

G*Fashion – Graph based Recommender for Fashion Rental

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The Project is on [GitHub](#)

The background features abstract, translucent geometric shapes in shades of blue, purple, and pink, floating in the upper right corner.

Rent The Run Way

Our client, Rent the Runway is an e-commerce platform that allows users to rent, subscribe, or buy designer apparel and accessories.

Q1 2023

145k subscribers
\$74.2M revenue

Problem

- How to **improve customer engagement** in the platform? (revenue)
- How to know **what item customer wants to buy** based on their reviews history? (recommendation)
- How to **gauge recommendation to improve revenue?** (buy-again)

Solution

We develop **recommender system using Graph-based algorithm** to recommend **3 items** to customers after giving review about the item that he/she rents



Data description

192k customer reviews (JSON format) of Run the Runway are released by University of California San Diego

The dataset consists of these elements:

- Customer ID and Item ID
- Reviews
- Physical attributes of customers
- Category of apparel rented by customer
 - Bust size
 - Weight
 - Height
 - Age
 - Body type



Romper



Trouser



Jacket



Sweatershirt



Blouson



Dress

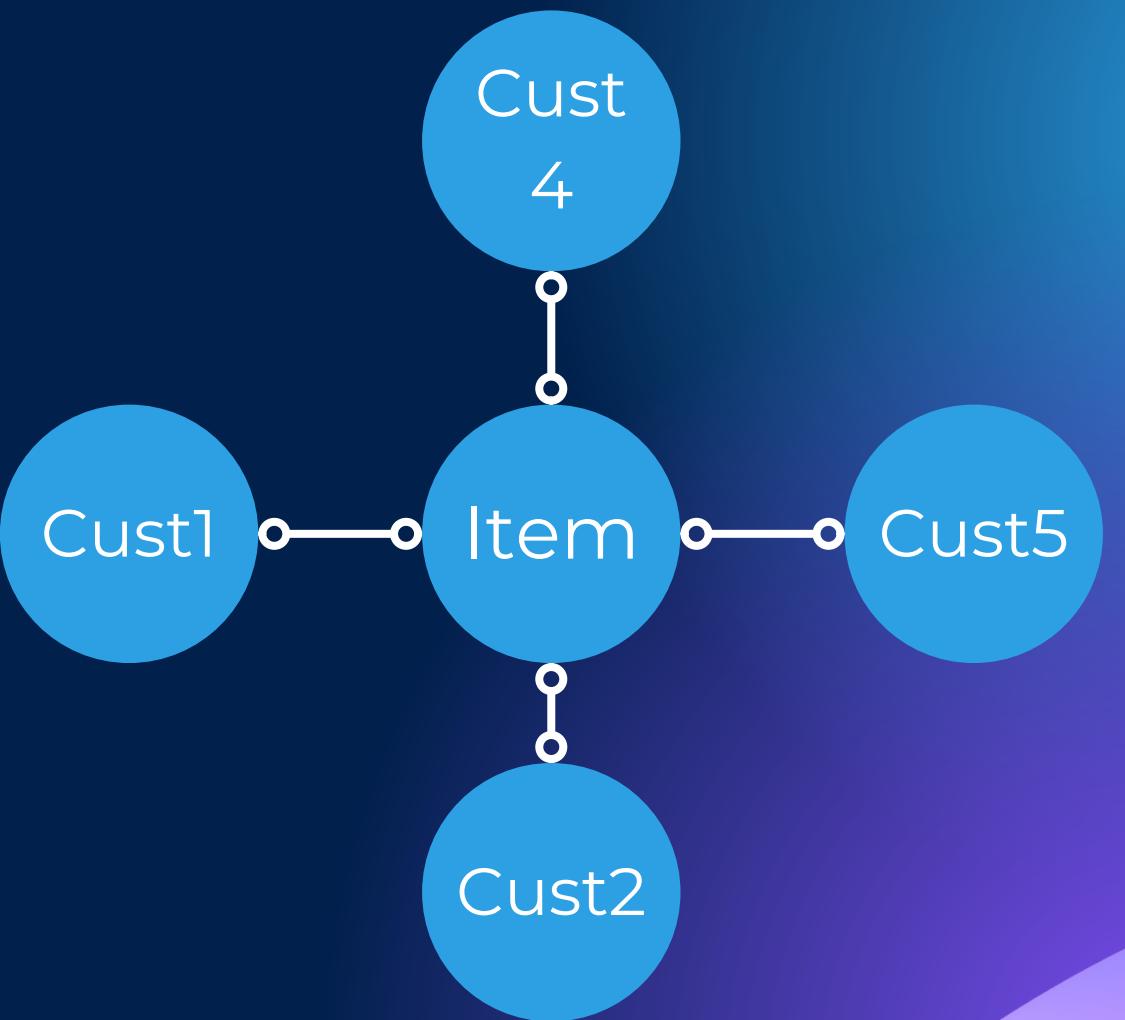
Methods of choice (1/2)

