

# Board Games Recommender

Riche Ngo





# Evolution of Board Games

**3000 BC** 🚩

Egypt had ancient board games like Senet & Mehen.



**1950s** 🚩

Ameritrash games in the US.  
Eurogames in Germany.



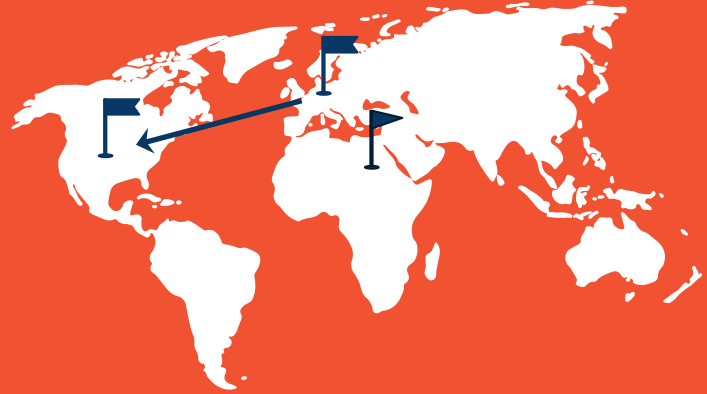
**1995**

Eurogames like Catan gained popularity outside of Europe.

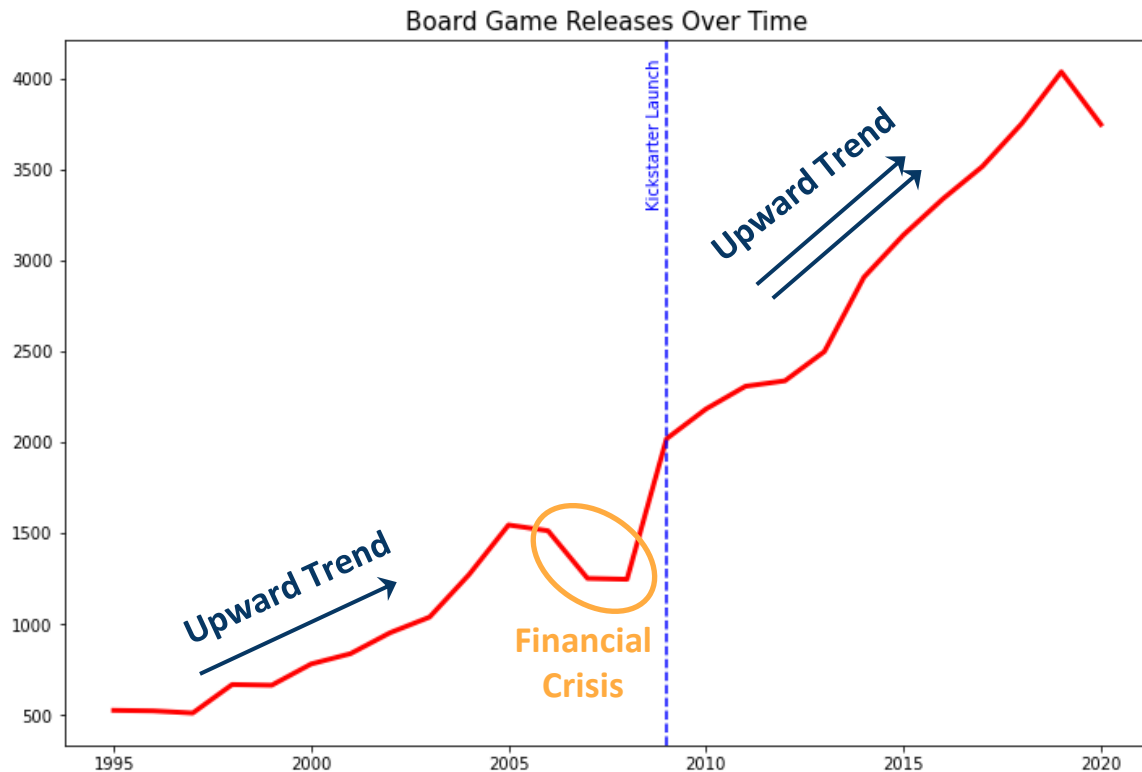


**2020s**

Worldwide emergence of hybrid games combining multiple genres.



