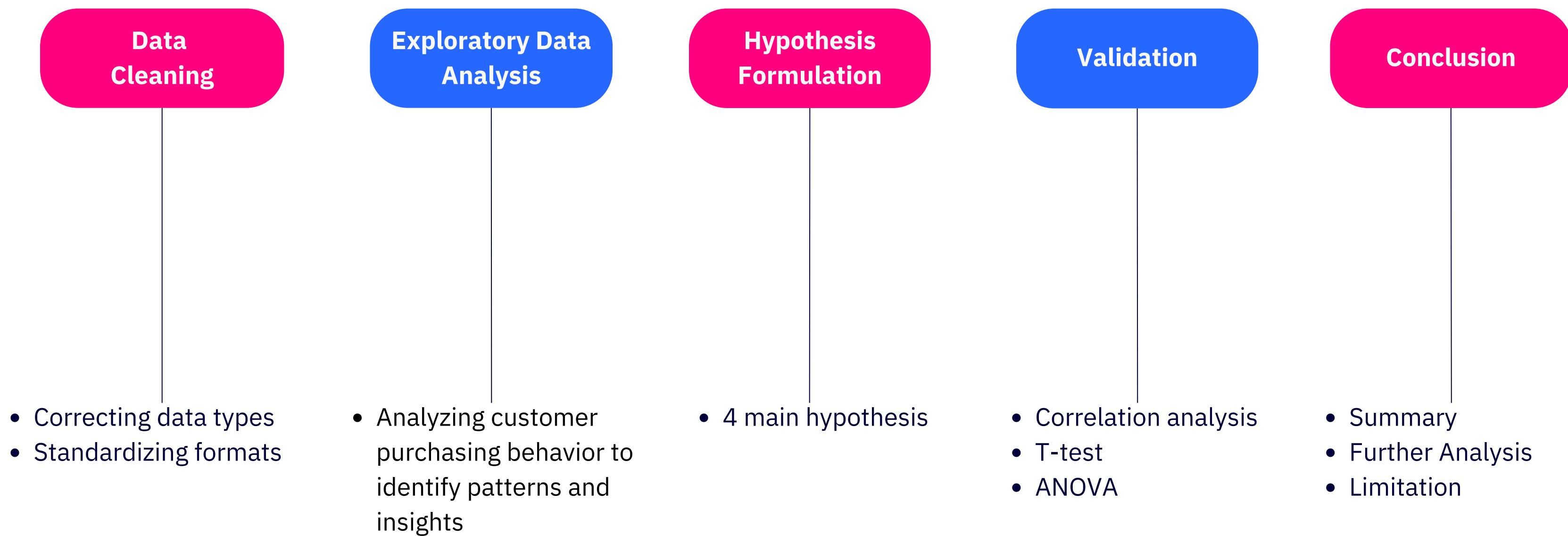


Analyzing the Summer Sales Dip 2024

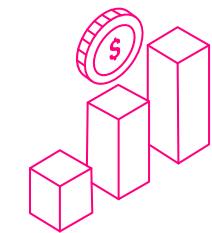
with Python Data Visualization Libraries



Data Analysis Process

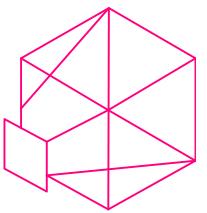


Analysis Approach



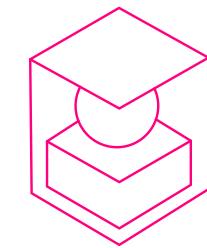
Product Analysis

- Conducting a seasonal analysis to identify underperforming products of 4 product categories.



Customer Segments

- Demographic Insights
- Repurchase Insights
 - Based on historical repurchase data.



Customer Reviews & Shipping Impact

- Analyze how customer ratings impact sales trends and if shipping choices affect purchase behavior.

Dataset Overview

[Back to Agenda](#)



Data Source

- 2024 E-commerce Customer Analysis from Kaggle
 - About 2024 customer spending records, including age, gender, products, categories, spending amount, and product information.

Main Product Category

- Clothing
- Accessories
- Footwear
- Outerwear

Agenda



Key Findings Overview



Hypotheses & Validation



Summary



Limitation



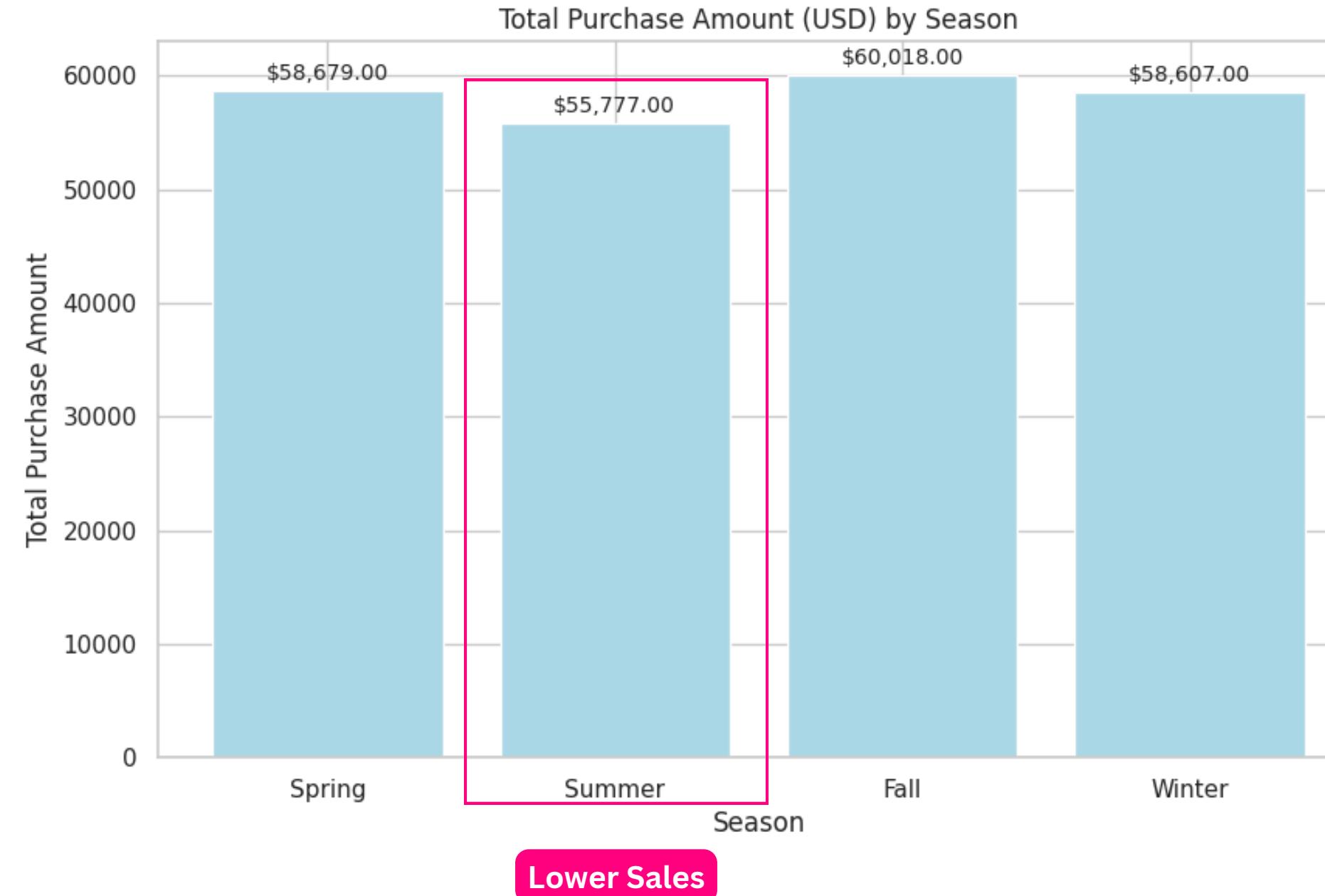
Analyzing the Summer Sales Dip 2024

Key Findings

[Back to Agenda](#)

