

# Too Many Choices

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Board Game  
Recommendation  
Systems

# Problem Statement

There are nearly 120,000 board games listed on [boardgamegeek.com](https://boardgamegeek.com).

The average price of board games continues to increase as component quality increases.



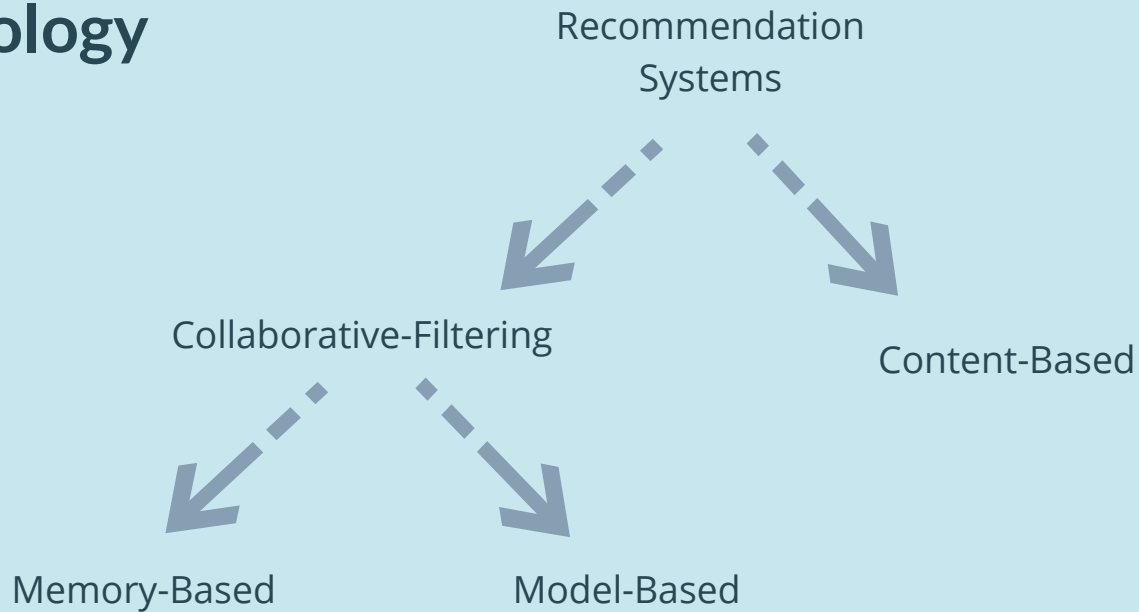
# Business Value

Suggestive upselling

Improve website usability

Rotate stock quickly

# Methodology



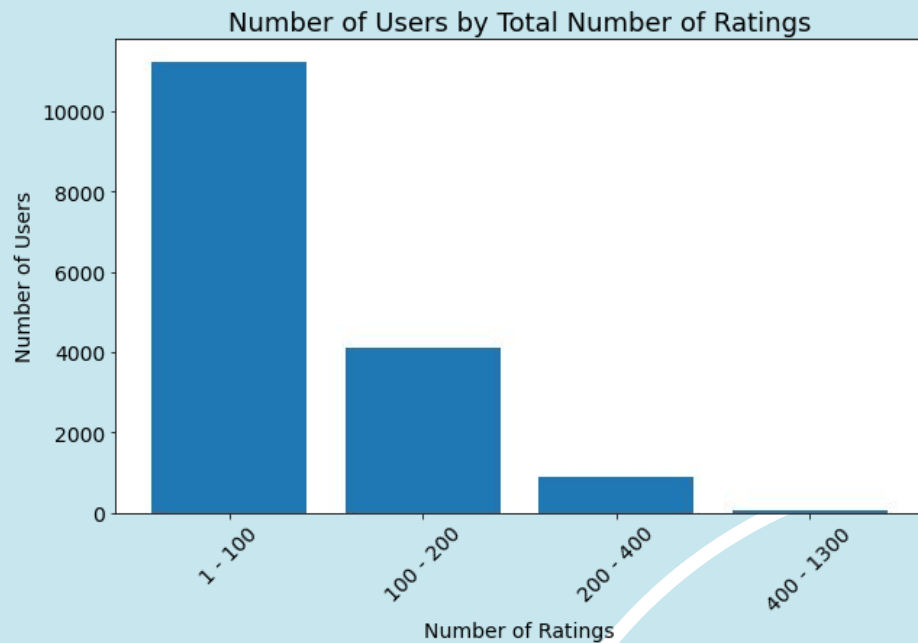
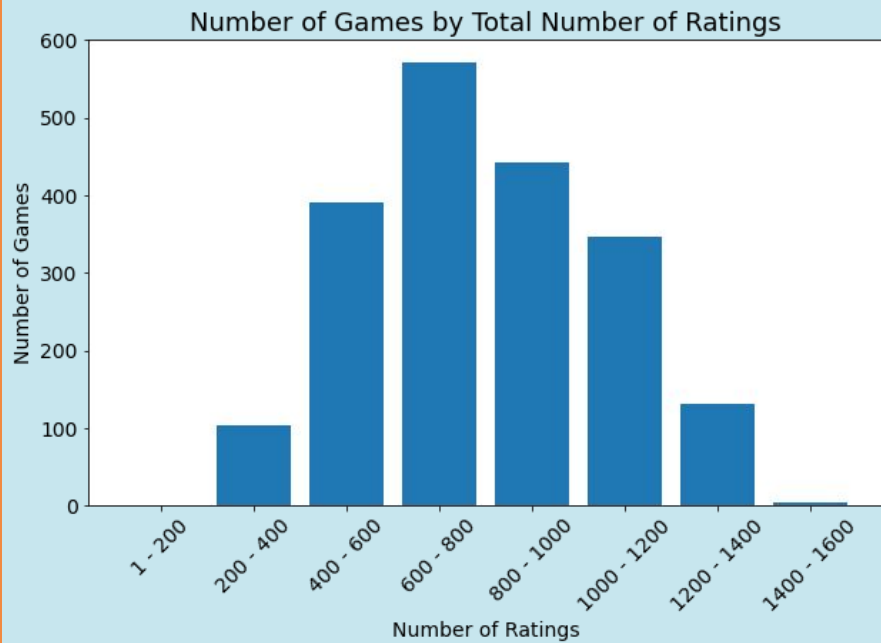
## Methodology - Content-Based System



# Content-Based Recommendations



# Methodology - Collaborative-Filtering



# Memory-Based Recommendations





# Collaborative-Filtering Recommendations





# Recommendations

Use content-based system for suggesting similar items.

Encourage customers to rate games that they buy

Use Collaborative-filtering for users with reviews

# Next Steps

Gather more reviews

Build a system to account for implicit ratings

Refine our language processing techniques





# Thank You!

Any Questions?

# Appendix - NLP

Used the name of game, designer's name, artist's name, publisher's name, and short description for each board game along with a list of which categories, mechanics and families the boardgame showcased as our text.

Used two approaches:

Count frequency - Rated similarities based on the count of each words.

