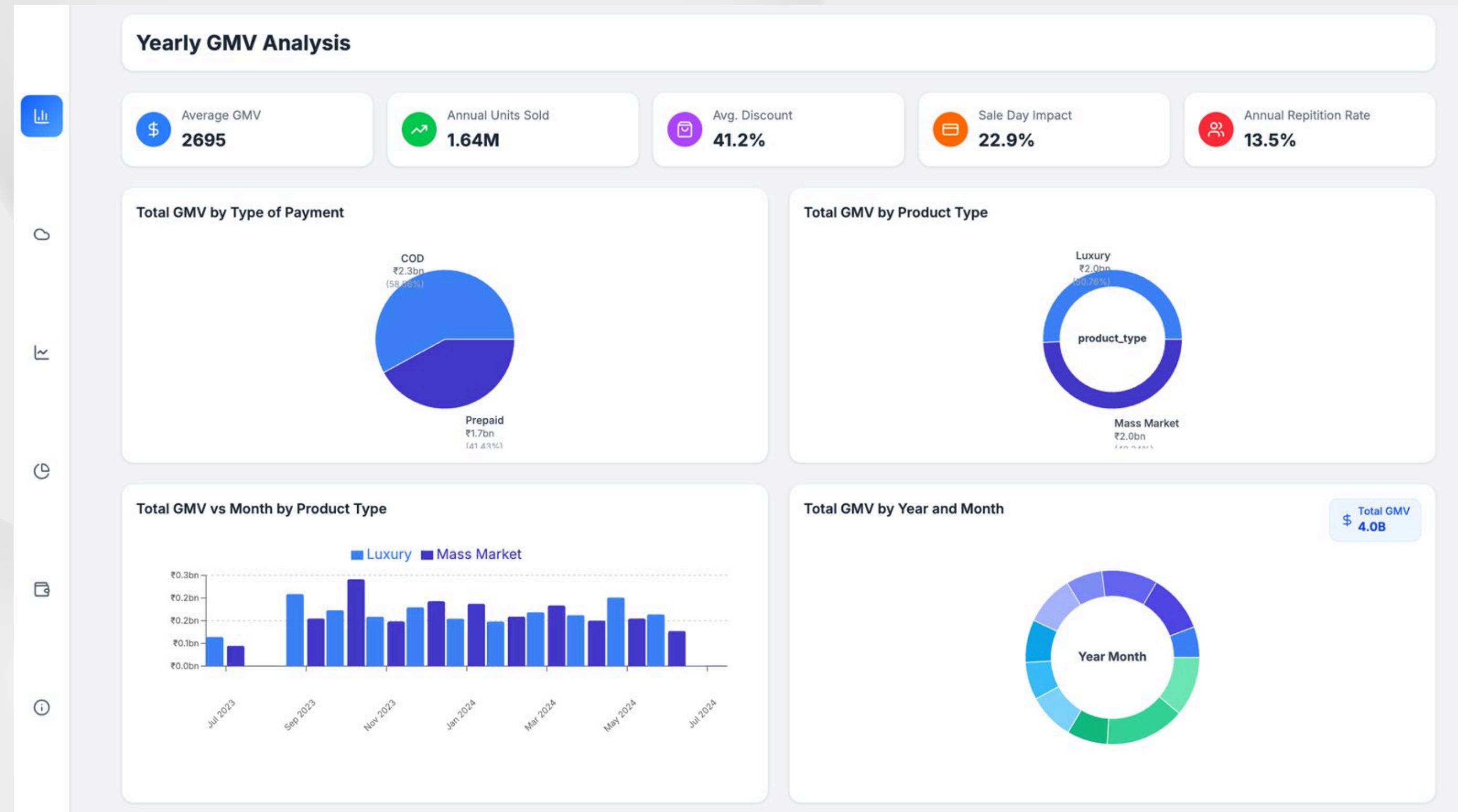
Front End contain 6 different Dashboard

We have created a Dashboard to calculate the Investment division in next month.



