

Voice of Market (VoM): Unlocking Market Insights from Social Media

Sponsor Name: Costco Wholesale

Team Number: MSDS 25.4



Meet our Team



**Mustafa
Bhavanagarwala**



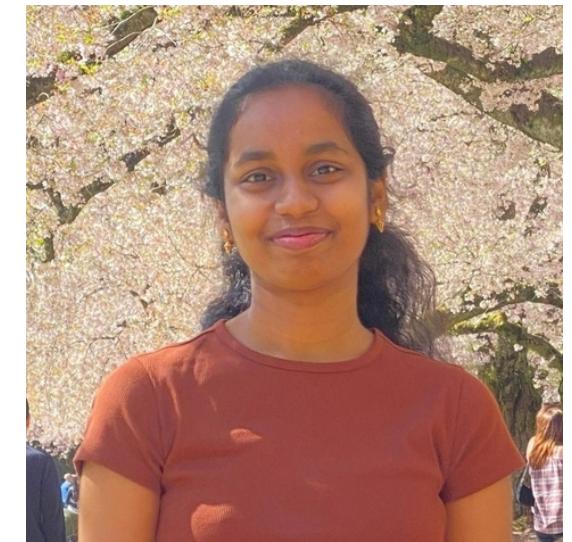
**Hrishikesh Deepak
Dhole**



Lakshit Gupta



Priyal Sunil Joshi



Tejaswi Neelapu

Background

- Serves over **137 million members** across 14+ countries. [1]
- Built on values of **bulk savings, trusted private label (Kirkland)**, and **customer-first service**
- Growing customer engagement on platforms like **Reddit, Instagram, Twitter (X)**
- Digital voice becoming **as important as in-store experience**



1. Statista. (2025, Jan 16th) Costco - Statistics & Facts Retrieved February 20, 2025, from <https://www.statista.com/topics/4399/costco/>

Problem Statement

The Challenge

- Millions of customer comments scattered across social media
- Traditional feedback methods like e-commerce reviews and surveys are slow, outdated, and biased
- No real-time visibility into public sentiment
- Delayed response → lost trust



“What if every customer post could speak directly — and instantly — to Costco?”

Why This Matters for Costco

Strategic Impact

- Real-time insights → smarter decisions
- Spot issues early, protect the brand
- Align products with customer needs
- Unified feedback across teams
- Boost customer satisfaction



“From noise to strategy — every comment becomes a business signal.”

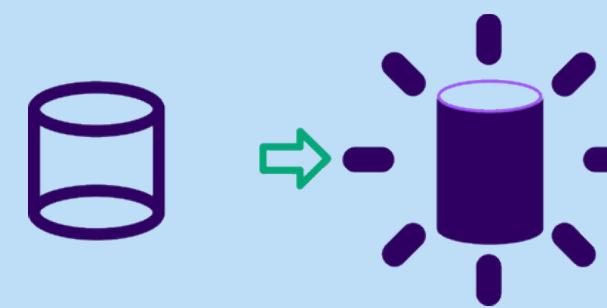
Project Roadmap & Agenda

Data Acquisition and Preparation (4-5 weeks)

Data Cleaning (weeks)



Preprocessing

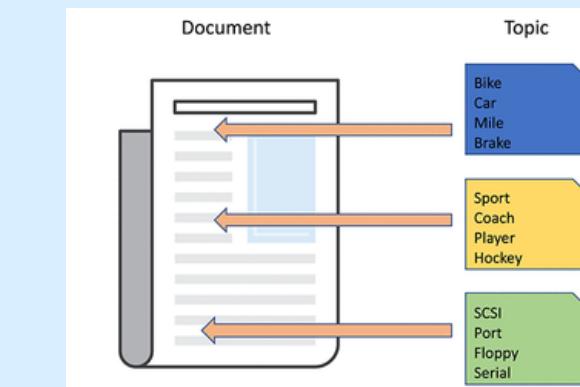


Exploratory Data Analysis

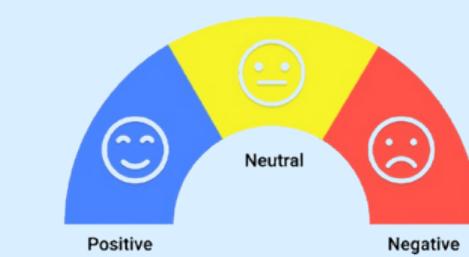


NLP Modeling & Insight Extraction (3-4 weeks)

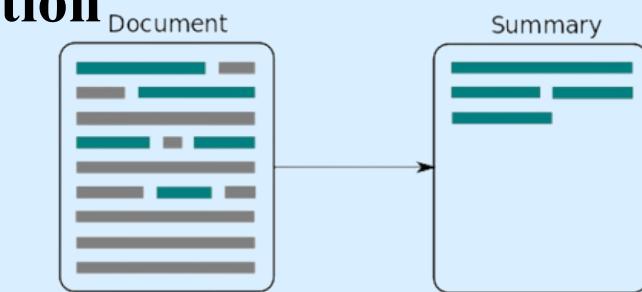
Topic Modeling



Sentiment Analysis



Summarization and Trend Identification

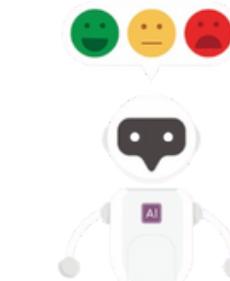


Insight Delivery & Deployment (3-4 weeks)

Visualization & Reporting



Chatbot



Model Deployment



Data Collection

Collection Approach

- Used a hybrid strategy:
 - Web scraping (via BeautifulSoup, Scrapy)
 - Public APIs, where available
- Focused on unstructured, user-generated content



1 – 8 of 252 Reviews

Challenges:

- Platform restrictions
- Data fetch rate limitations
- Inconsistent Data Formats

Web Scrapped Data:

- 400K+ rows

★★★★★

Kirkland salted mixed nuts.

VERIFIED PURCHASER

4 months ago

Nice variety of nuts. Macadamias were larger and more plentiful than in earlier packages. Preferred the plastic jar to the resealable bag.

Yes, I recommend this product.

Helpful? (2) (0) Report

★★★★★

[3]

Helpful vs. Not Helpful Customer Review – Why It Matters?

Not Helpful Review

17w ·  1

Reply

30s ·  The product was okay I guess!
Reply

- Too vague
- Not actionable
- Limited analytical value

Helpful Review

2 · 

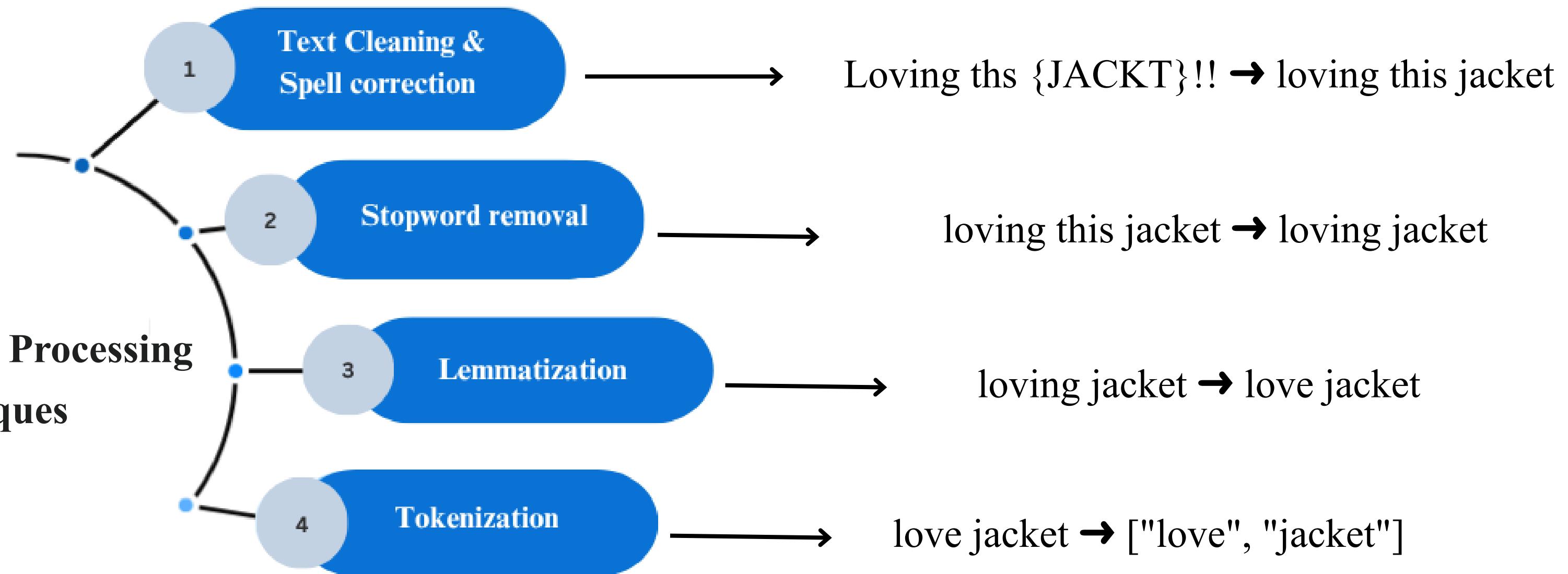
[2]

1w ·  by author
I absolutely love these!! So good for dishes, I also use them for cleaning walls and baseboards!!
 1
Reply
2w · 
Why do these smell no matter how much you try to squeeze the water out? Yet my grandmas green and yellow sponge  still good from 1983
Reply