# Game Releases





# 30 BILLION

USD by Year 2026





# Problem Statement

Current methods that people use to seek board game recommendations, such as forums and video reviews are hardly personalized. The same “mainstream” games will always be suggested by these platforms.

As part of a data science team affiliated to BoardGameGeek (BGG), we want to build a good board game recommender.

- To reduce user churn.
- Increase time spent on website.
- Attract new users to BGG community.
- Attend to every user's personal needs.



# What Is In The Data?

The screenshot shows the BoardGameGeek (BGG) website interface. The top navigation bar includes links for Browse, Forums, GeekLists, Shopping, Community, and Help. The main content area displays the game page for **Wingspan (2019)**, which is highlighted with a red box. The game's rating is 8.1, and it has 41K ratings and 5.8K comments. The page also shows the number of players (1-5), play time (40-70 min), age (10+), and weight (2.42 / 5). The designer is Elizabeth Hargrave, the artist is Ana Maria Martinez Jaramillo, Natalia Rojas, and Beth Sobel, and the publisher is Stonemaier Games + 22 more. The page includes a "My rating" section with a star rating and buttons for "Buy a Copy", "Add To Collection", "Log Play", and "Subscribe".

**Wingspan (2019)**  
Attract a beautiful and diverse collection of birds to your wildlife reserve.

41K Ratings & 5.8K Comments · [GeekBuddy Analysis](#)

**1-5 Players**  
Community: 1-4 — Best: 3

**40-70 Min**  
Playing Time

**Age: 10+**  
Community: 10+

**Weight: 2.42 / 5**  
'Complexity' Rating

Designer: Elizabeth Hargrave  
Artist: Ana Maria Martinez Jaramillo, Natalia Rojas, Beth Sobel  
Publisher: Stonemaier Games + 22 more

[See Full Credits](#)

**My rating** ★★★★★★★★

[Buy a Copy](#) [Add To Collection](#) [Log Play](#) 3.2K [Subscribe](#)

[Overview](#) [Ratings](#) [Forums](#) [Images](#) [Videos](#) [Files](#) [Stats](#) [Versions](#) [Expansions](#) [My Games](#) [Market](#) [More](#)

**WATCH IT PLAYED**  
Instructional Video

**GAME NIGHT!**  
Playthrough Video

**Wingspan (with Swift-Start Pack) - \$48.00** - Miniature Market - Free Shipping Over \$99 - Customer Holds Available - Guilt Free Gaming!  
Sponsor: [miniaturemarket](#) (See All)


**THE ORIGINS GAME TABLE**  
2 YEARS IN THE MAKING

**OFFICIAL KICKSTARTER**  
LAUNCH ON TUESDAY JAN 19TH


Hot on Amazon

1,072 IMAGES

# What Is In The Data?

[Browse](#) [Forums](#) [GeekLists](#) [Shopping](#) [Community](#) [Help](#)

Sign In Join (it's free!)



## Description

*Wingspan* is a competitive, medium-weight, card-driven, engine-building board game from Stonemaier Games. It's designed by Elizabeth Hargrave and features over 170 birds illustrated by Natalia Rojas and Ana Maria Martinez.

You are bird enthusiasts—researchers, bird watchers, ornithologists, and collectors—seeking to discover and attract the best birds to your network of wildlife preserves. Each bird extends a chain of powerful combinations in one of your habitats (actions). These habitats focus on several key aspects of growth:

- Gain food tokens via custom dice in a birdfeeder dice tower
- Lay eggs using egg miniatures in a variety of colors
- Draw from hundreds of unique bird cards and play them

The winner is the player with the most points after 4 rounds.