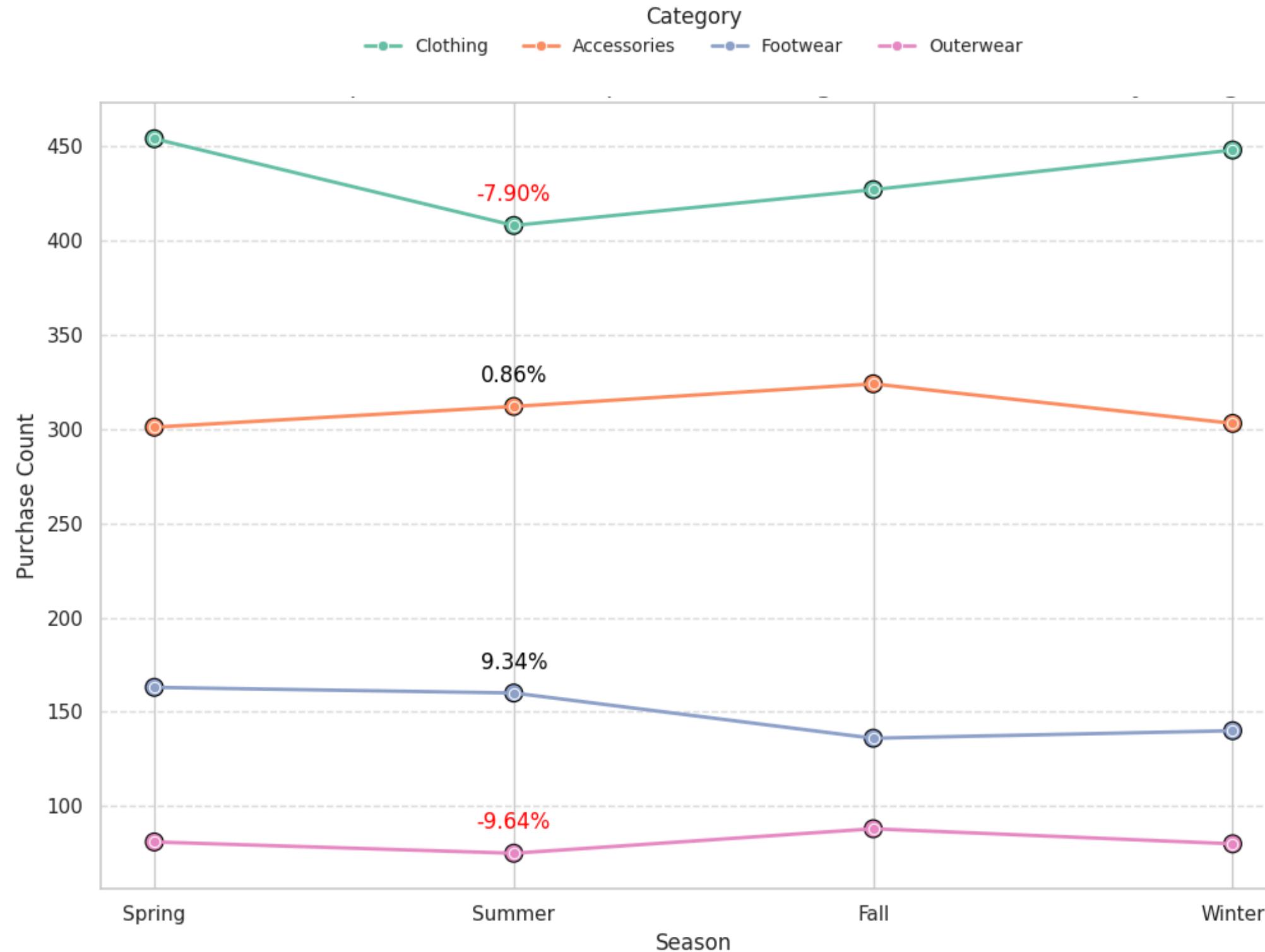


Sales drops 4.95% in summer 2024



- Summer has the lowest total sales USD \$55,777 (4.95% dump).
- Fall leads in total sales USD \$60,018, showing its overall strength in generating revenue.
- Spring and Winter are almost tied for 2nd place, each contributing over USD \$58,000.

Sales Volume Drop in Summer



- Clothing: Experienced a notable drop of **-7.9%**, marking the largest decline and the worst performance across all seasons.
- Outerwear: Saw a decrease of **-9.64%**, making it one of the lowest-performing categories during the summer.



Analyzing the Summer Sales Dip 2024

Seasonal Sales Trends

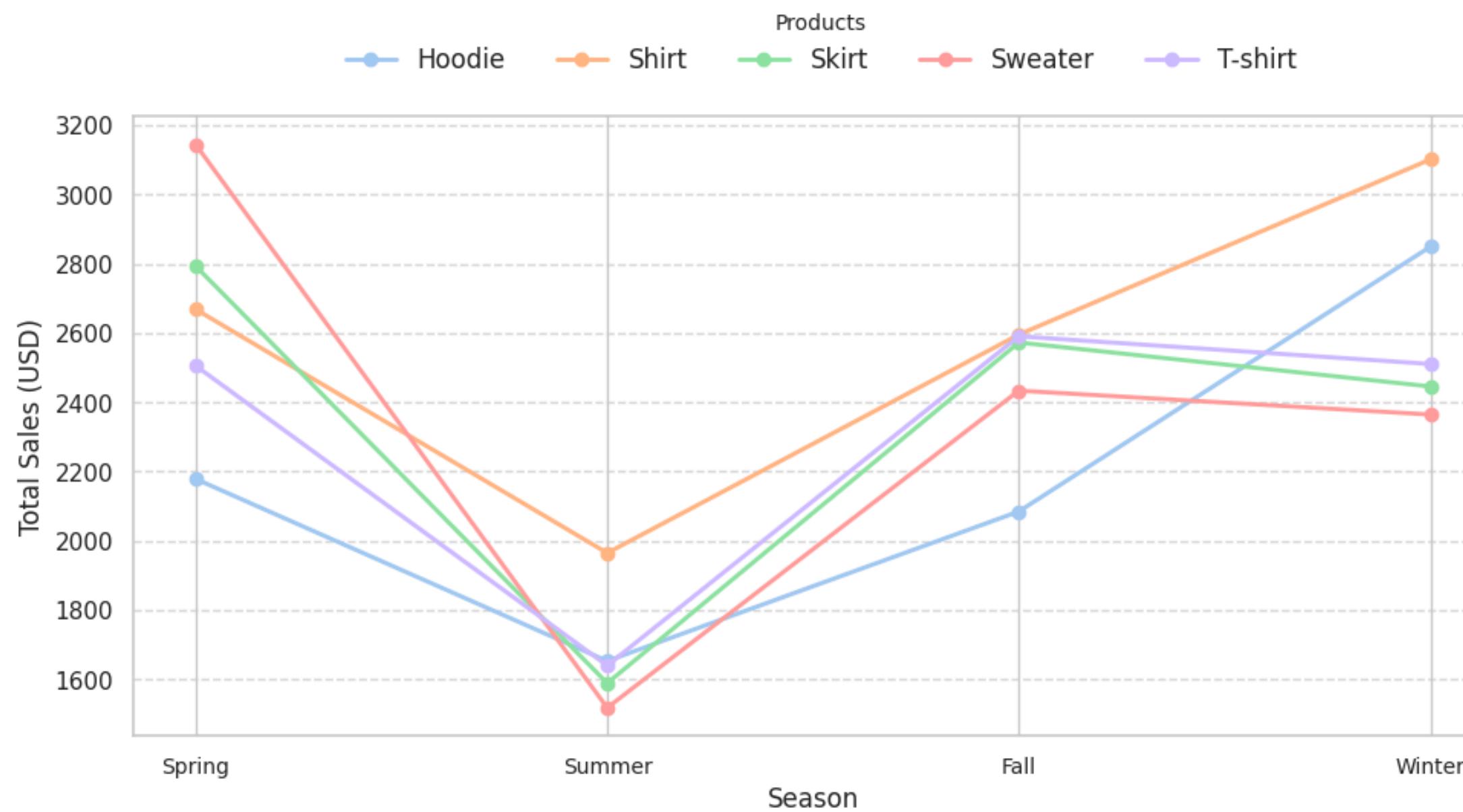
By Product Category

[Back to Agenda](#)



Products with Lowest Sales in Summer

Clothing Category



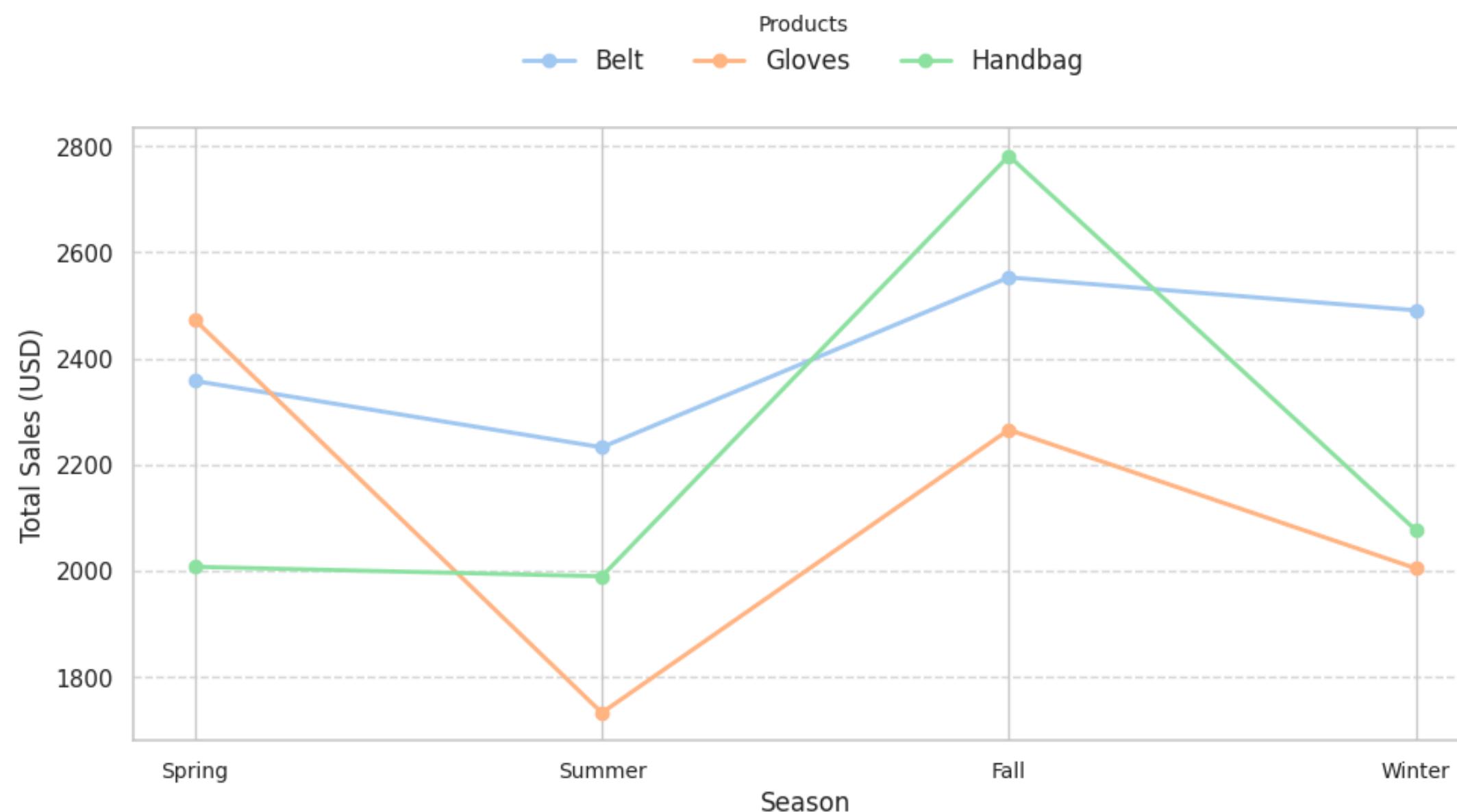
These products saw a
sharp summer sales drop:

- Sweater: -42.6%
- Shirt: -38.9%
- T-shirt: -35.3%
- Hoodie: -30.2%
- Skirt: -29.5%

Summer Change Percentage = $(\text{Summer Sales} - \text{Average of Other Seasons}) / \text{Average of Other Seasons} \times 100$