- Constructive review
- Specific & actionable
- Useful for analysis

Preprocessing

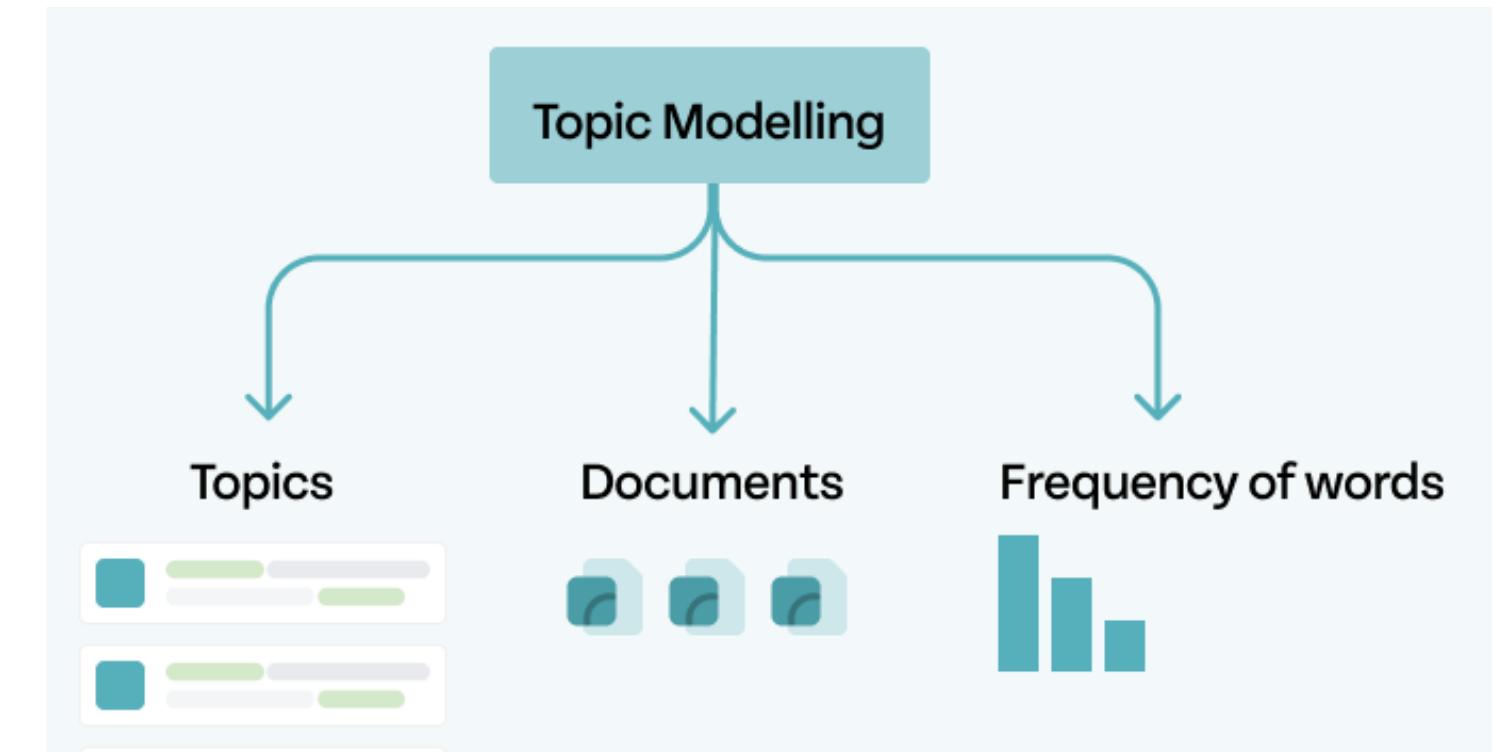
Natural Language Processing Techniques



Methodology

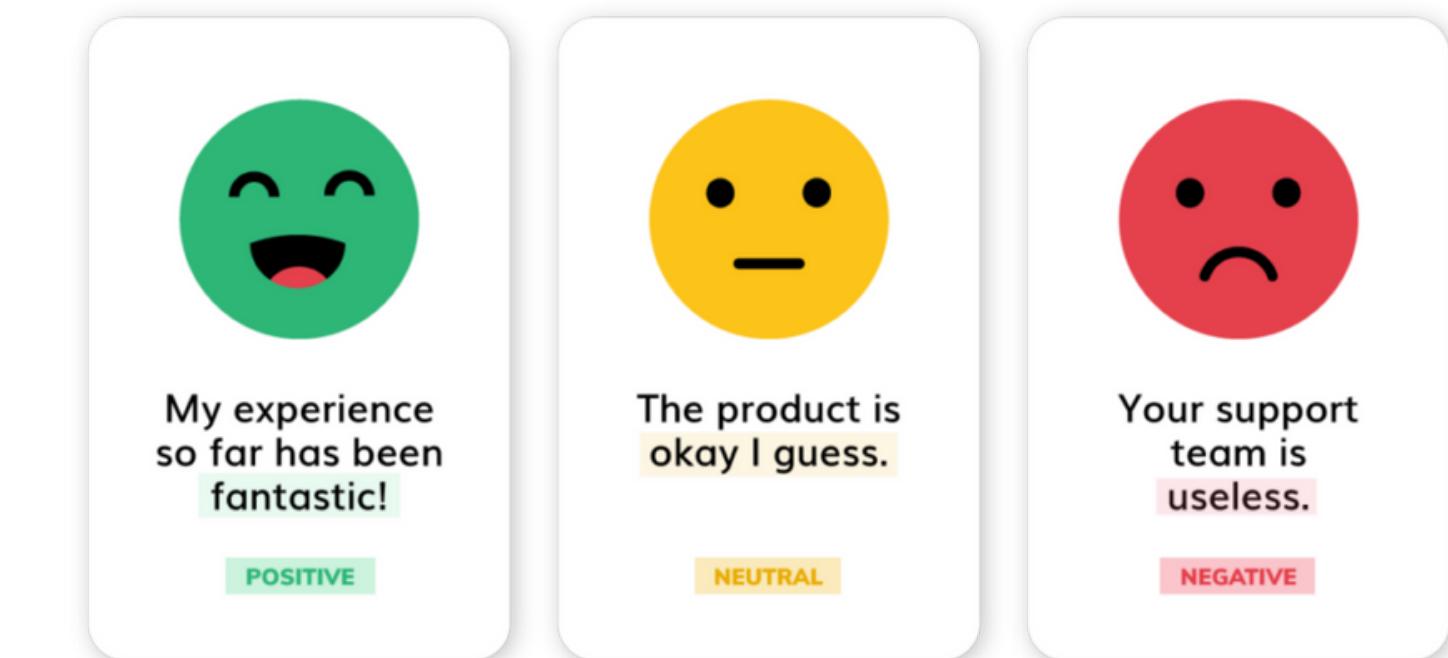
Topic Modeling

- Identify key discussion themes
- LDA & Sentence Transformers
- Categorize reviews effectively



Sentiment Analysis

- Classify: Positive / Negative / Neutral
- VADER → short-form sentiment
- BERT → deep contextual insights
- Ensemble methods for better accuracy



Methodology

AI-Powered Summarization

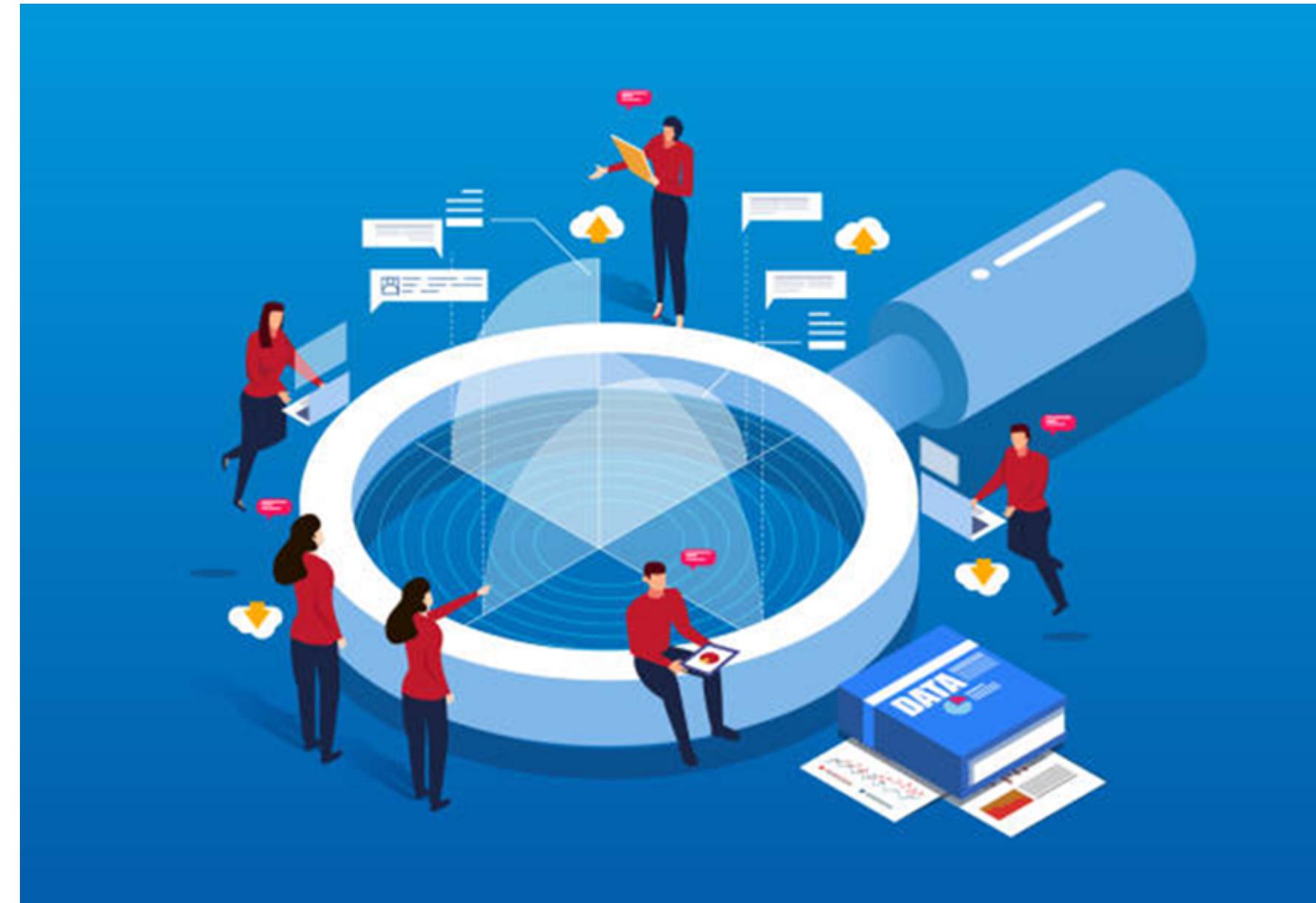
- Extractive & Abstractive methods

Visualization & Reporting

- Power BI dashboard
- AI Powered Chatbot

Compliance & Ethics

- Data Anonymization.



Results

Let's explore results that highlight performance, trends, and impact!

[Overview](#)
[Instagram Insights](#)
[Reddit Insights](#)
[X Insights](#)
[Costco Official Insights](#)
[Other Sources Insights](#)
[Chatbot](#)