Tf-idf vectorizer - Normalized the count of each word by reducing the impact of words that appear in many descriptions (ie. player, game).

Attempted to tune our approach by removing the name of the game, the designer's name, the artist's name and the publisher's name; but, there was no effect on the recommendations.

# Appendix - Memory-Based Collaborative Filtering

Built a K-nearest neighbors model to compute cosine similarity.

Top 5 recommendations for users who like 'Gloomhaven':

1: Gloomhaven: Jaws of the Lion, with distance of 0.8302014392979479:

2: Spirit Island, with distance of 0.8408221723065283:

3: Aeon's End: Legacy, with distance of 0.8472333914652613:

4: Founders of Gloomhaven, with distance of 0.8482777123514965:

5: The City of Kings, with distance of 0.8491417494404531:

# Appendix - Model-Based Collaborative Filtering

Baseline RMSE: 1.0; RMSE after tuning 98.5

Imputed user ratings:

'Cthulhu Wars': 8

'Terraforming Mars': 9

'Gloomhaven': 9

'Twilight Imperium: Fourth Edition': 8

'Mage Knight Board Game': 8

Predicted recommendations:

Recommendation 1: Nemesis | Predicted Score = 8.8

Recommendation 2: Go | Predicted Score = 8.6

Recommendation 3: Magic: The Gathering | Predicted Score = 8.6

Recommendation 4: Twilight Struggle | Predicted Score = 8.57

Recommendation 5: Puerto Rico | Predicted Score = 8.57