Products with Lowest Sales in Summer

Accessories Category



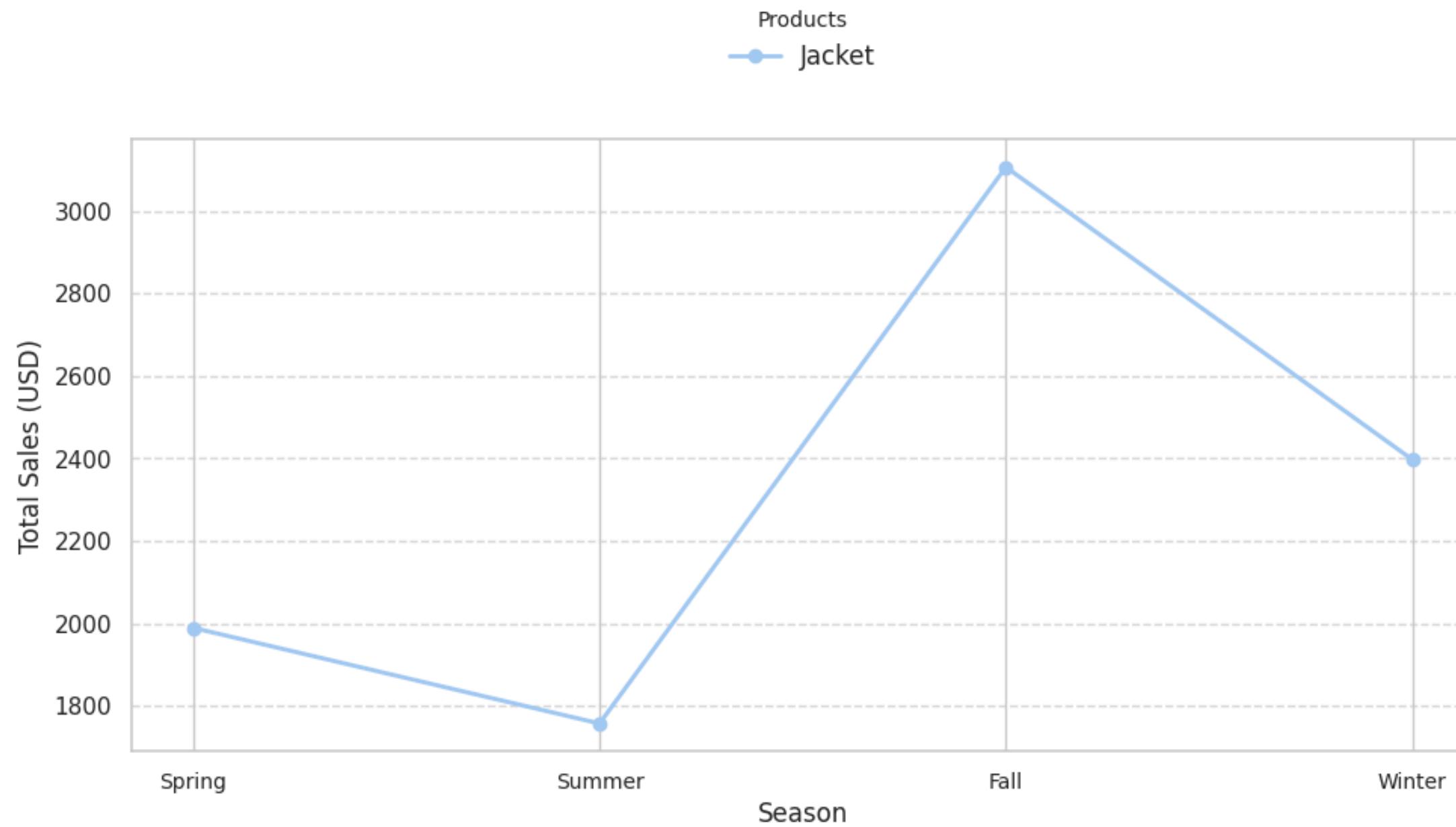
These products saw a
sharp summer sales drop:

- Gloves -22.9%
- Handbag -13.06%
- Belt -9.4%

Summer Change Percentage=(Summer Sales-Average of Other Seasons/Average of Other Seasons)×100

Products with Lowest Sales in Summer

Outerwear Category



These products saw a
sharp summer sales drop:

- Jacket -29.6%

Summer Change Percentage=(Summer Sales-Average of Other Seasons/Average of Other Seasons)×100

Key Findings

1. Summer-Related Products:

- T-shirt (-35.3%), Shirt (-38.9%), Skirt (-29.5%):
 - These items saw sharp drops, possibly due to changing trends or a shift toward more casual, lightweight options in summer.

2. Winter-Related Products:

- Sweater (-42.6%), Hoodie (-30.2%), Jacket (-29.6%), Gloves (-22.9%):
 - Heavy layers saw significant declines, reflecting reduced demand for warm clothing in the hotter months.
- Handbag (-13.06%), Belt (-9.4%):
 - These accessories are less season-dependent, and their drops could be attributed to changing fashion trends or consumer spending shifts.



Analyzing the Summer Sales Dip 2024

Customer Segmentation

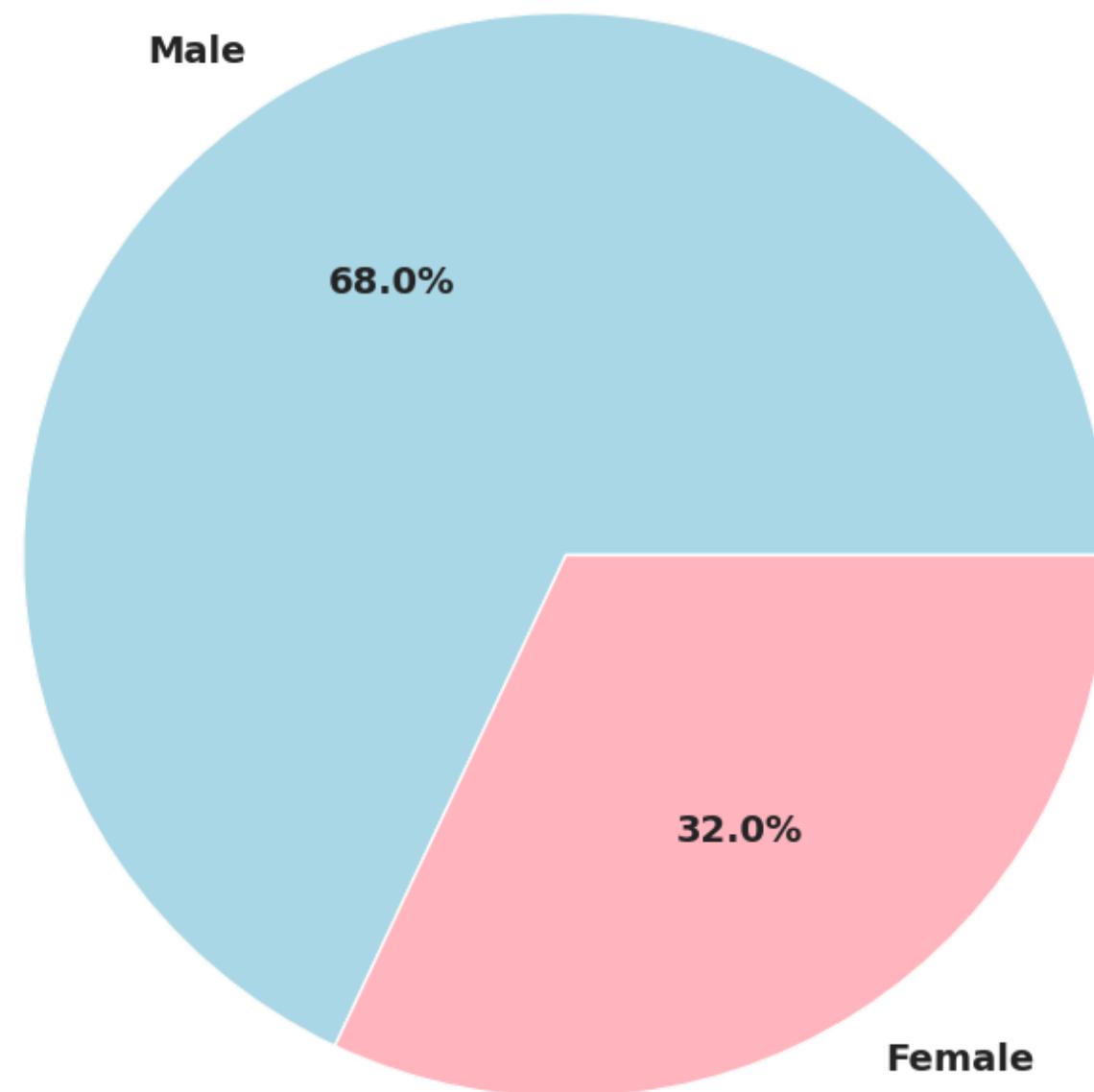
By Age-Gender Group

[Back to Agenda](#)