Total Number of Posts

61K

Total Number of Comments

404K

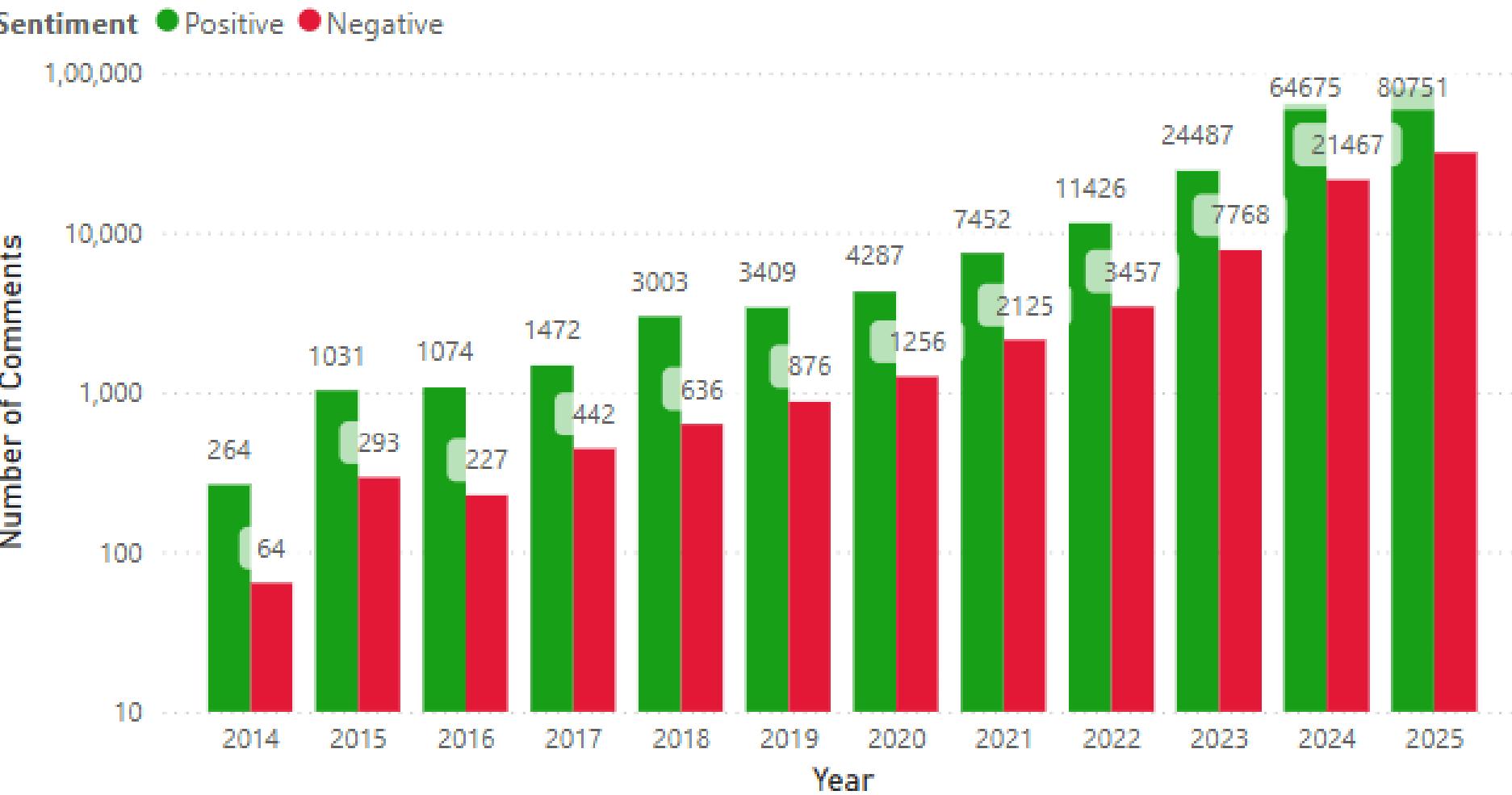
Total Post Likes

4B

Total Comment Likes

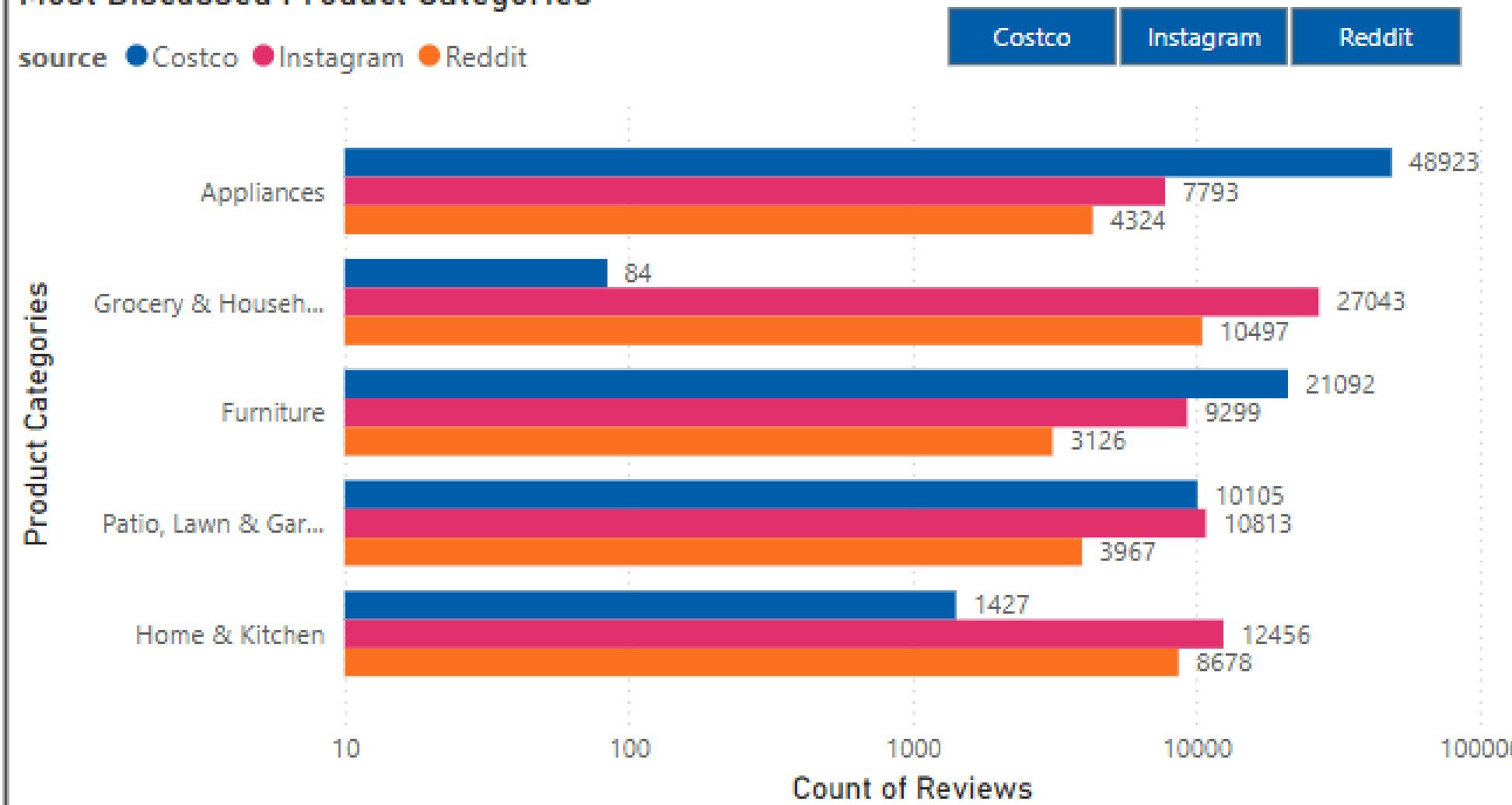
3M

Annual Trends in Sentiments of Costco Customers



Most Discussed Product Categories

source ● Costco ● Instagram ● Reddit



"Explore real-time sentiment trends and customer priorities across platforms, products, and time - all in one unified view"

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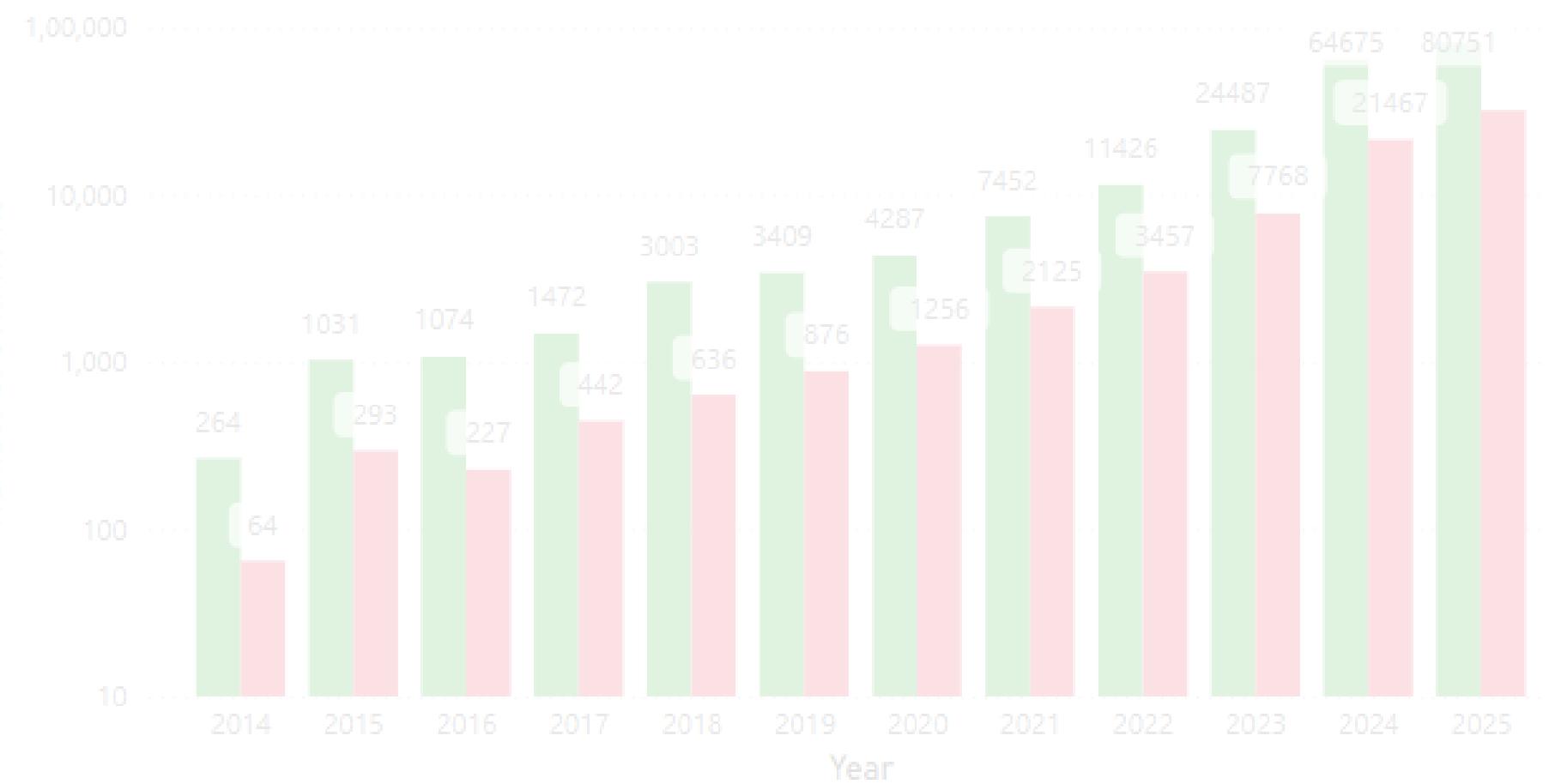
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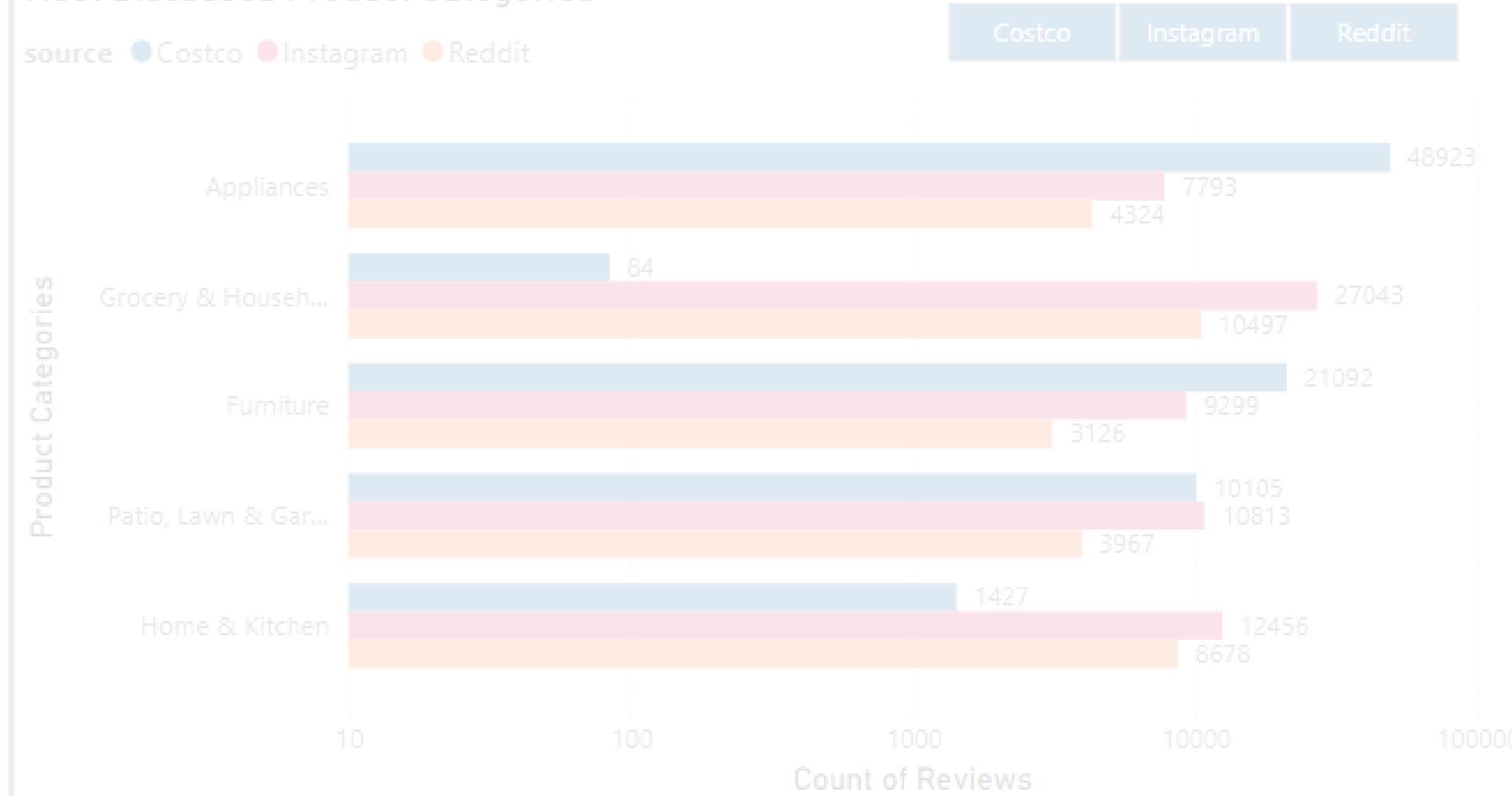
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Sentiment ● Positive ● Negative