Keyword extraction

- Extracting keywords from customer reviews: transforming text to list of keywords
- Techniques: Removing stopwords, Part-of-speech tagging, keywords (noun and adjective)

Build Bipartite graph

- Bipartite network consists of 2 nodes (customer and item)
- Attribute to customer node: weight, height, age, bust size
- Attribute to item node: keywords

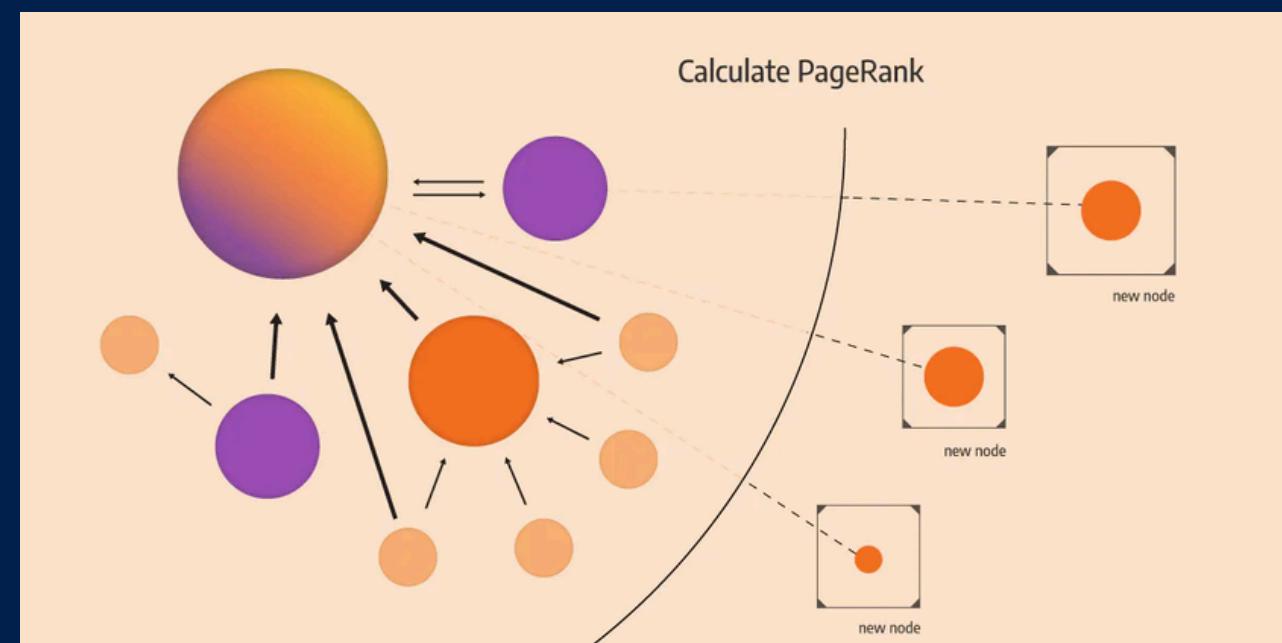


Methods of choice (2/2)