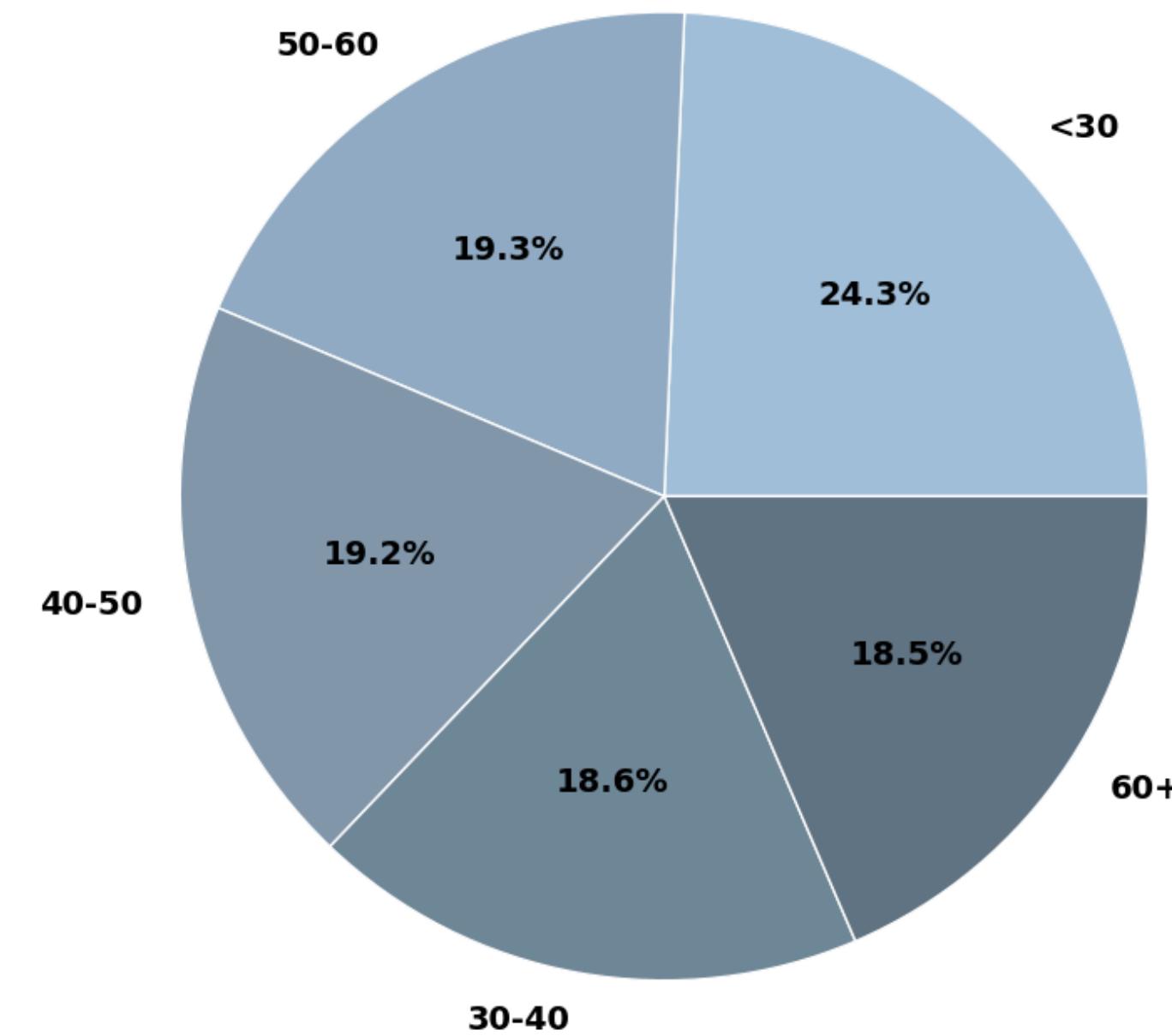


Gender & Age Distribution of Total Sales

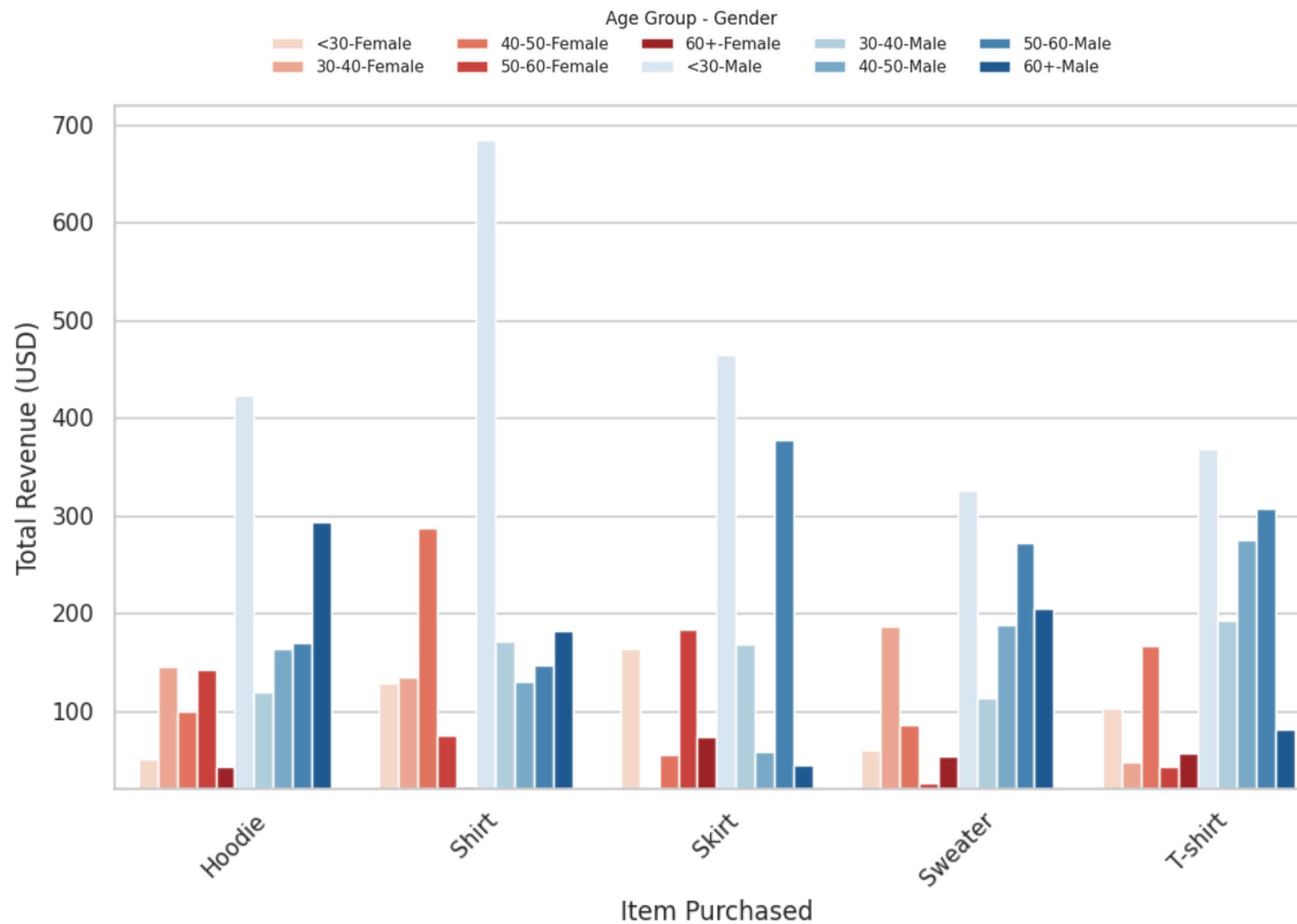
Gender Distribution



Age Distribution by Group

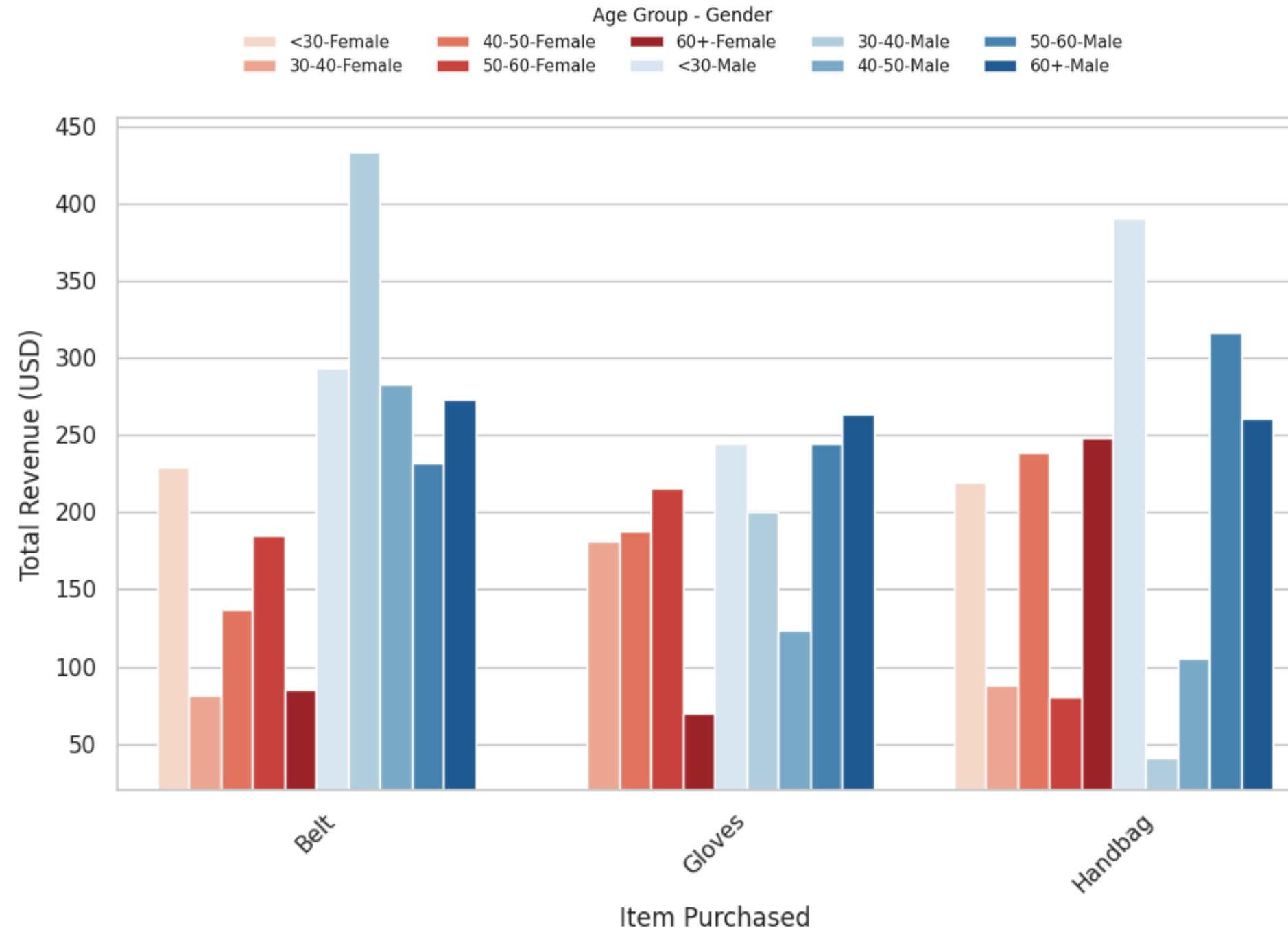


Clothing Sales in Summer



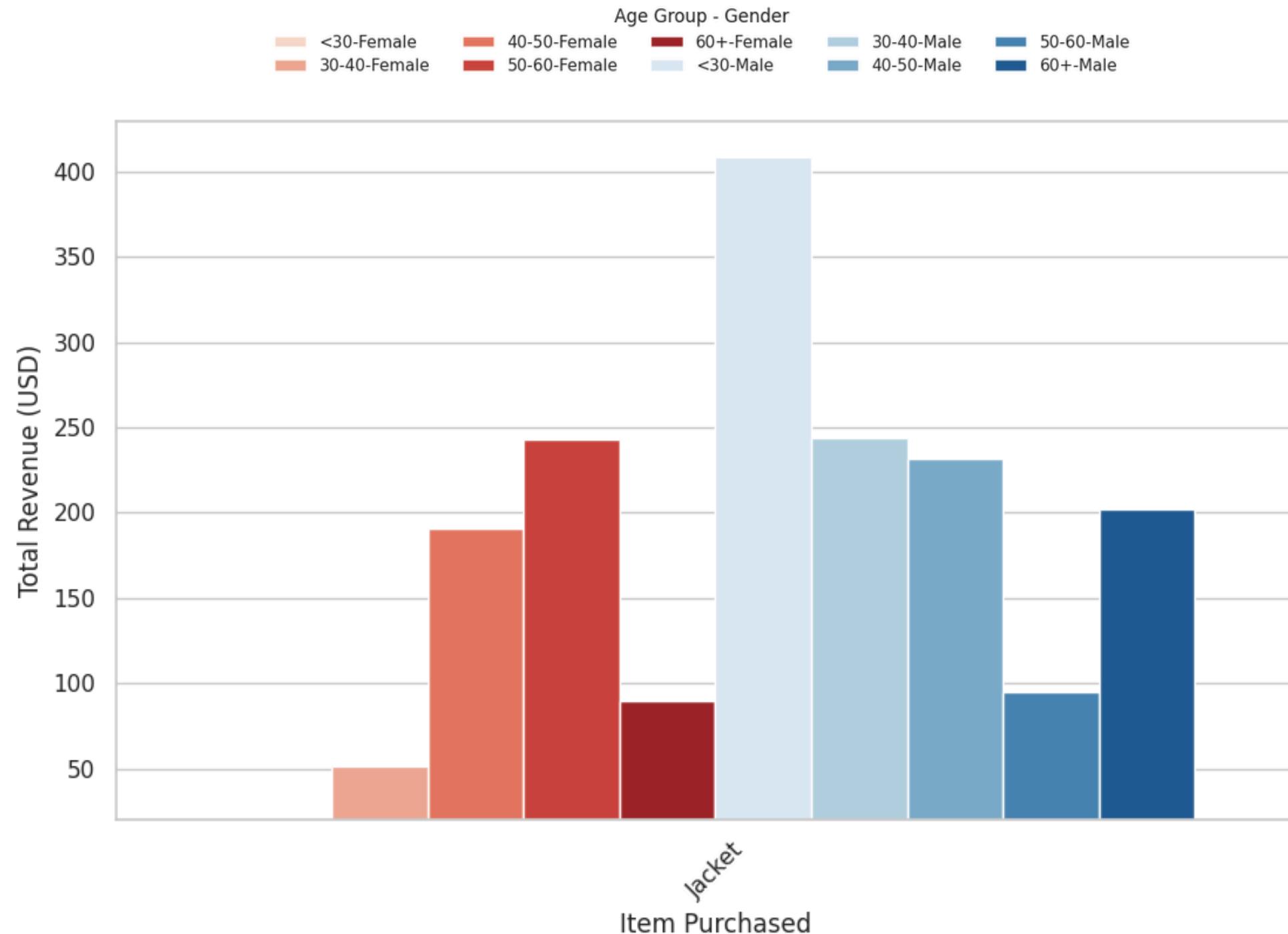
- **Hoodie:**
 - Most popular for >30 male
 - Least popular for >30 female and 60+ female.
- **Shirt:**
 - Most popular for >30 male
 - No sales for 60+ female.
- **Skirt:**
 - Most popular for >30 male and 50-60 male
 - No sales for 30-40 female.
- **Sweater:**
 - Popular for >30 male and 50-60 male
 - Lowest sales for 50-60+ female.
- **T-shirt:**
 - Generally popular for male under 60
 - Least popular for female.

Accessories Sales in Summer



- **Belt:**
 - Most popular for 30-40 male
 - Least popular for 30-40 & 60+ female
- **Gloves:**
 - Most popular for 60+ male, >30 and 50-60 male close behind
 - Least popular for 60+ female; no sales for <30 female
- **Handbag:**
 - Popular for >30 male and 50-60+ male
 - Lowest sales for 30-40 male

Outerwear Sales in Summer



- **Jacket:**
- Most popular for >30 male
- Least popular for >30 female(no sales) and 30-40 female

Key Findings

Male Preference Across Categories:

- Most products show a clear preference for males below 30,
 - especially in categories like hoodies, shirt, skirts, sweater, and jackets.
 - It suggests that men, particularly those 30 and younger, are the primary buyers for a majority of these products.
- There's also a general lack of sales for younger females in many categories,
 - such as hoodie, sweater, and jackets, which points to a potential misalignment in the design or marketing for this group.

Key Findings

Older Demographics:

- Older males (50-60+, especially 60+) show strong interest in items like
 - gloves
 - handbags
 - sweaters
- While older females (50-60+) seem less engaged in certain products like
 - sweaters
 - gloves

which could indicate a preference for more practical or specific items rather than fashion-forward accessories.

This suggests a need for more comfort-oriented or age-appropriate designs for older females.



Analyzing the Summer Sales Dip 2024

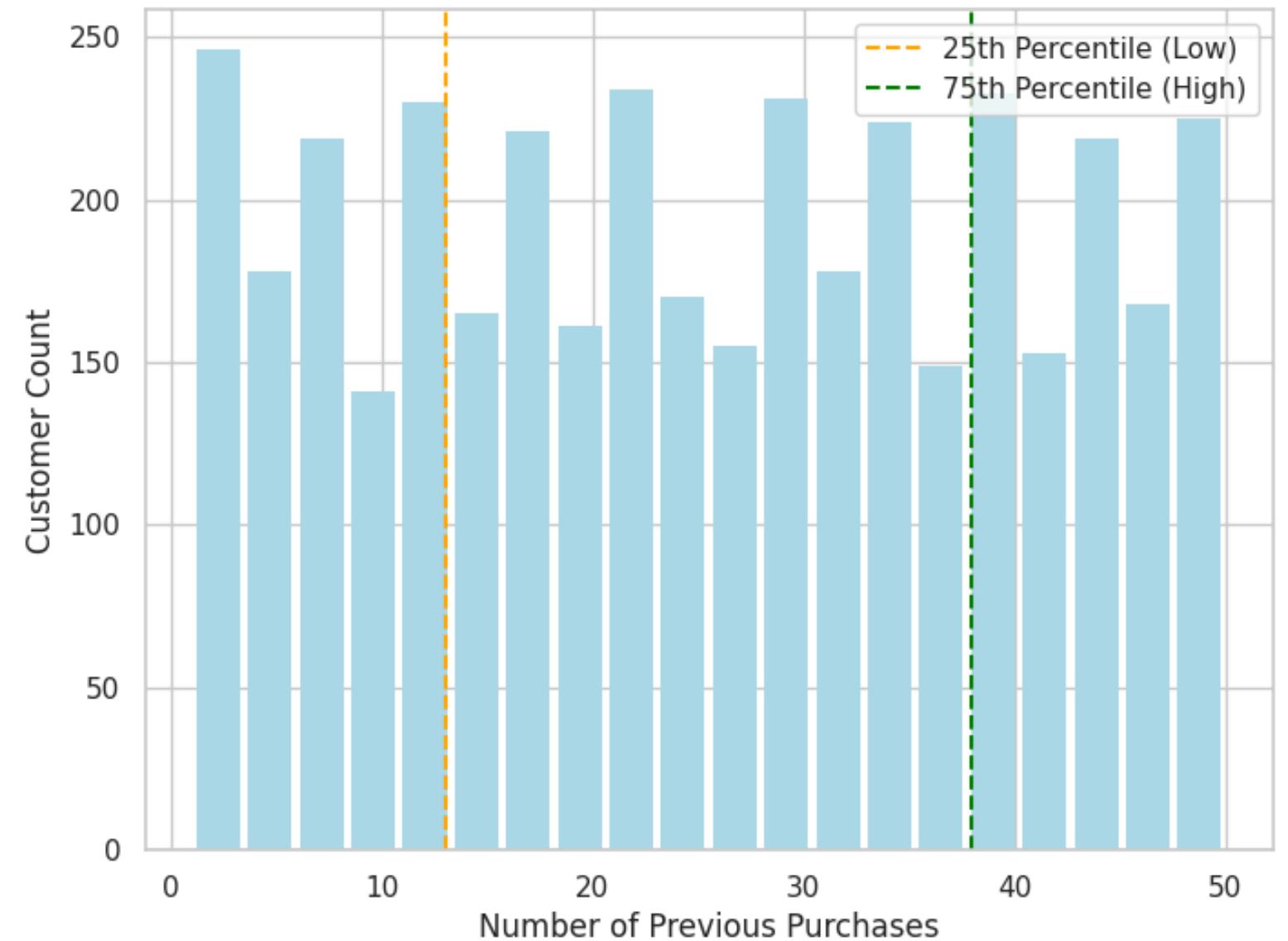
Customer Segmentation

By Repurchases Group

[Back to Agenda](#)



Repurchase Group Segmentation



Customer are divided into 3 groups
based on their number of previous purchases:

Low Repurchase



Fewer than 13 purchases
(below the 25th percentile)