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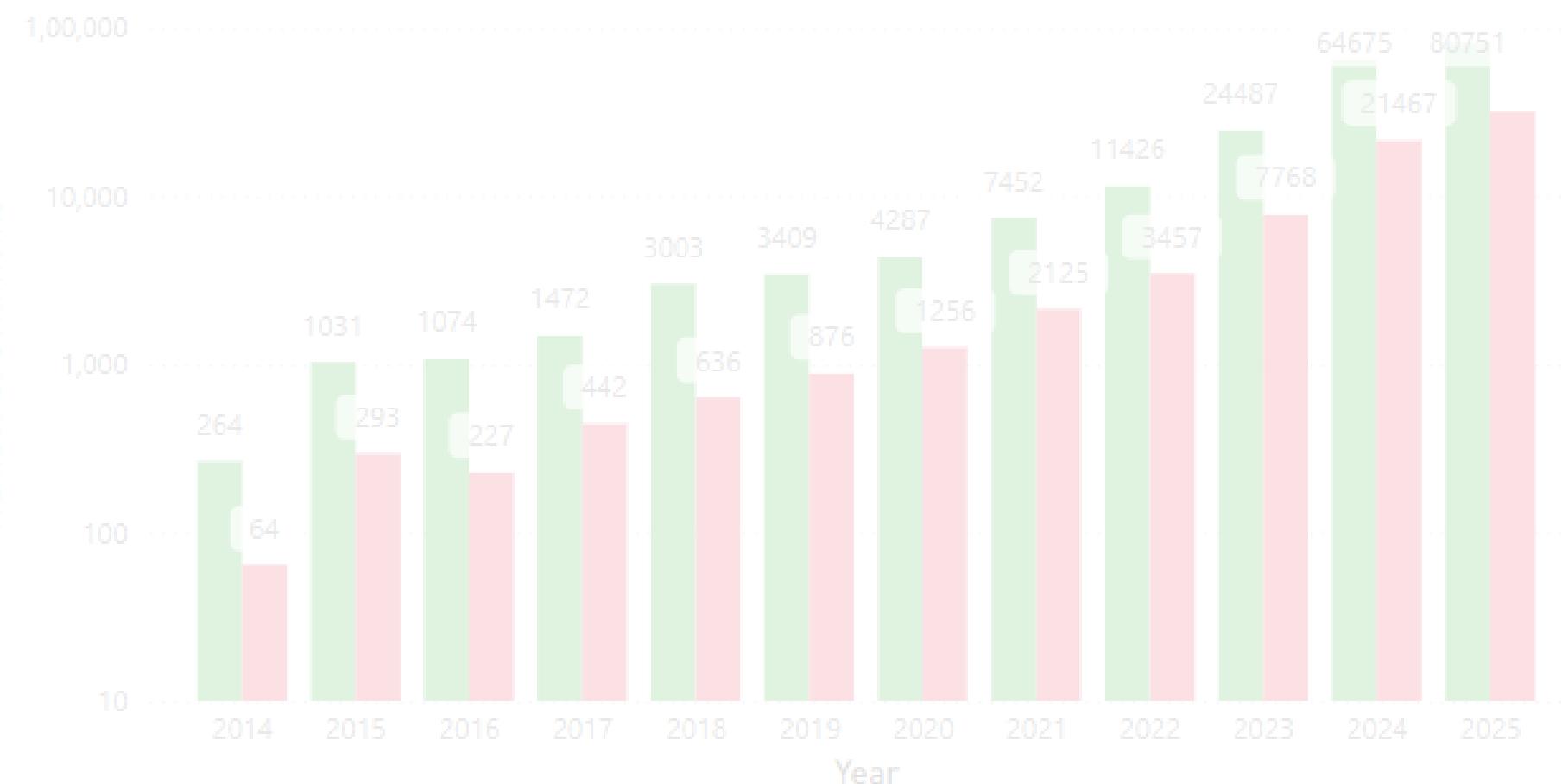
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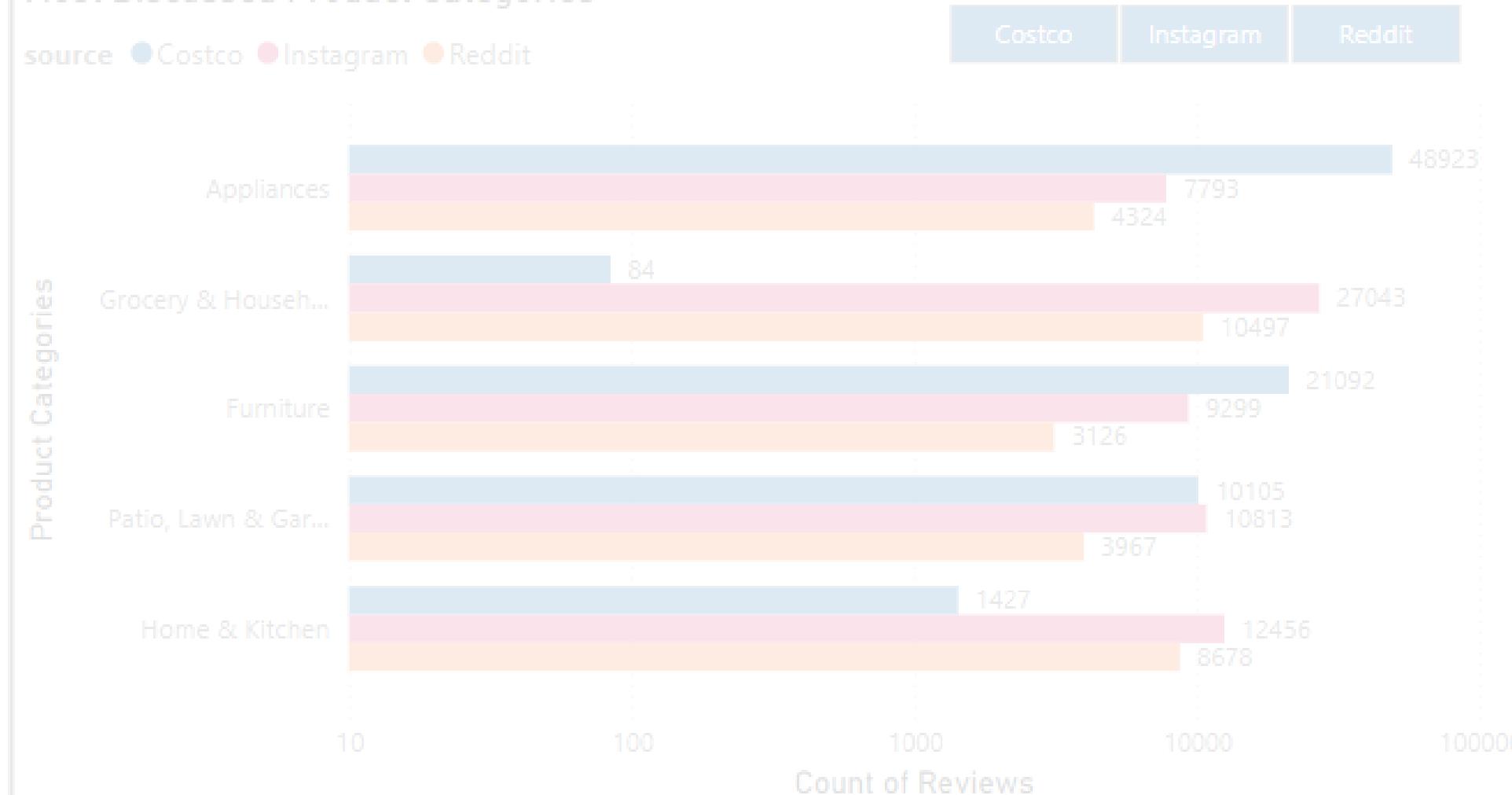
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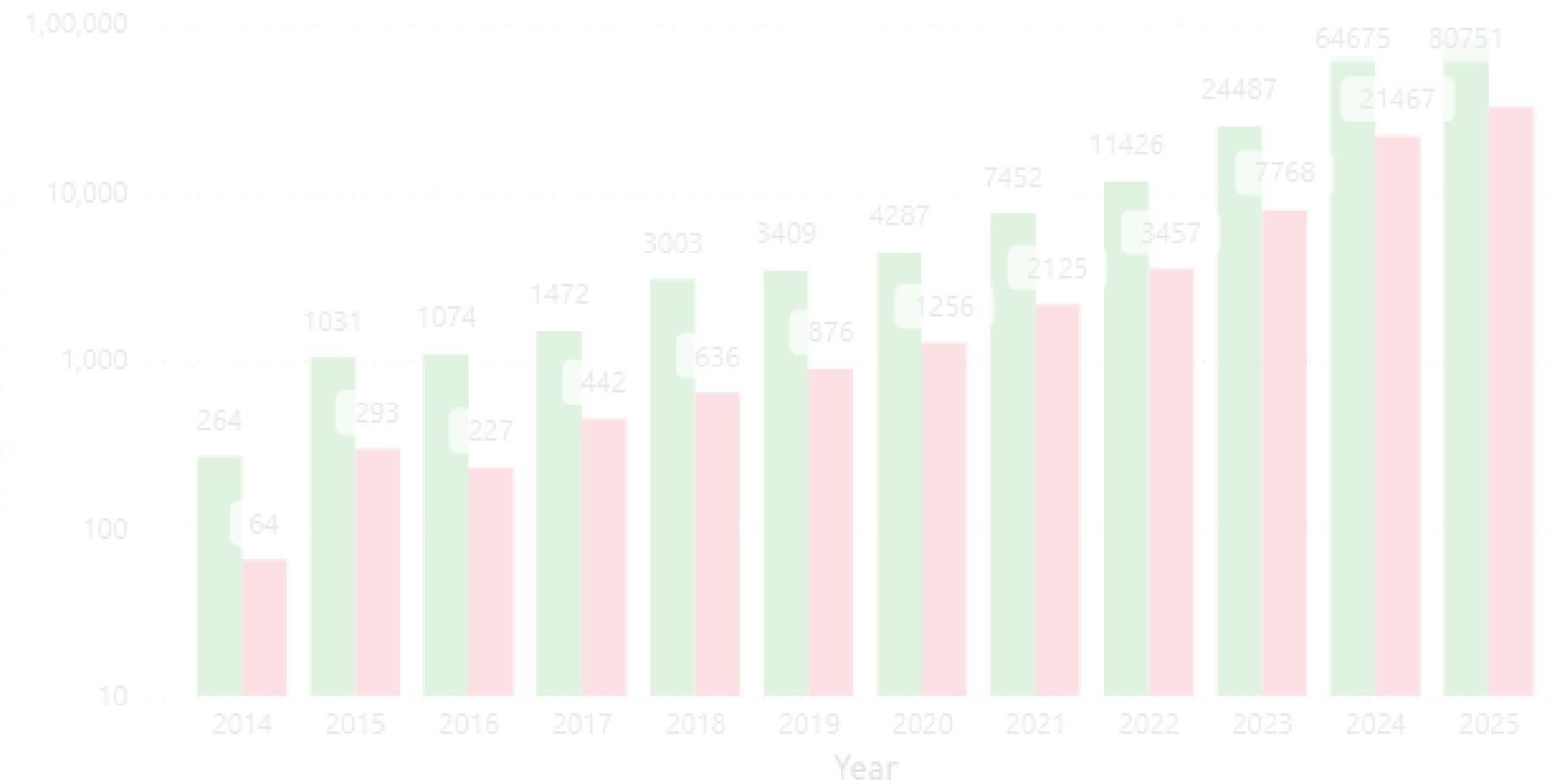
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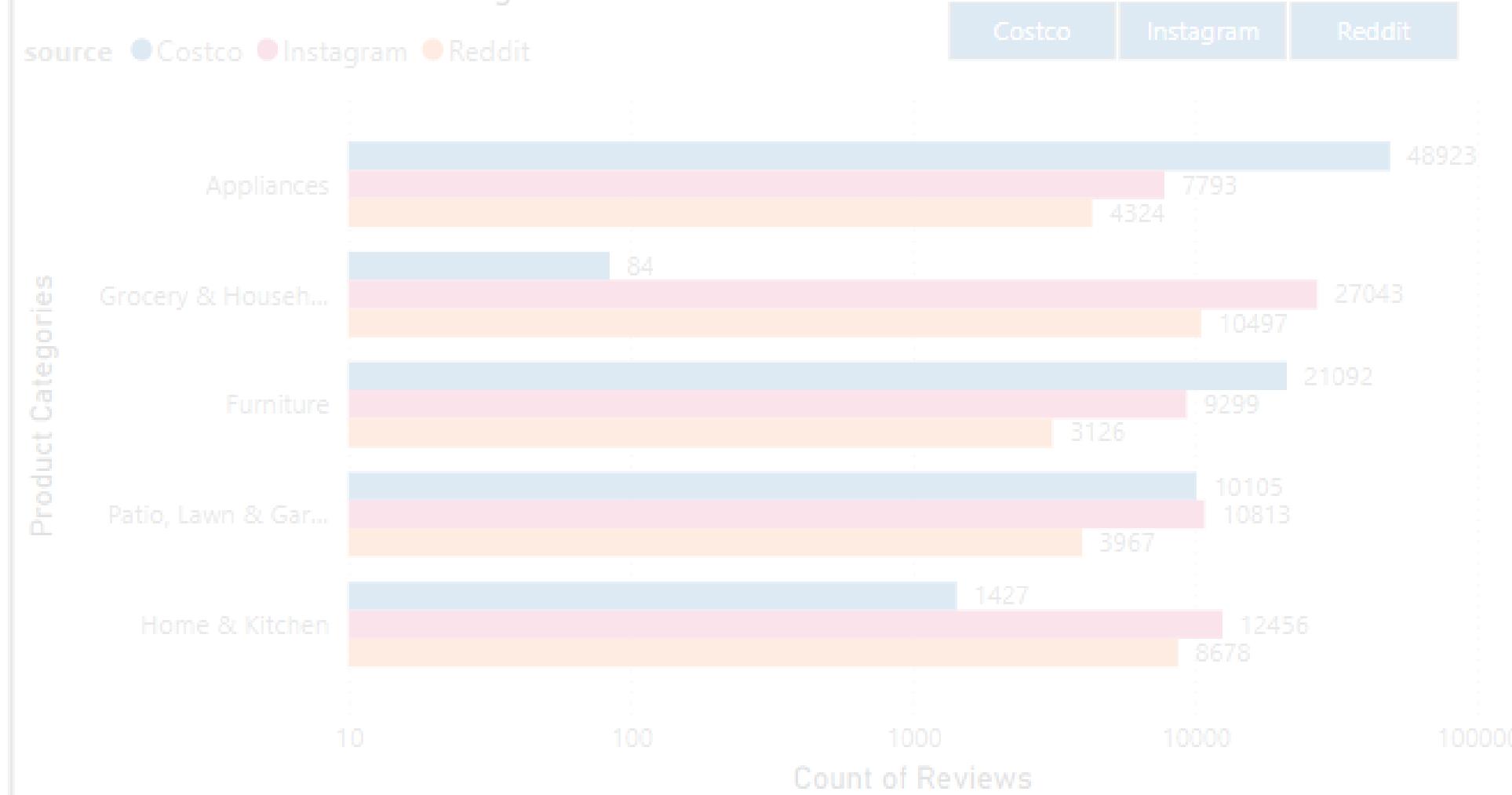