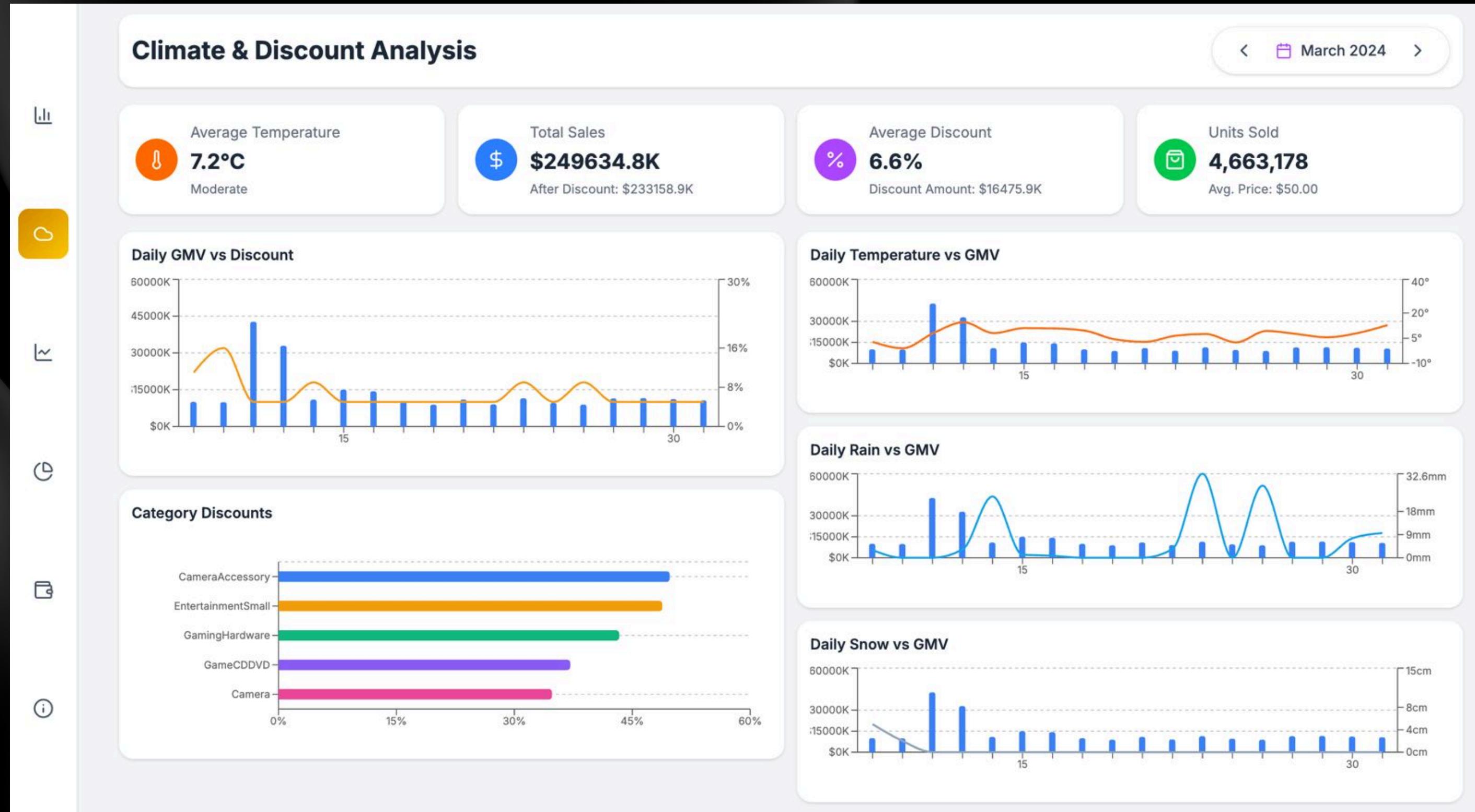
Application Interface

Annual Summary Dashboard



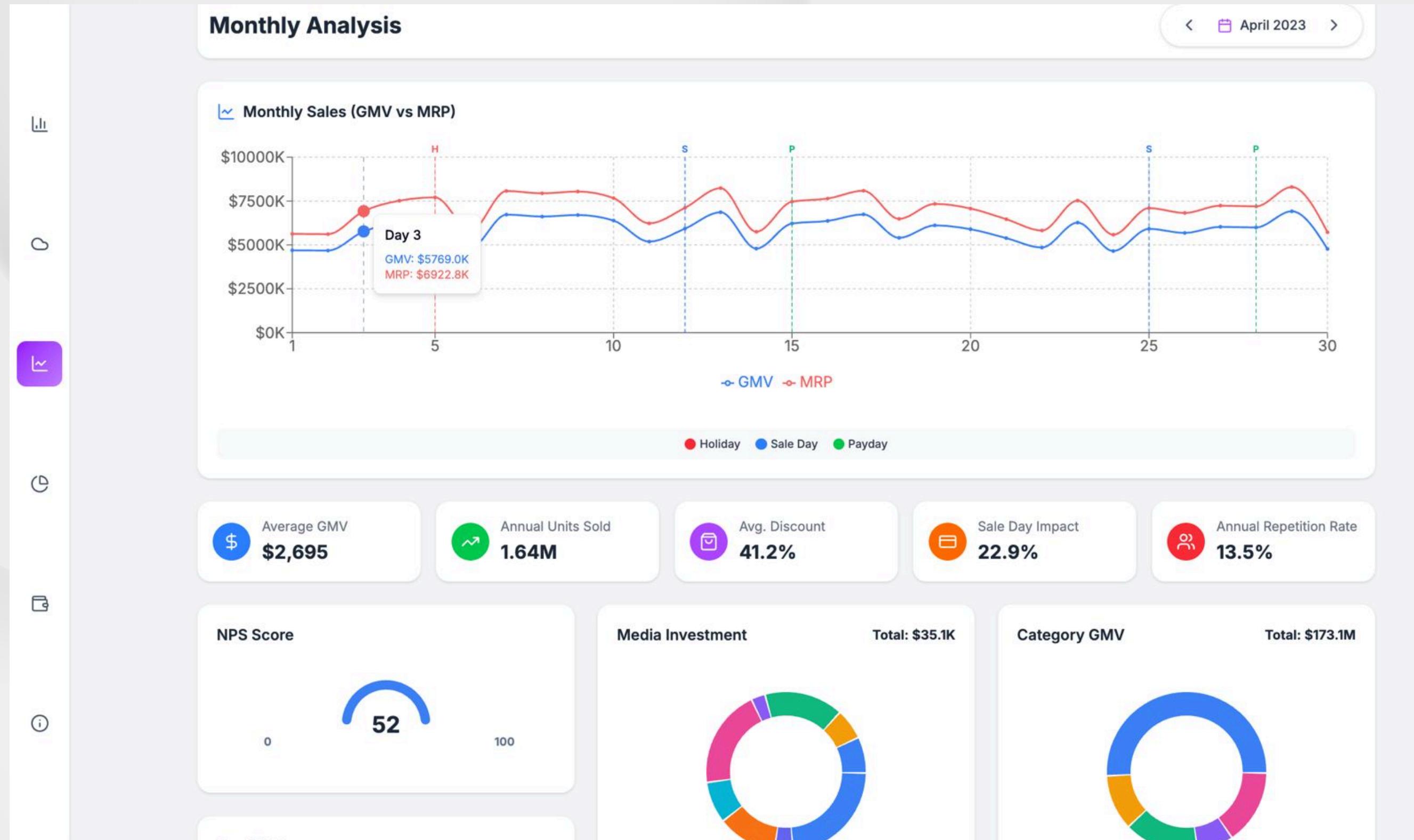
Application Interface

Impact of Weather and Discounting



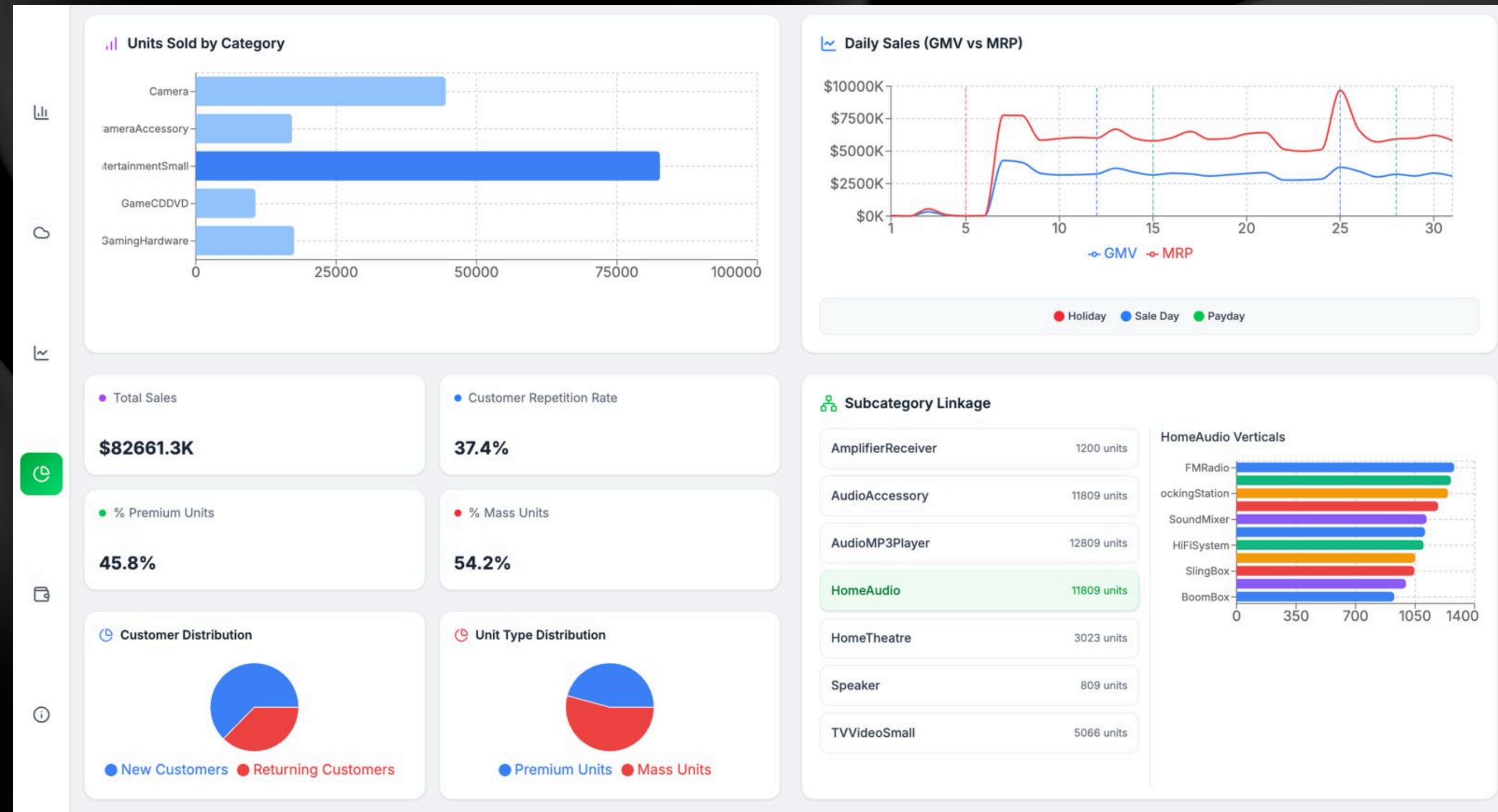
Application Interface

Monthly Summary Dashboard



Application Interface

Category Wise Analysis



Application Interface

Investment Distribution Planner

Investment Planner

Month: 3, Holidays: 0, Sales Days: 4

Add Event
Schedule holidays, sale days, and paydays

Investment Amount
\$50000.00

\$1,000 \$100,000

Predict Distribution

Event Legend

- Holiday
- Sale Day
- Pay Day

March 2025

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1						
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Recommended Investment Distribution

	Total: \$50000.00
TV Advertising	32.36%
Digital Advertising	7.90%
Sponsorships	1.75%
Content Marketing	33.72%
Online Marketing	5.02%