Medium Repurchase



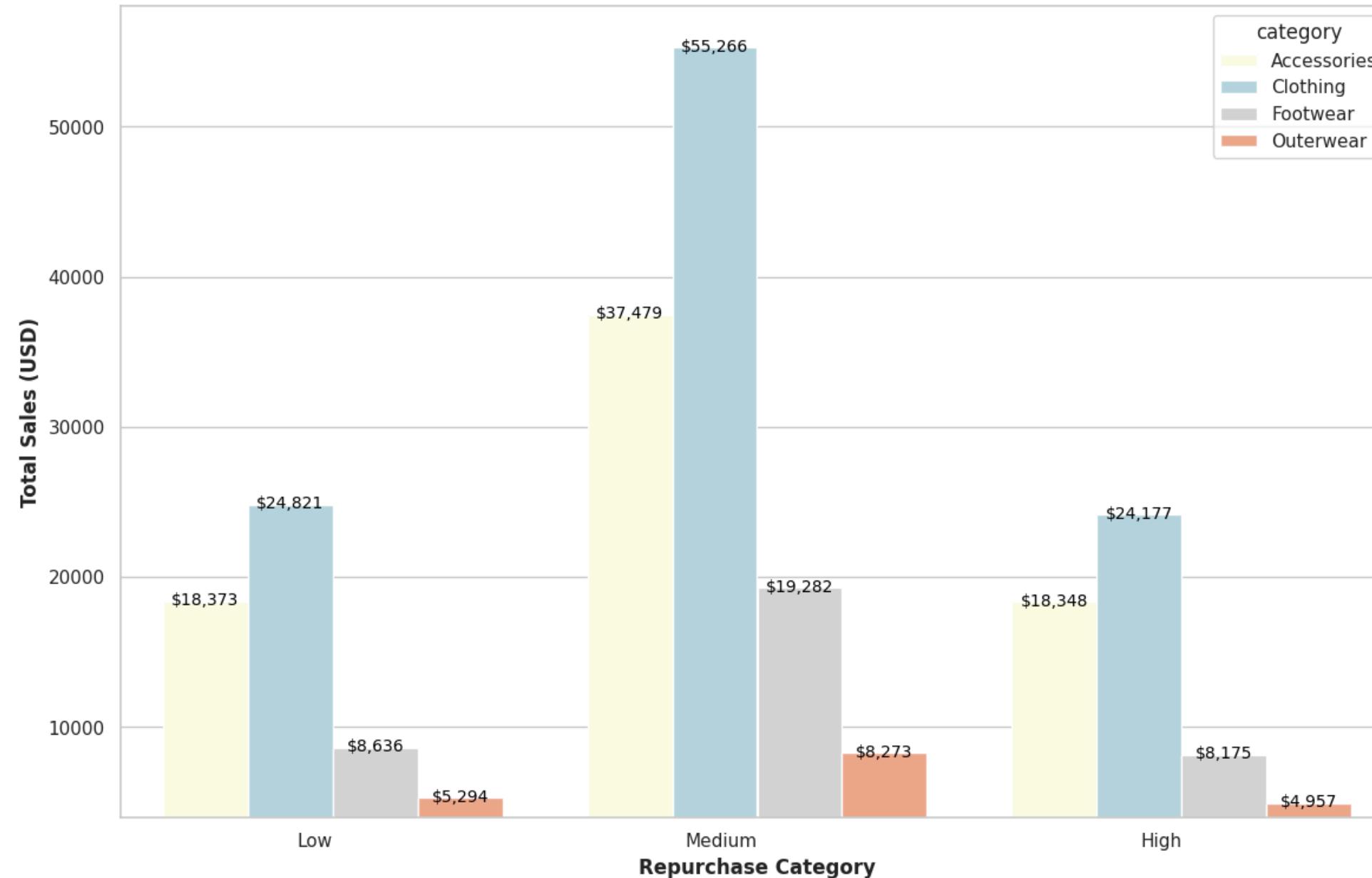
Between 13 - 38 purchases
(25th to 75th percentile)

High Repurchase



More than 38 purchases
(above the 75th percentile)

Total Revenue 2024



Total: \$57,124
Average: \$60.44

Total: \$120,300
Average: \$59.34

Total: \$55,657
Average: \$59.97

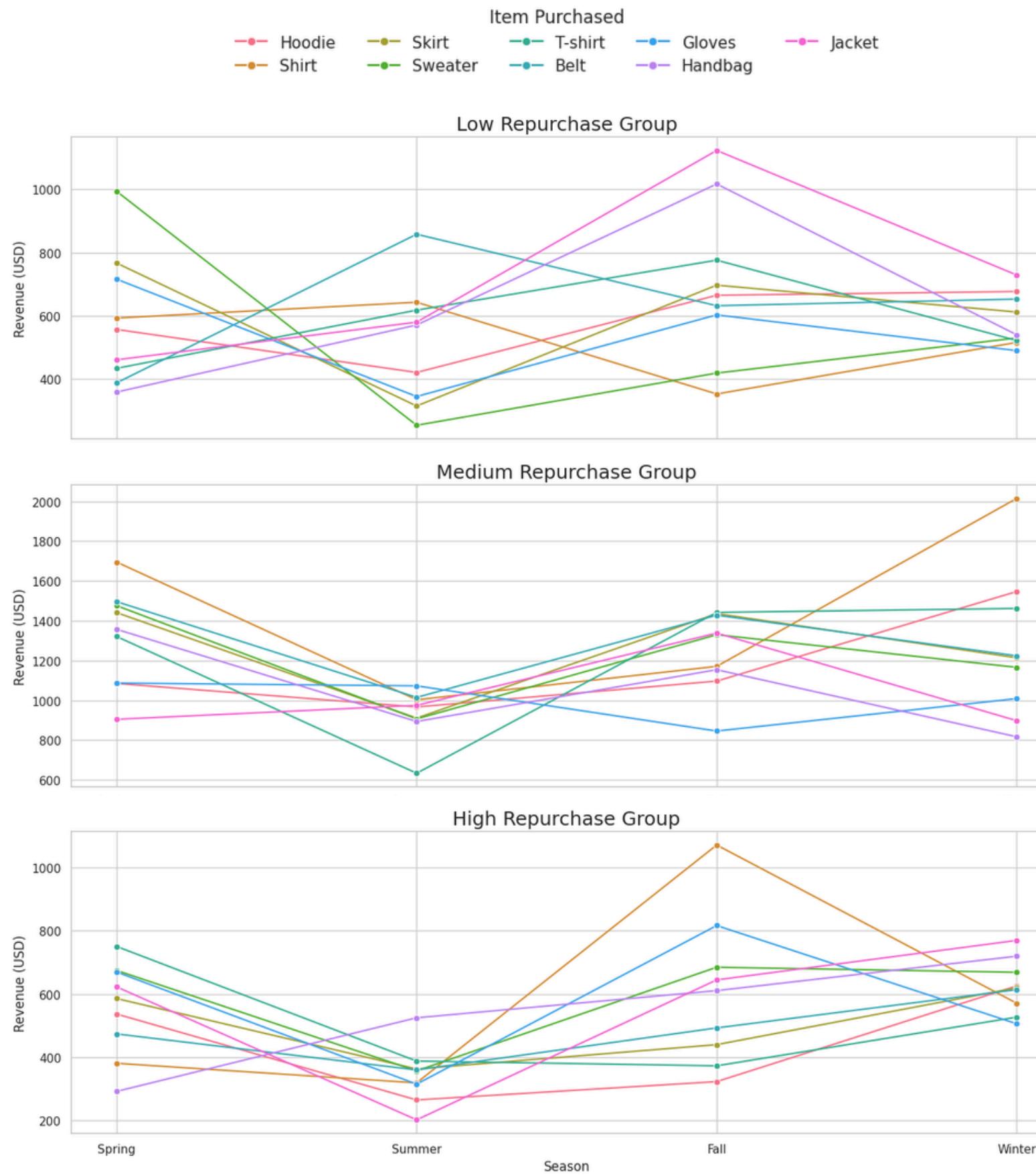
Medium Repurchase Category Dominates

Medium repurchase customers contributed significantly to total sales, with a total of \$120,300, more than double that of High and Low categories.

Balanced Sales in High and Low Groups

High and Low repurchase categories have comparable total sales (~\$55,000), indicating similar retention or acquisition patterns.

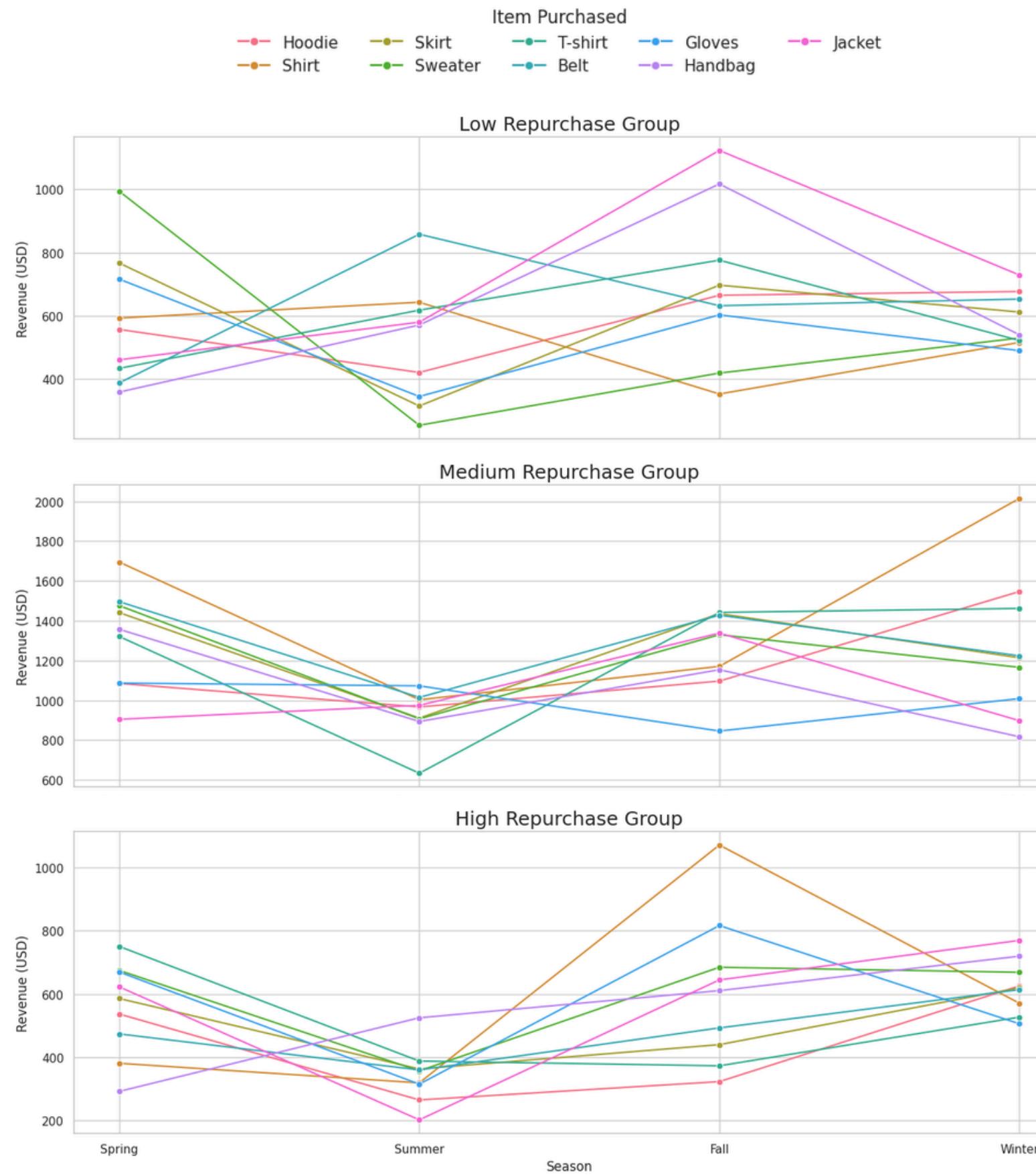
Seasonal Trends



Low Repurchase Customers:

- Less pronounced seasonal pattern compared to the High Repurchase Group.
- Revenue for items like Jackets and Handbags spikes during Fall, likely driven by colder weather and pre-holiday shopping.
- Summer sees an uptick in T-shirts, which aligns with warmer weather and casual wear trends. Spring and Winter maintain relatively stable, moderate sales across categories, with no clear dominance of specific items.