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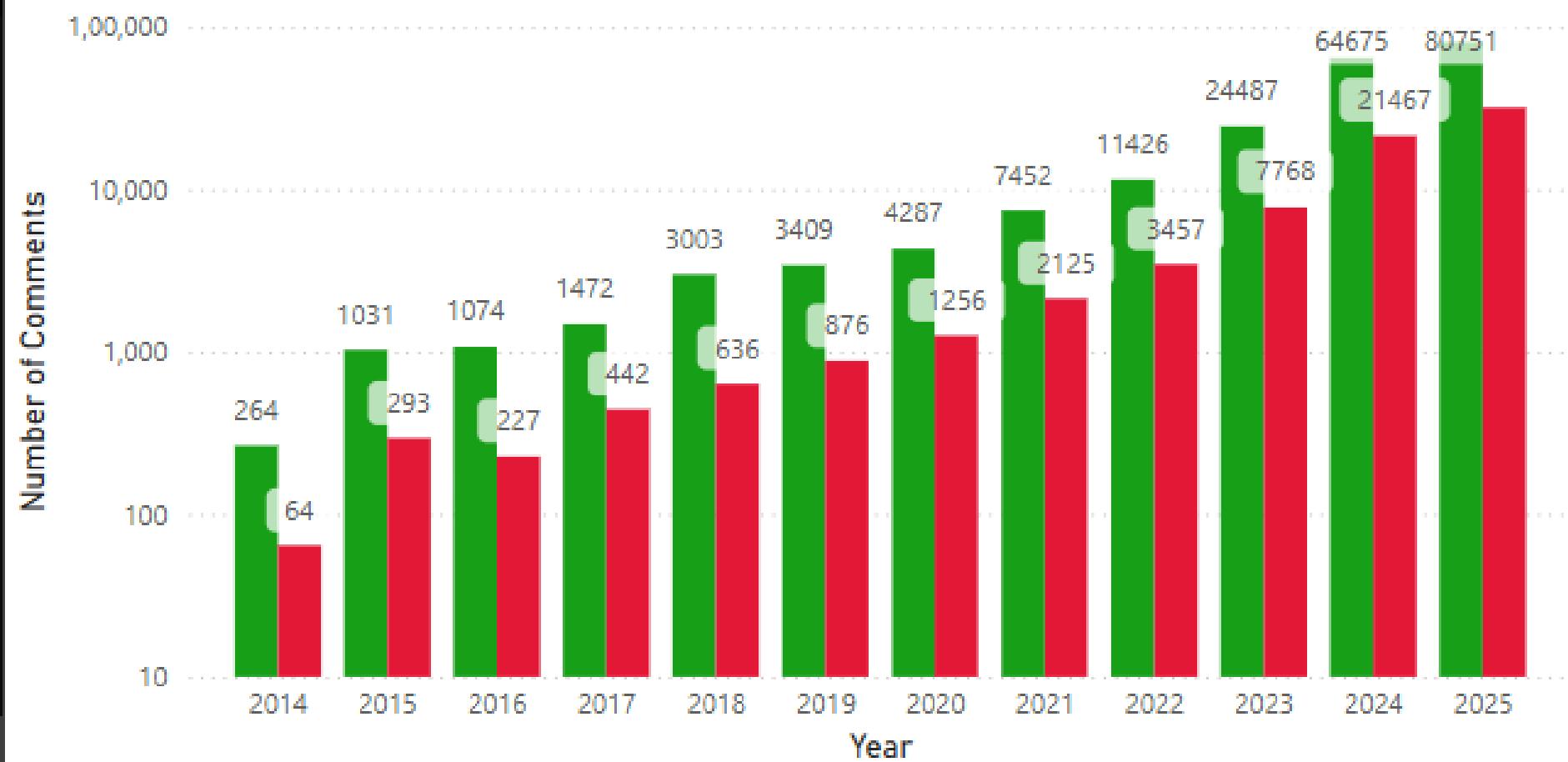
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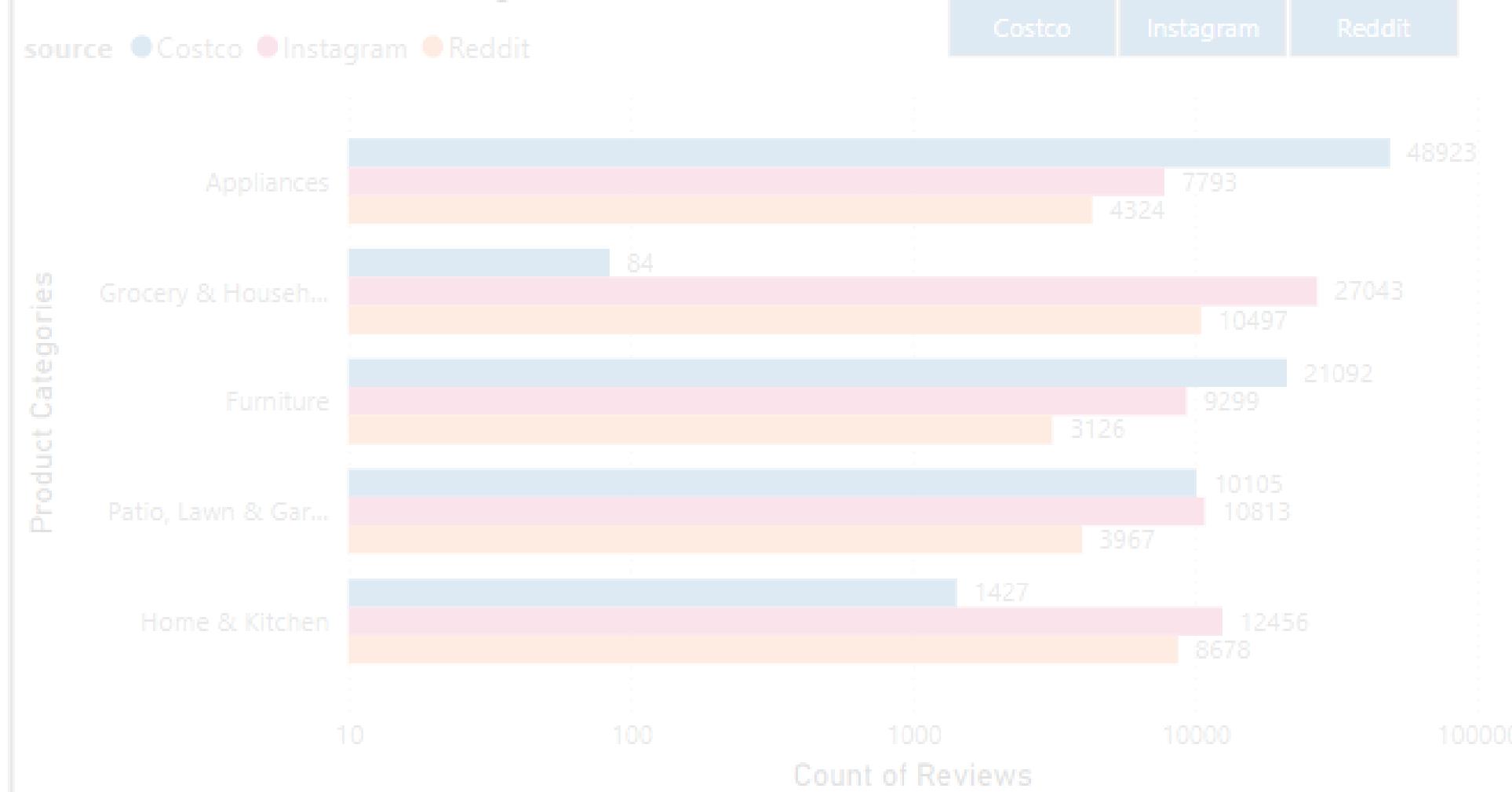
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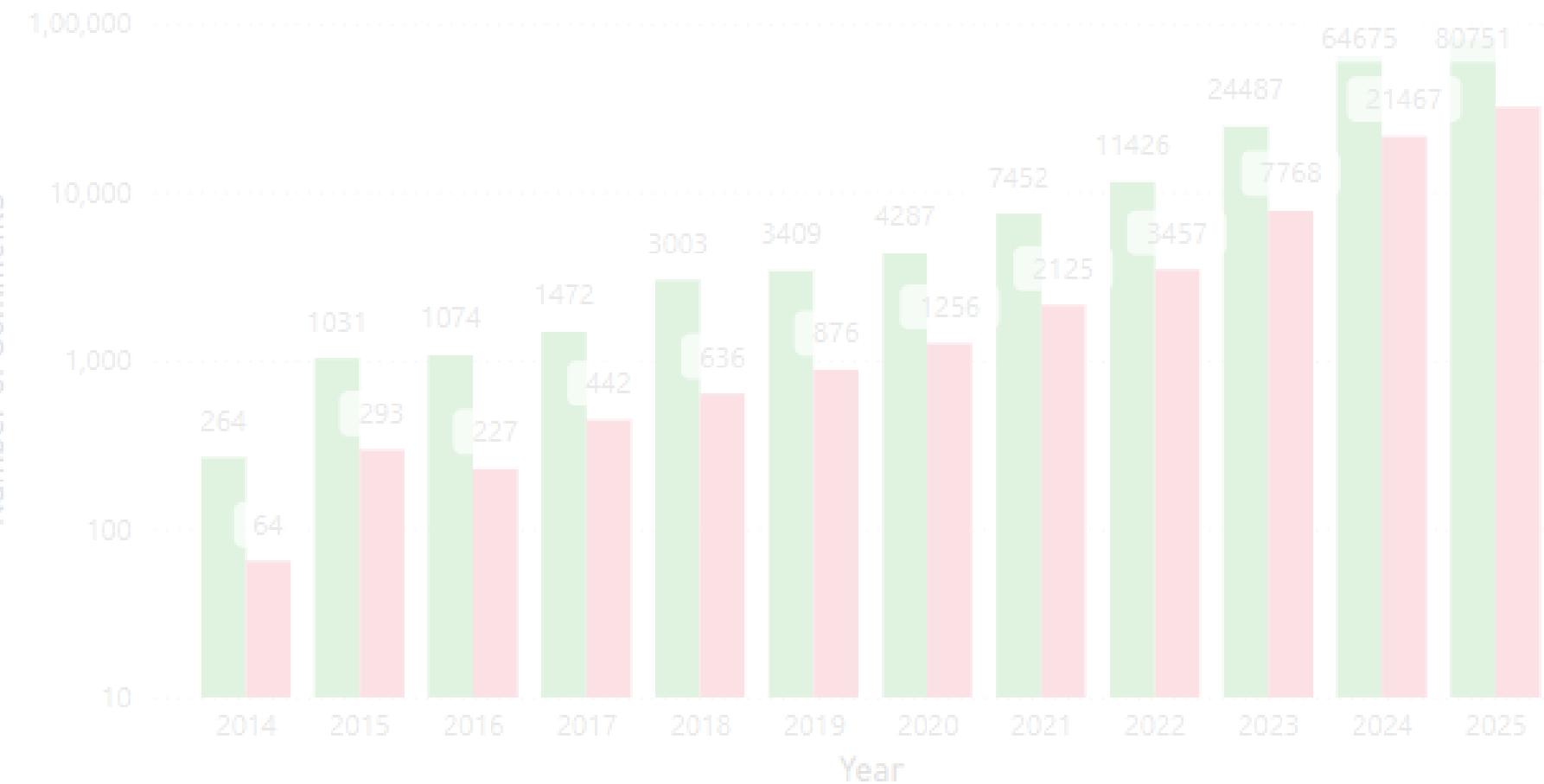