Affiliate Marketing	6.42%
Search Engine Marketing	1.50%
Other Channels	11.34%

Application Interface

Product Wise Analysis

Details

Start Date: 16/07/2023 | End Date: 30/11/2023 | Category: EntertainmentSmall | Subcategory: AudioMP3Player | Vertical: AudioMP3Player

Search by FSN ID... Apply Filters

FSN ID	Total Sales	Units	Avg. SLA	% COD	% Prepaid	Last 7 Days
AUDDVX8ZHX6RTGN2	\$1,566,384	425	5.483137254901961 days	56%	44%	
AUDEA25AP9ZUCYHX	\$1,350,309	84	9.285714285714286 days	46%	54%	
AUDDM4XSFAHRNKJH	\$1,286,376	730	5.17252446183953 days	66%	34%	
AUDCXHDXHDZSXBX4P	\$1,237,223	546	5.458058608058608 days	55%	45%	
AUDEAYF3PBQ29HEA	\$1,169,036	51	10.490196078431373 days	67%	33%	
AUDDGN3Q2GSCBUSX	\$1,132,581	3,446	4.171888017463091 days	80%	20%	
AUDEAZDQF6HQZSUE	\$964,200	50	8.68 days	58%	42%	
AUDE5HW9MWQHTTR9	\$929,158	269	5.004646840148699 days	61%	39%	
AUDDM4XSCYSXJFBG	\$907,463	514	5.644589586807485 days	72%	28%	
AUDEA38MY4TFBCNG	\$819,641	42	10 days	64%	36%	

Showing 1-10 of 1077 products | Rows: 10 | [Previous](#) [1](#) [2](#) [3](#) [Next](#)

Recommendations & Action Plan

What Worked

- ✓ Correlated weather data with sales to find perfect time to push sales
- ✓ Distribution of advertisement investment over all the channels
- ✓ Determining impact of sale day, pay day and holidays on overall revenue generation

What Didn't Work

- ✗ Couldn't analyze weekly distribution of advertising investment
- ✗ Couldn't analyze geographical distribution of sales due to defect in pincode data
- ✗ Couldn't analyze distribution of advertising investment in different product categories

Next Steps

- ✓ Determining decay rate for Ad-stock calculation
- ✓ Weekly distribution of advertisement investment
- ✓ Determining when to put sale days and to set the discount levels



Thank You