PageRank calculation

- Measures the importance of each node within the graph, based on
 - The number incoming relationships
 - The importance of the corresponding source nodes
 - Simulates random walks on the graph
 - Damping factor 0.85



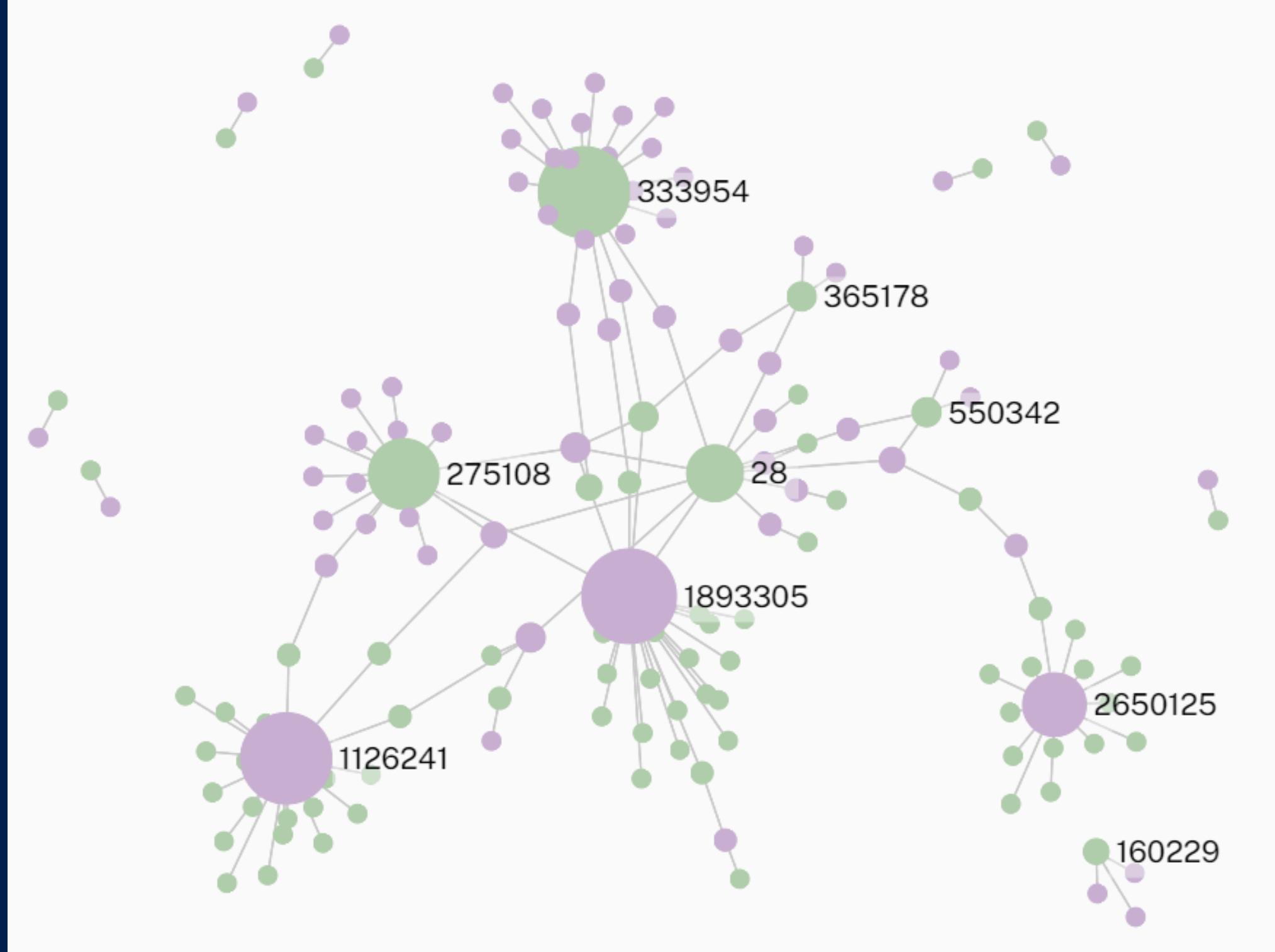
$$PR(A) = (1 - d) + d \left(\frac{PR(T_1)}{C(T_1)} + \dots + \frac{PR(T_n)}{C(T_n)} \right)$$