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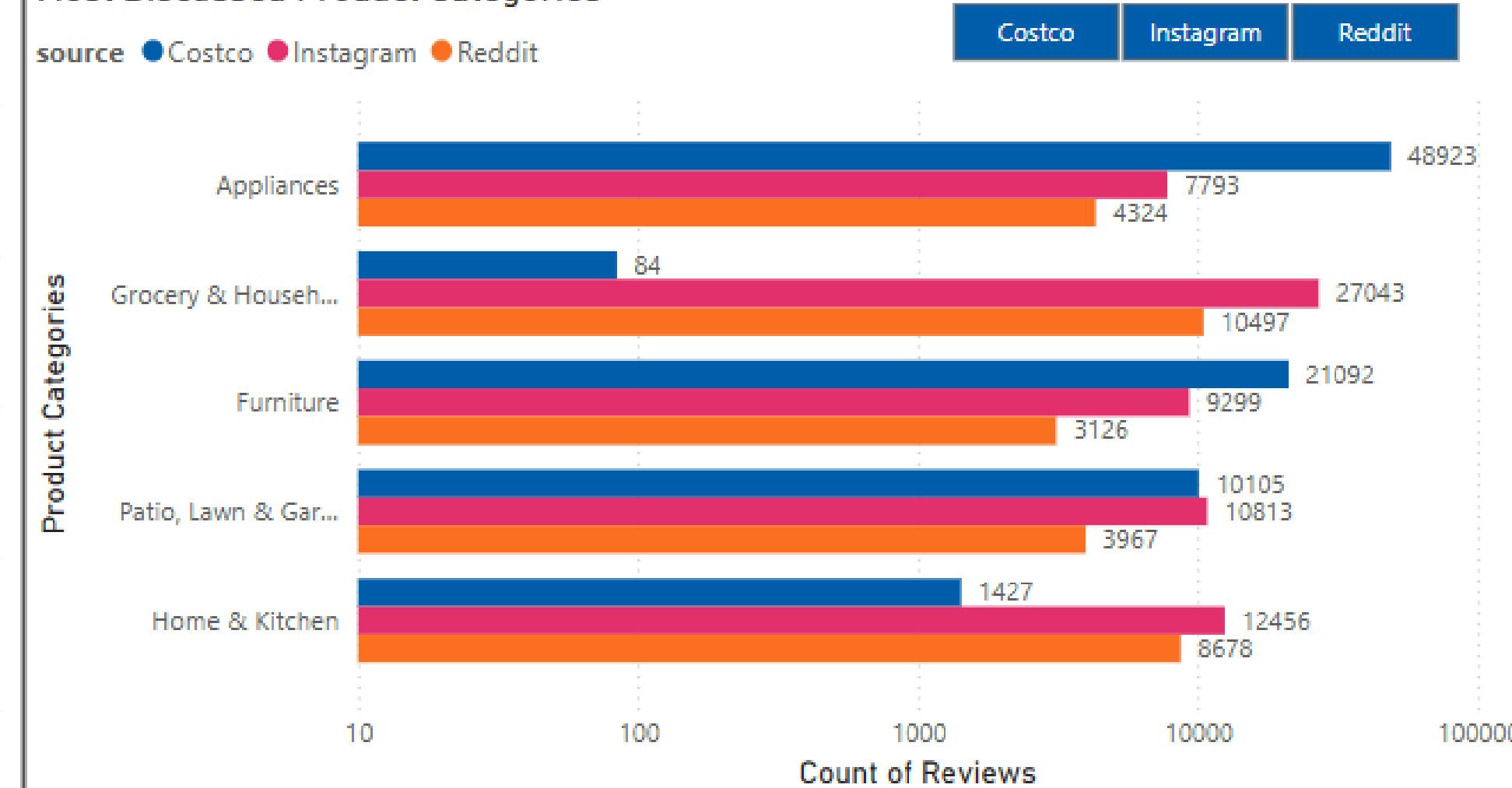
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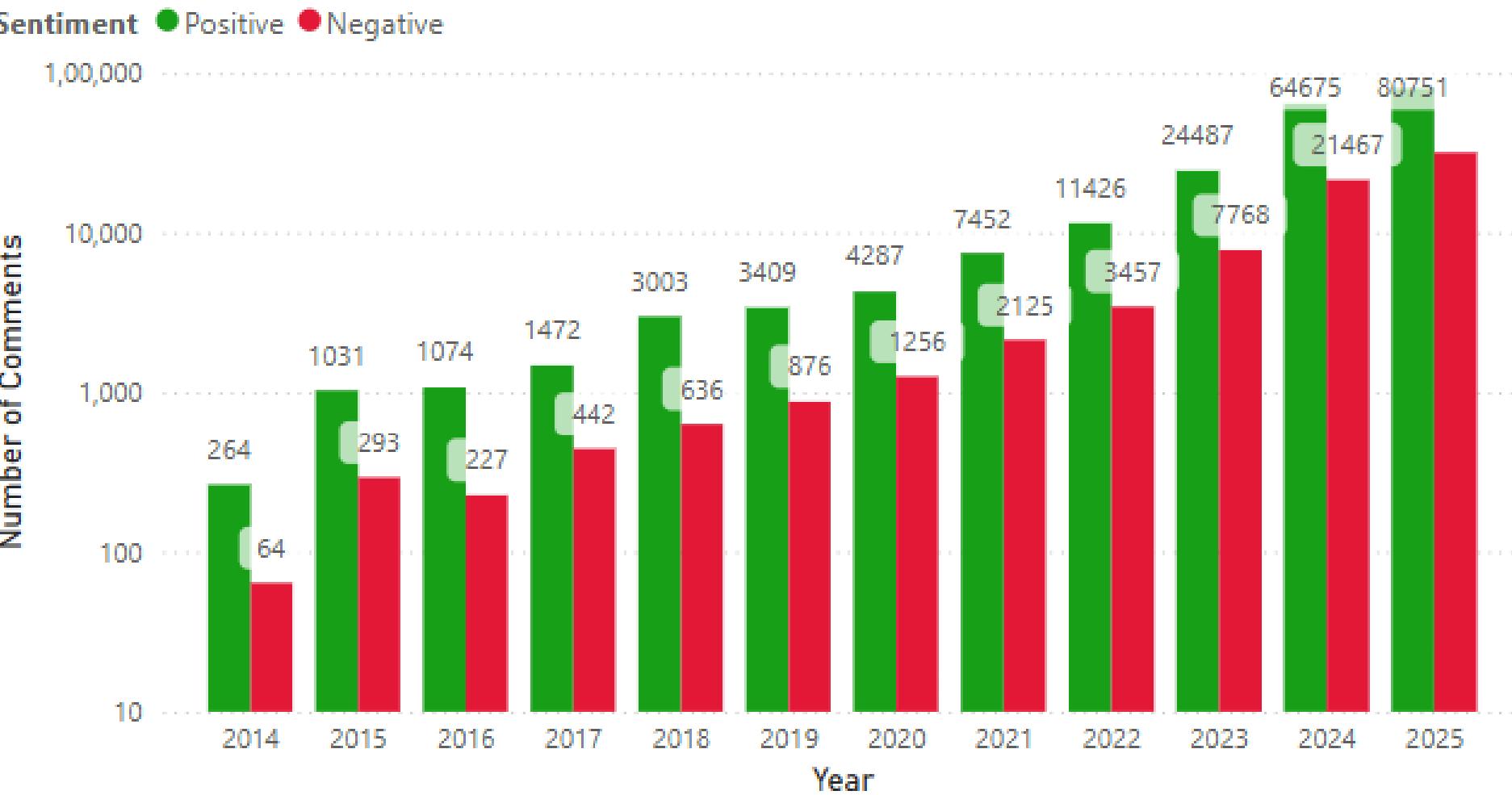
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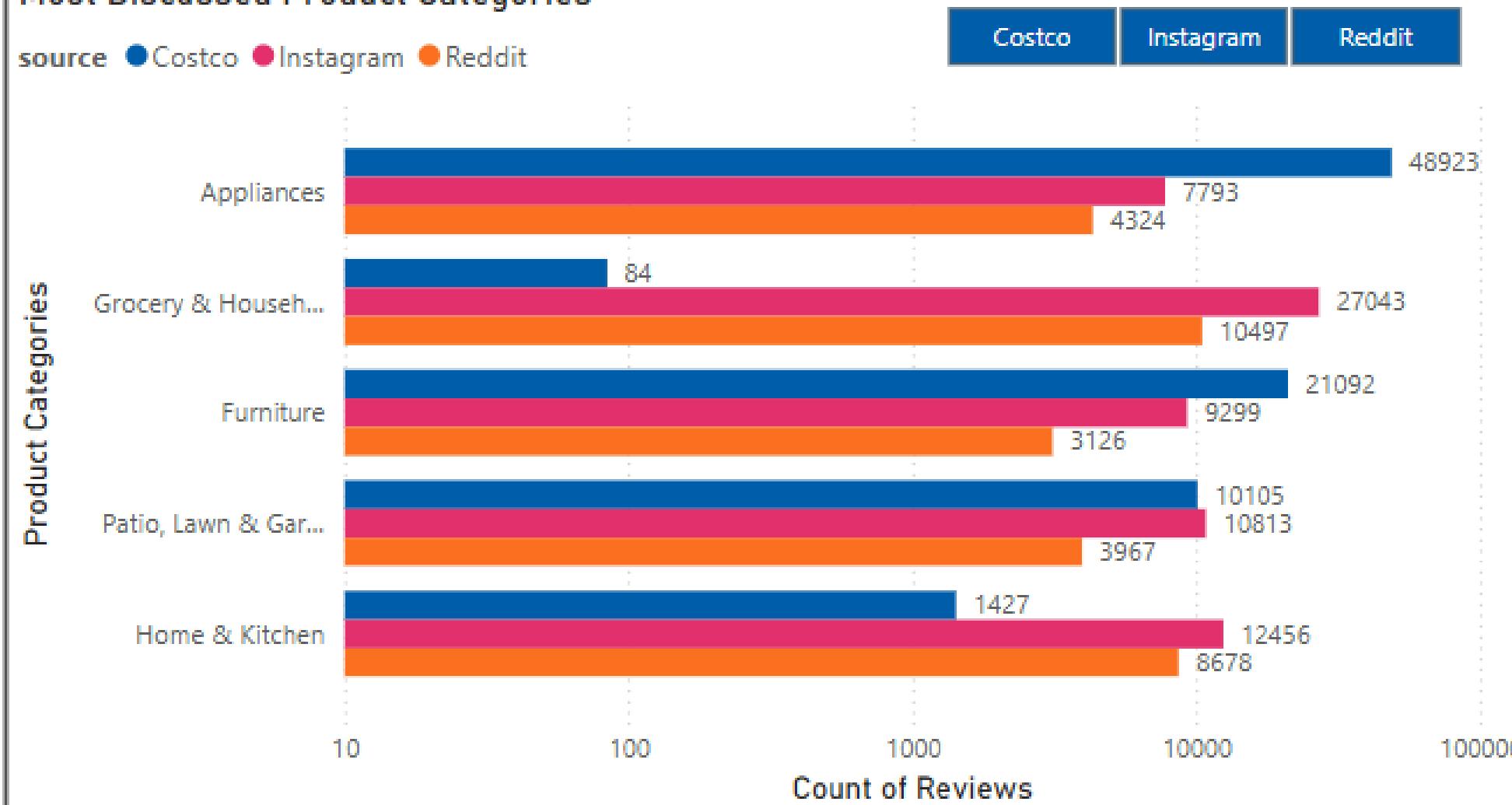
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Voice of Market