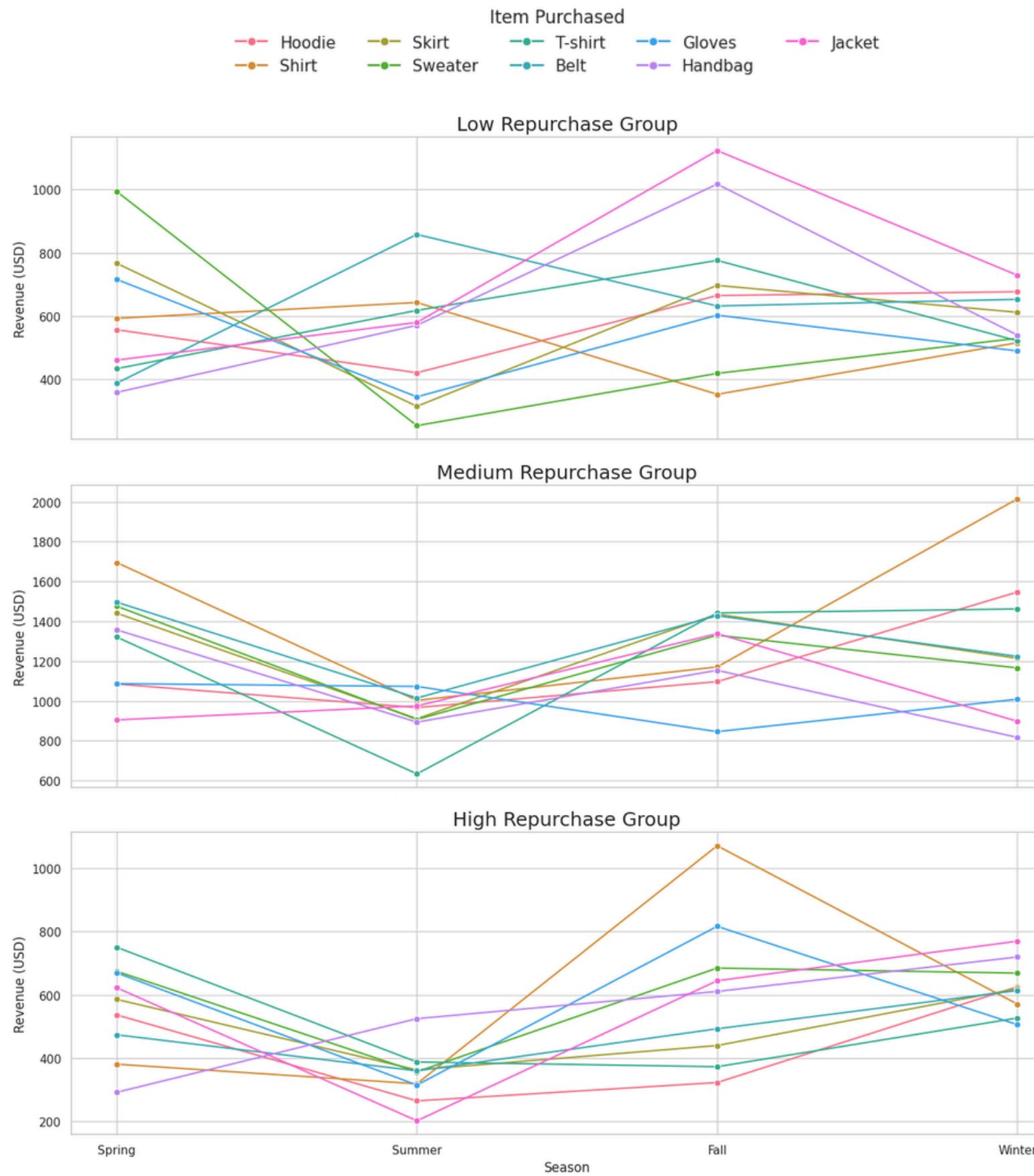
Seasonal Trends



Medium Repurchase Customers:

- This group shows moderate seasonal fluctuations in their purchasing behavior.

Seasonal Trends



High Repurchase Customers:

- It shows strong seasonal trends, with peak revenue in Fall driven by increased demand for items like Shirts and T-shirts, and a recovery in Winter for Jackets and Sweaters due to colder weather and holiday shopping.



Analyzing the Summer Sales Dip 2024

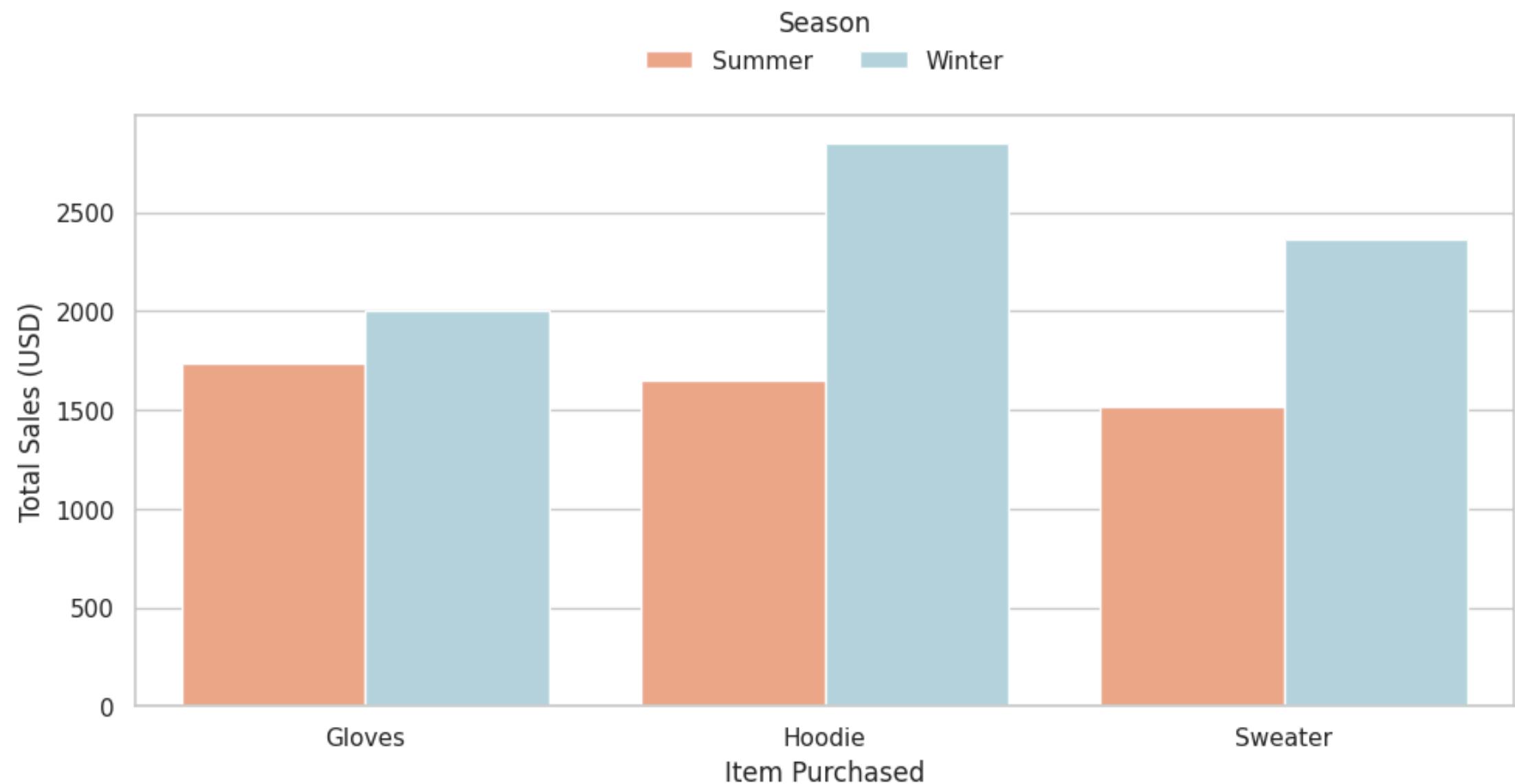
Hypotheses & Validation

[Back to Agenda](#)



Hypotheses 1

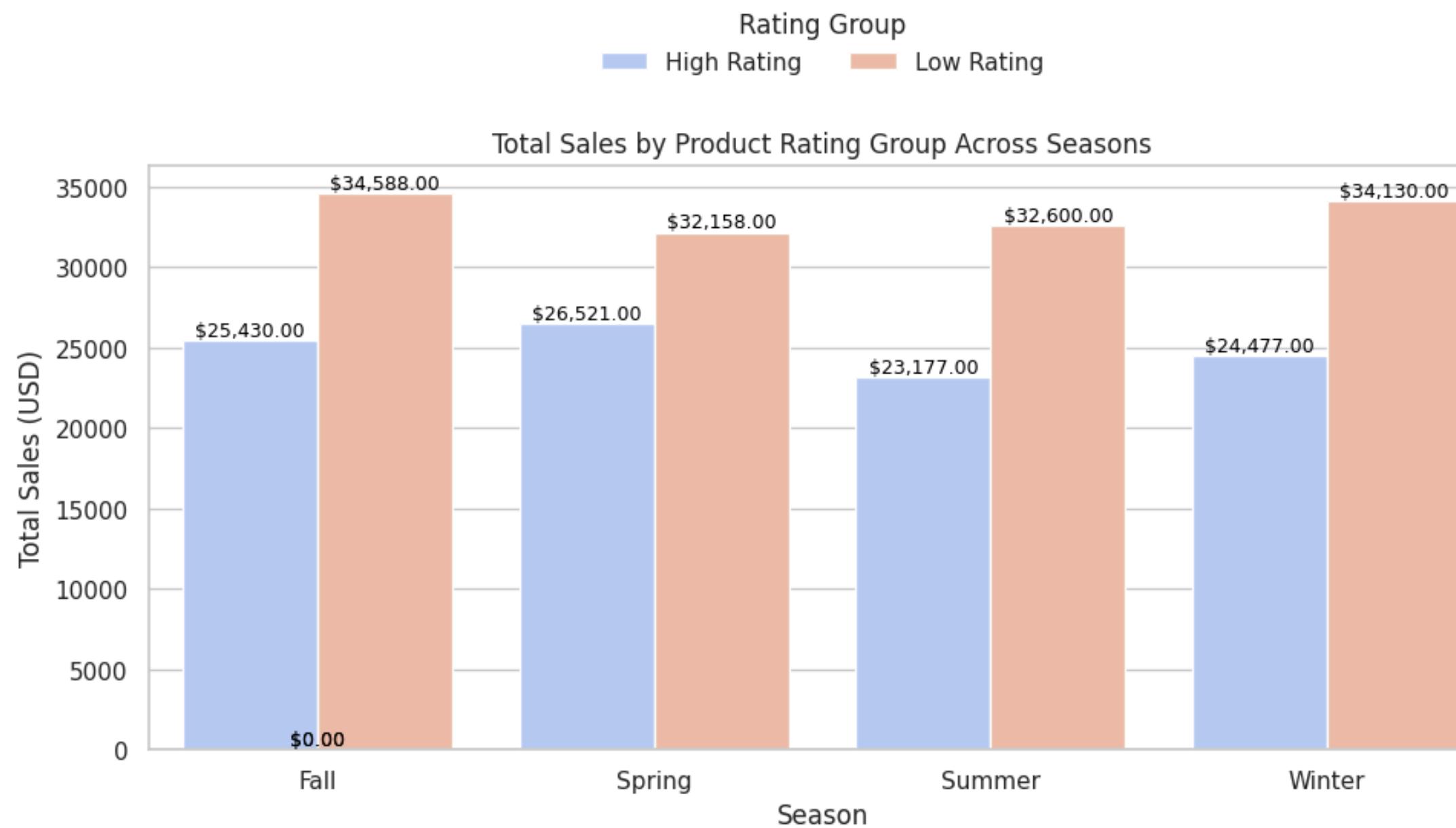
Consumer demand for winter-related products is higher in winter and lower in summer.