Recommender algorithm based on sorted PageRank

- Pick one customer ID
 - Display the whole items connected to that customer
 - Sort the PageRank score of item from highest to lowest
 - Take 3 highest scores as the recommended items

Which fashion rented in autumn?

Visualization using Retina.io from Graph extracted as GEXF file



- Select graph that contains keywords of seasons
- Visualize the graph for keyword "AUTUMN"
- The 3 biggest purple nodes are 3 most rented items in autumn



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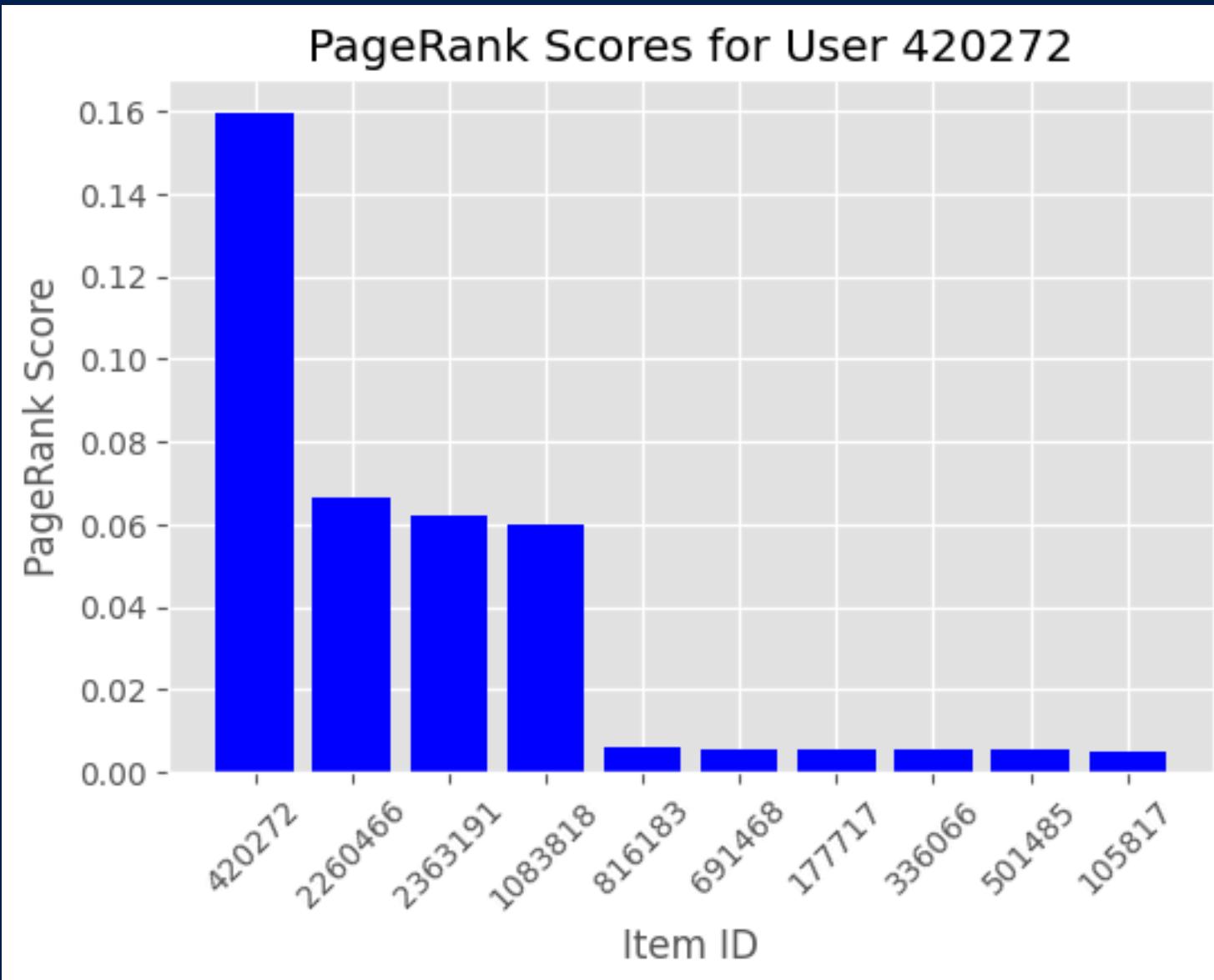