Reddit Insights

Fiscal Year

2024

Fiscal Month

All

Product Categories

All

Sentiment Level

All

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Positive Reviews

49.6%

Negative Reviews

18.0%

Neutral Reviews

32.4%

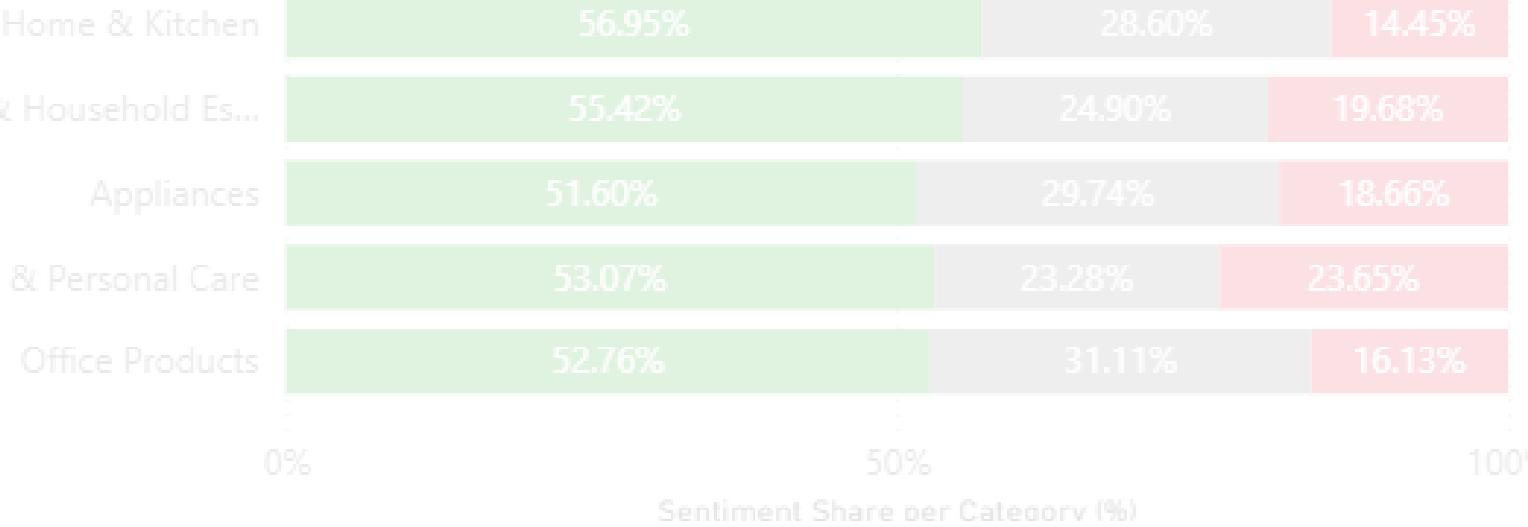
Top 5 Most Discussed Product Categories

Home & Kitchen	Grocery & Ho...	Appliances	Health & Personal ...
1654	747	686	537

Customer Sentiment Breakdown Across Top 5 Categories

Sentiment ● Positive ● Neutral ● Negative

Product Category

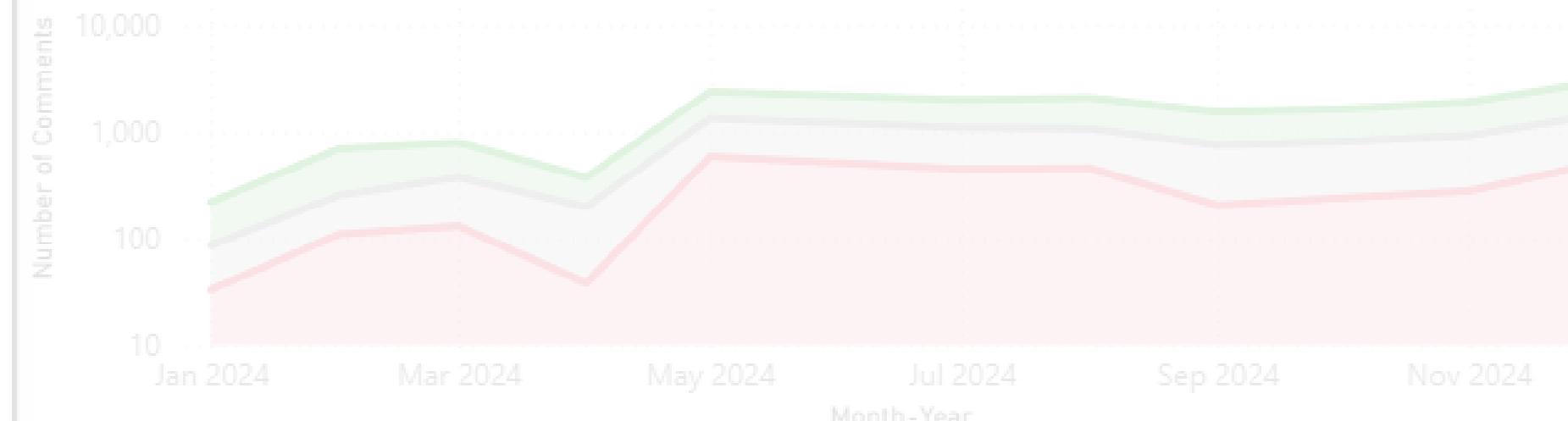


Trending Terms about Costco on Reddit



Customer Sentiment Trends by Month-Year

Sentiment ● Negative ● Neutral ● Positive



"One click deep-dive into Reddit's most honest customer voices"



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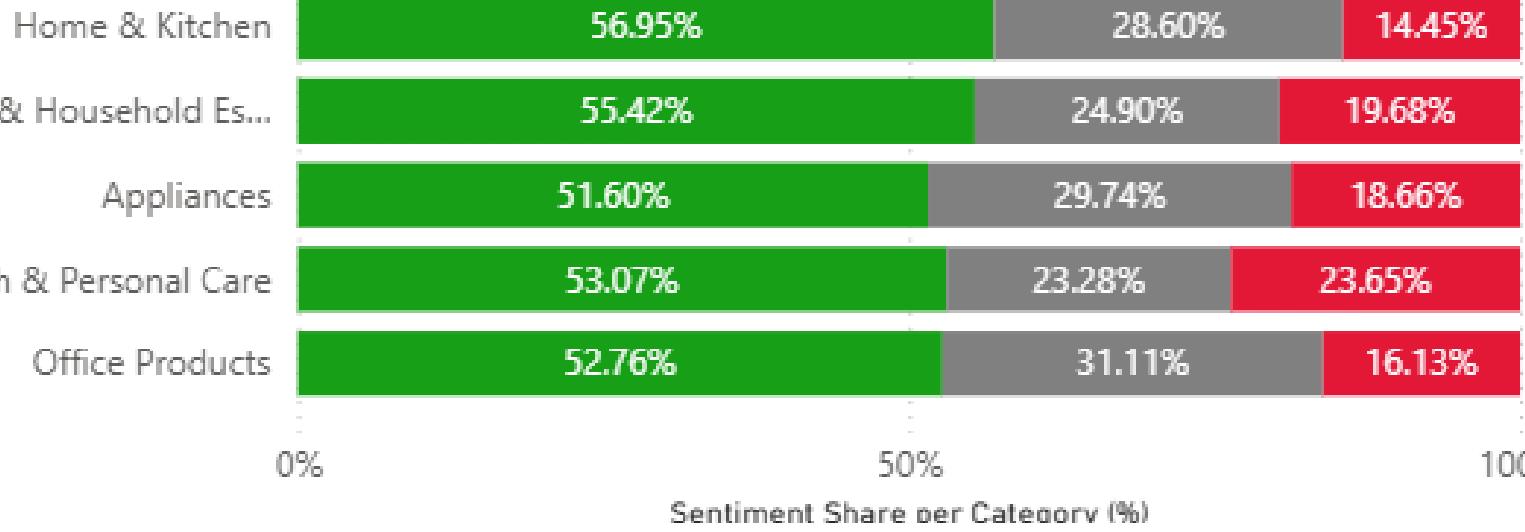
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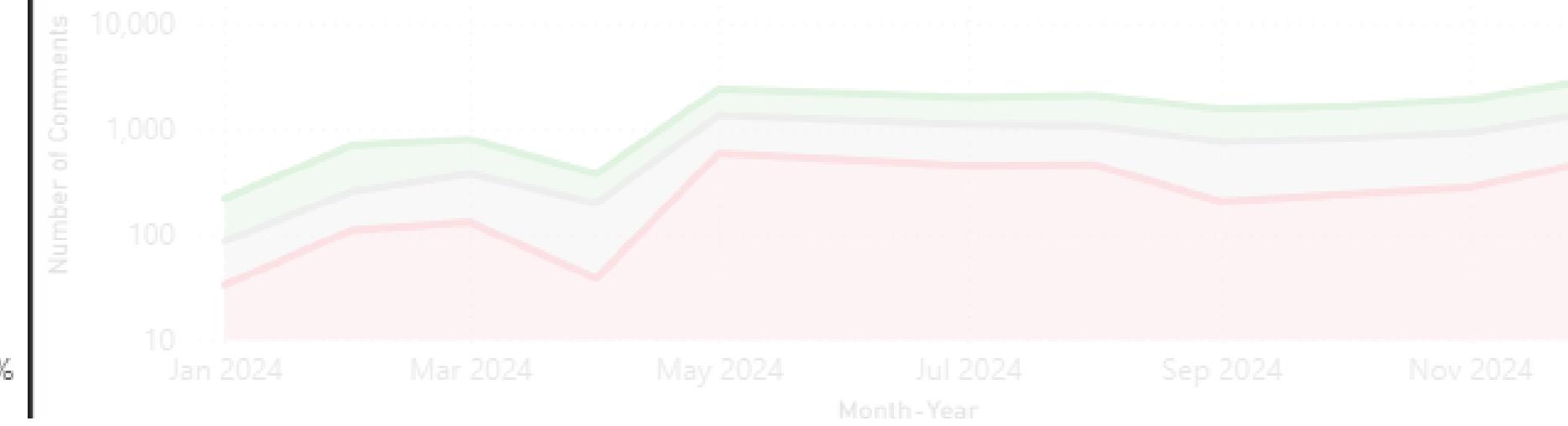


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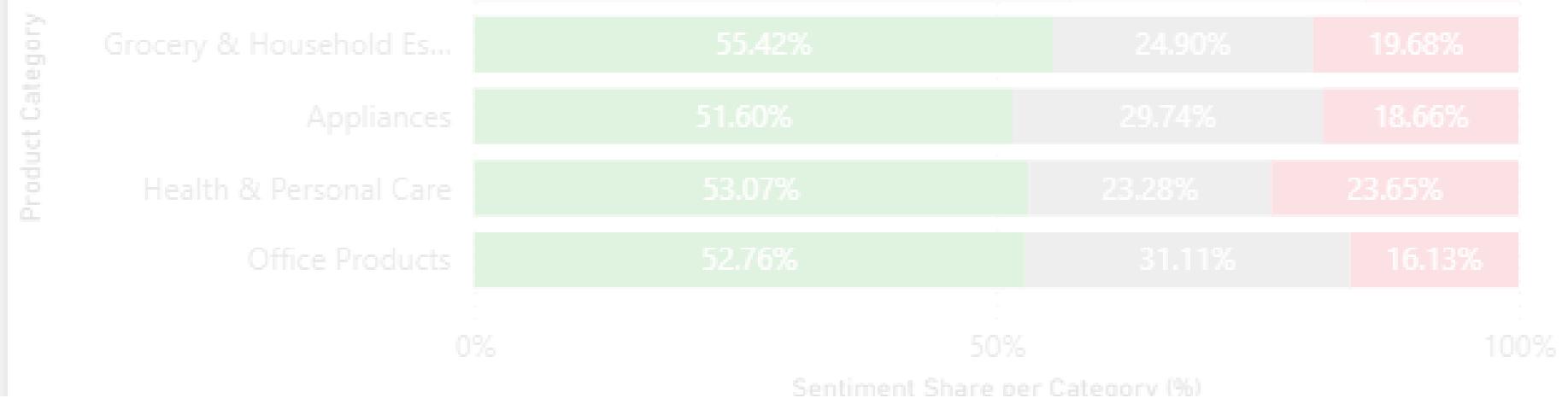
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Top 5 Most Discussed Product Categories