- T-Test Result: p-value = 0.0379, indicating a **significant difference** in sales between summer and winter.
- Winter-related products (hoodie, sweater, gloves) have higher sales in winter and lower sales in summer.
- The hypothesis is confirmed—consumer demand for winter-related products is higher in winter and lower in summer.

Hypotheses 2

Products with higher ratings and reviews experience higher sales in the summer compared to those with fewer or no reviews.



- Despite visible differences in total sales, statistical testing (P-value analysis) indicates **no significant difference** between sales for high-rated and low-rated products across any season.

*Rating above 4 is consider as high rating.

Hypotheses 3

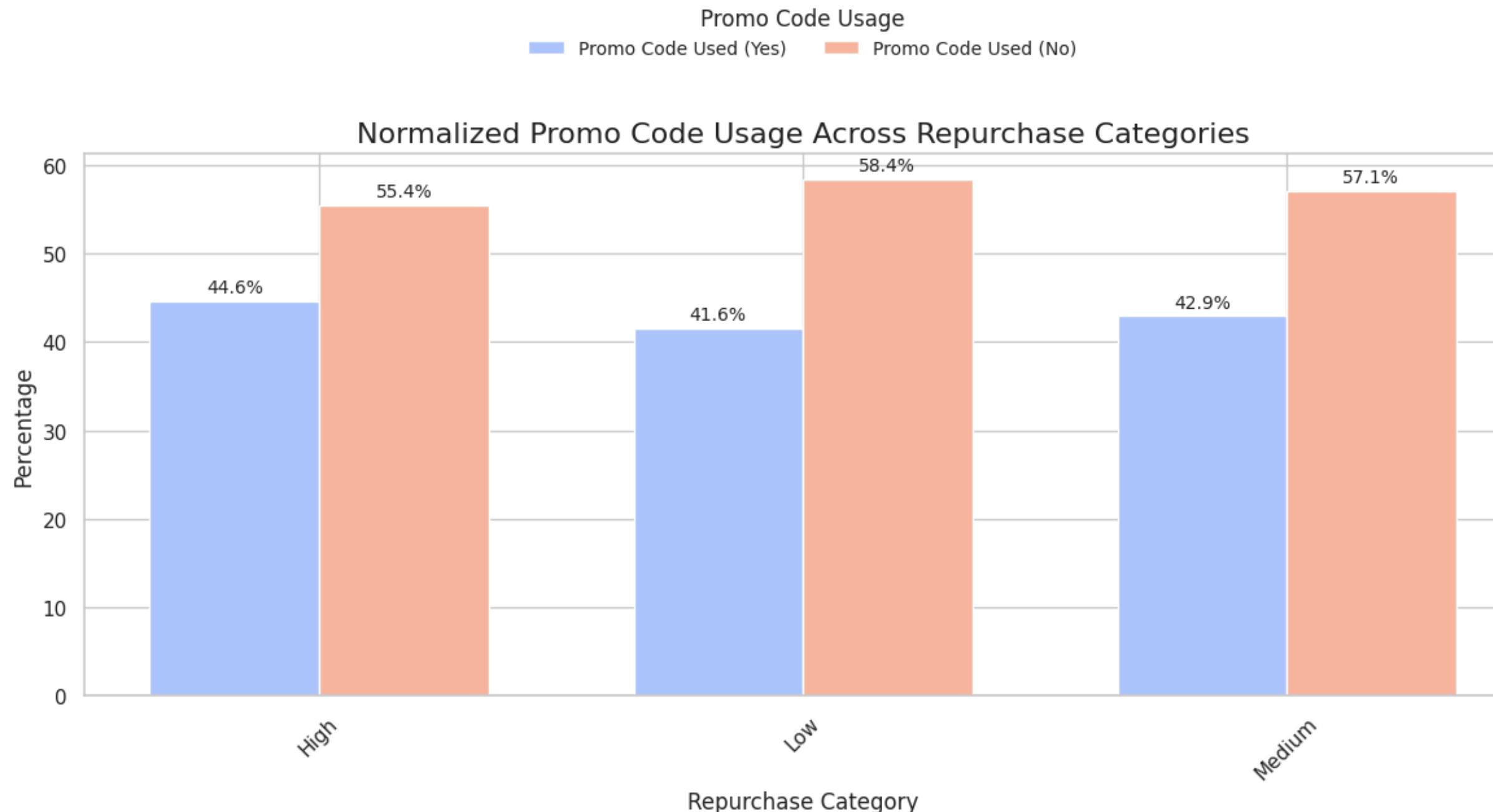
Free shipping offers increase order values in the summer season.



- The t-test results indicate a p-value of 0.191, which is greater than the 0.05 threshold. This means there is **no statistically significant** evidence to support the hypothesis that "Free Shipping" increases order values in the summer.

Hypotheses 4

Low repurchase categories rely more on promotional discounts, while high repurchase categories are less influenced by them.



- The Chi-Squared test shows **no significant relationship** between promo code usage and repurchase category, with a p-value of 0.4151, indicating no strong association.



Analyzing the Summer Sales Dip 2024

Summary

[Back to Agenda](#)



Overview

Product Performance:

- Clothing: Sweaters (-42.6%), shirts (-38.9%), and T-shirts (-35.3%) saw significant summer declines.
- Outerwear: Jackets experienced a -29.6% decrease in summer.
- Accessories: Gloves (-22.9%) and handbags (-13.06%) also showed lower sales in summer.

Note: The summer declines mentioned above are in comparison to the average performance of the other three seasons.

Demographic Insights:

- Males under 30 are the dominant buyers across categories, particularly hoodies, shirts, and jackets.
- Older females (50+) show lower engagement, especially for sweaters and gloves, highlighting a need for targeted designs.

Repurchase Behavior:

- Medium repurchase customers contributed the most to total sales, with over \$120,300 in revenue.
- To improve summer sales, focus on enhancing the appeal of items like T-shirts, which see an uptick during warmer weather, and explore ways to drive demand for accessories and lightweight outerwear.
- For Low Repurchase Customers, consider promoting fall-related items in advance to capture early interest, while for High Repurchase Customers, emphasizing summer essentials could help balance seasonal trends. Additionally, maintaining stable offerings across Spring and Winter will keep engagement consistent year-round.

Overview

Hypothesis Testing Results:

Confirmed: Winter-related products have higher sales in winter than summer.

Rejected: Free shipping, higher product ratings, or promo code usage significantly influencing sales.

Key Observations:

Products designed for summer still underperform during the season, indicating a mismatch between inventory and demand.

Promotional discounts show limited influence on repurchase behaviors.

Further Analysis

Seasonal Product Optimization:

- Conduct a deeper dive into the inventory and design of summer-specific products to better align offerings with seasonal demand.
- Examine competitors' strategies for successful summer product launches.

Demographic-Specific Campaigns:

- Investigate engagement levels and preferences among older female demographics to design age-appropriate or comfort-oriented products.
- Analyze if the current product designs are more suited to men, considering factors like color, cuts, and styles, and determine if a more unisex approach is needed to appeal to a wider audience.
- Develop campaigns targeting males under 30, leveraging their dominant purchasing behavior.

Further Analysis

Customer Loyalty Programs:

- Explore behavioral patterns of high repurchase customers to design effective retention strategies.
- Assess the potential of tailored loyalty programs or exclusive offers to convert low repurchase customers into higher-tier groups.

Shipping and Review Dynamics:

- Revisit the hypothesis on free shipping with a broader dataset, potentially segregating data by order size or delivery zones.
- Study the correlation between product reviews and sales by incorporating review text analysis for sentiment or keyword trends.



Analyzing the Summer Sales Dip 2024

Limitation

[Back to Agenda](#)



Data Limitations

- **Single Product Purchase per Customer:**
 - Each customer in the dataset only purchases a single product, which limits the ability to perform basket analysis or measure repurchase rates. This restriction hinders the understanding of customer buying patterns, such as cross-selling opportunities or customer loyalty.
- **Lack of Product Data:**
 - There is a lack of detailed product data, including inventory levels, product sizes, and other product attributes, making it difficult to assess stock availability, product assortment, or perform in-depth analysis like demand forecasting.
- **Coupon Usage Bias:**
 - The dataset reveals a significant bias in coupon usage, with only male customers redeeming coupons.

[Back to Agenda](#)



Other Hypotheses

Data is insufficient to validate.

1. Lighter clothing typically associated with summer may have low inventory or limited variety, which result in reduced customer attraction.
2. The sales of products like jackets, gloves, and skirts are generally lower among young women because the designs of these products do not align with their preferences or needs.
3. Men below 30 are the main buyers of many products, possibly because the marketing strategy is primarily targeted at this demographic.
4. There is no significant correlation between product ratings and sales, possibly because customers place more importance on product descriptions, images, or reviews.