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How the recommender works?

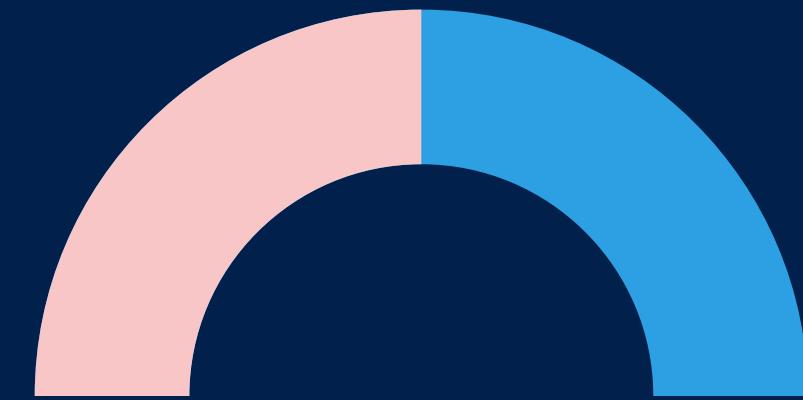


- Joanne (customer ID 420272) has just bought item 2260466 and gave his review
- Select the subset of graphs with customer node contains Joanne
- PageRank calculates the scores of every items
- Joanne is recommended 3 other items with high scores

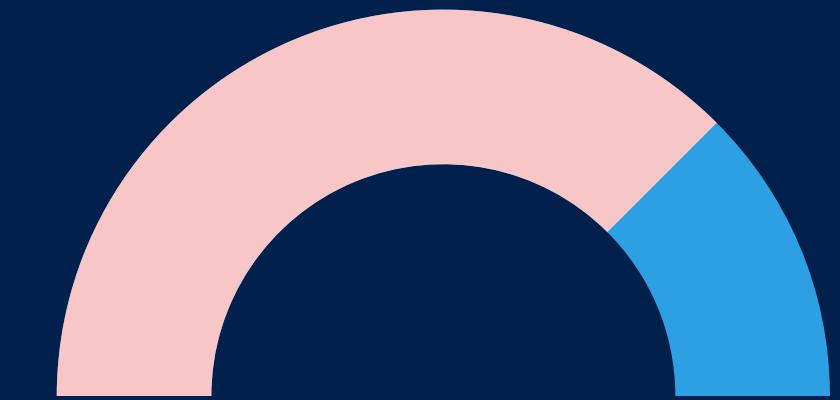


Conclusion

- Graph analysis can be used to identify top items and brands rented by customers according to a specific theme, such as “Autumn season”
- PageRank can be used to recommend similar recommended items and brands to a customer who bought an item
- This way the platform can increase customer engagement by “buying again” and increase the revenue



Revenue before



Revenue after “Buy
again”



Thank You

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