Category	Count
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Appliances	686
Health & Personal ...	537
Office Products	

Customer Sentiment Breakdown Across Top 5 Categories

Sentiment ● Positive ● Neutral ● Negative

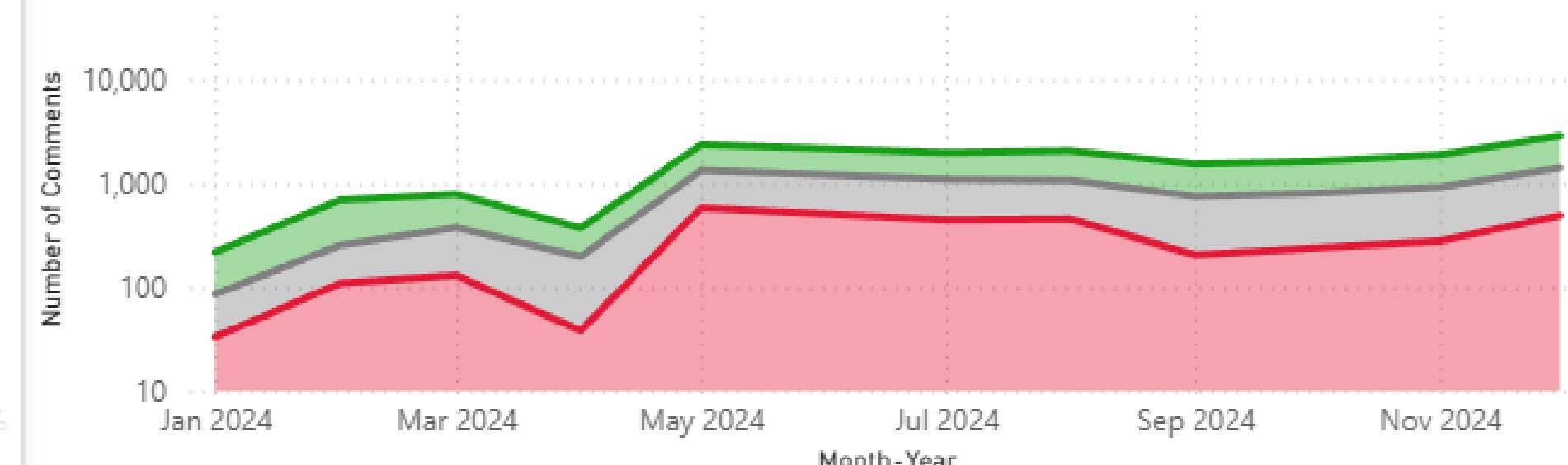


Trending Terms about Costco on Reddit

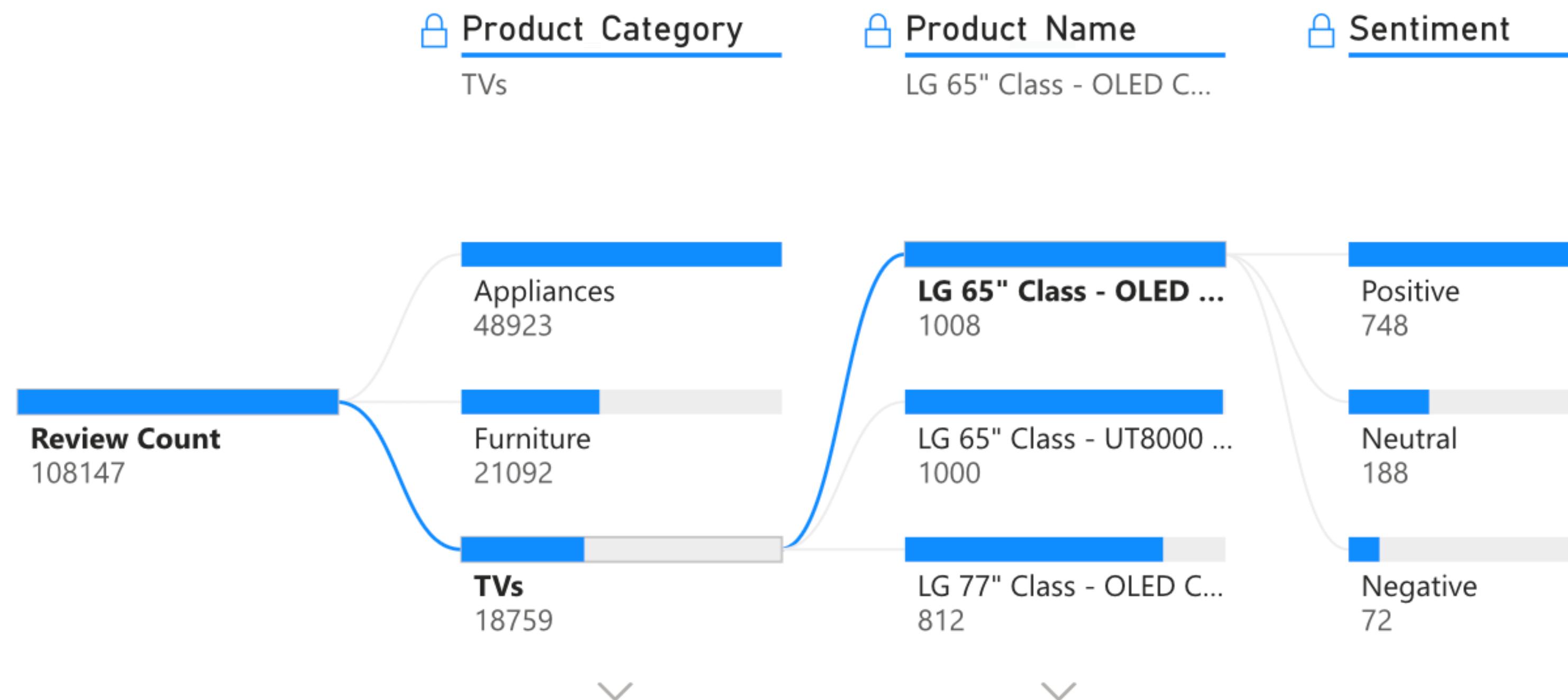


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*"One click deep-dive into Reddit's most honest customer voices"*

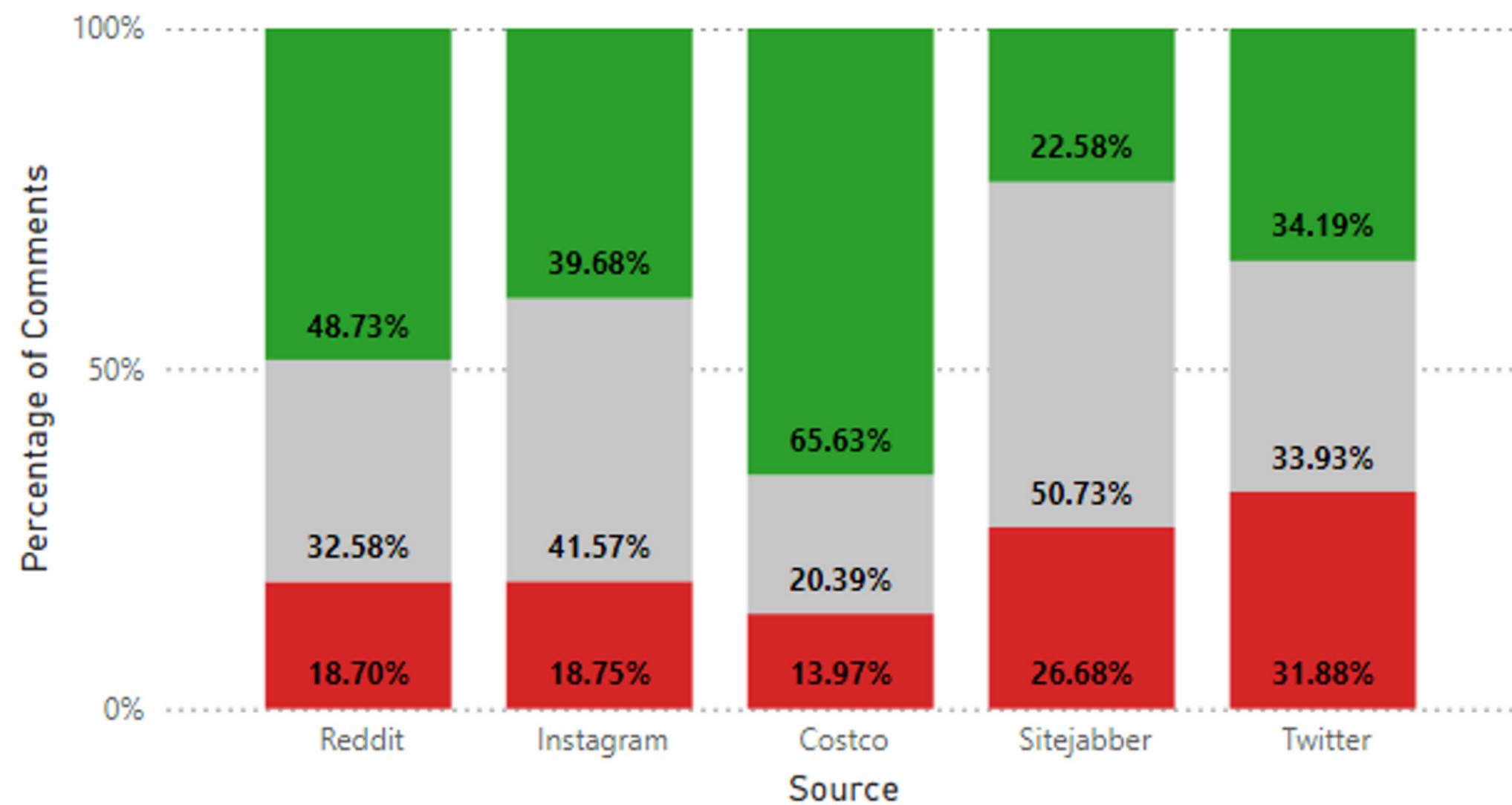
Breakdown of Customer Sentiment across Costco Products



Impact & Insights

Sentiment Distribution of Comments by Source

Sentiment ● Negative ● Neutral ● Positive



Social Media	Takeaways
Reddit	Trusted, detailed discussions
Instagram	Positive on essentials & promos
Costco	Strong positivity on big-ticket buys
Sitejabber	Key to identifying issues
Twitter	Fast, often negative spikes

Welcome to the Costco Review Assistant!!

Ask me anything about Costco products, customer sentiments, or trends



Type your message here...



Final Takeaways

- **Actionable** → 400K+ comments analyzed
- **Scalable** → Auto sentiment tracking pipeline
- **Engaging** → Chatbot + dashboard real-time insights
- **Strengths** → Hybrid, multi-platform data
- **Limitations:** Bias, time gaps
- **Future** → Voice/video, real-time alerts



Acknowledgements

We would like to express our sincere gratitude to those who have guided and supported us throughout this project.



Prakash Bhandi
**Sr. Manager - Data Science
and AI Digital Products**



Xuan Zhang
**Data Scientist - Data Science
and AI Digital Products**



Dr. Elio Zhang
**Associate Professor,
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Dr. Ariana Mendible
**Assistant Professor
Capstone Director**

- Costco Wholesale - IT and HR Leadership (Sponsor Organization)
- Project Center Team (Seattle University)

Finally, we extend our appreciation to the audience for your time, engagement, and valuable feedback as we continue refining our work.

**Thank you!
Any Questions?**

References

1. **Statista.** (2025, Jan 16th) Costco - Statistics & Facts Retrieved February 20, 2025, from <https://www.statista.com/topics/4399/costco/>
2. **Instagram.** (2025, May 16th) costcohofinds Retrieved April 12, 2025, from. <https://www.instagram.com/p/DJuA4o-uLfU/>
3. **Costco.** (2025, Jan 16th) Costco - Kirkland Signature Extra Fancy Mixed Nuts, Salted, 2.5 lbs Retrieved April 12, 2025, from <https://www.costco.com/kirkland-signature-extra-fancy-mixed-nuts-salted-25-lbs.product.4000042734.html>