If you enjoy *Terraforming Mars* and *Gizmos*, we think this game will take flight at your table.

—description from the publisher

From the 7th printing on, the base game box includes *Wingspan: Swift-Start Promo Pack*.

## CLASSIFICATION

Type  
[Family](#), [Strategy](#)

Category  
[Animals](#)  
[Card Game](#)  
[Educational](#)


Mechanisms  
[Card Drafting](#)  
[Dice Rolling](#)  
[Drafting](#)  
[End Game Bonuses](#)  
[Hand Management](#)  
[+ 2 more](#)


Family  
[Animals: Birds](#)  
[Animals: Crows / Ravens / Magpies](#)  
[Animals: Ducks](#)  
[Animals: Geese](#)  
[Animals: Owls](#)  
[Animals: Turkeys](#)  
[+ 9 more](#)


BGG Store: In Stock


**\$60.00**

[Buy Now](#)







Wingspan Board Game - A...  
\$54.96 

 [Shop now](#)


Advertisement


Star Realms: Deckbuilding Game

**\$13.75**   
★★★★★ (1482)





Funko Pan Am The Game, Multicolor

**\$23.67**   
★★★★★ (309)




Thames & Kosmos | Targi | Two Player Game | St...

**\$19.95**   
★★★★★ (399)



Asmodee 7 Wonders - Duel, Multi-colored

**\$24.97** 

## AWARDS & HONORS

[2020 JUG Adult Game of the Year Winner](#)


[2020 JUG Adult Game of the Year Finalist](#)

[2020 Guldbrikken Best Adult Game Nominee](#)


[2020 Gra Roku Family Game of the Year Nominee](#)


[+ More](#)

## OFFICIAL LINKS

 [Stonemaier Games](#)  
(stonemaiergames.com)

## ADDITIONAL SUGGESTIONS

**Language Dependence** 

Extensive use of text - massive conversion needed to be playable 

## COMMUNITY STATS

|            |     |                |       |
|------------|-----|----------------|-------|
| Own:       | 59K | Want In Trade: | 1,637 |
| Wishlist:  | 12K | Has Parts:     | 9     |
| For Trade: | 235 | Wants Parts:   | 7     |

[See All Stats](#)

BGG Item ID: 266192





# Data Dictionary



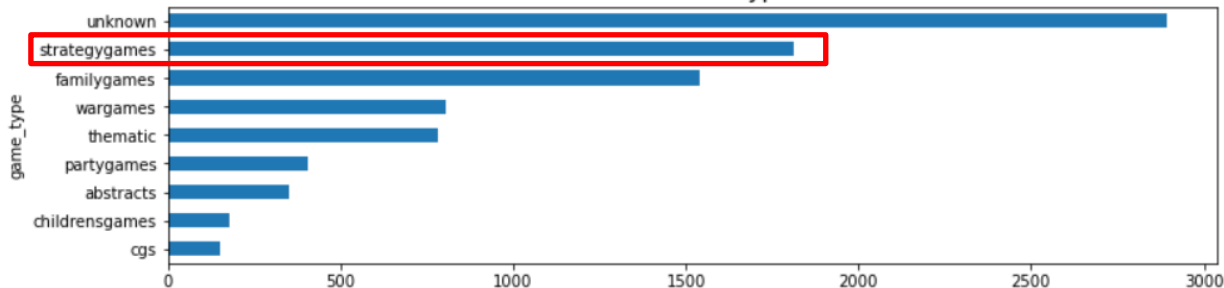
| Feature          | Description  |
|------------------|--|
| bgg_id           | Board game's ID on BoardGameGeek database.   |
| name             | Board game's name in English.  |
| year             | Board game's year of release.  |
| game_type        | Board game's associated game types (e.g. strategy game, thematic, etc.).                     |
| designer         | Designer(s) of the board game.   |
| artist           | Artist(s) of the board game and its components.  |
| publisher        | Publisher(s) of the board game.  |
| min_players      | Minimum number of players for the board game by design.                                      |
| max_players      | Maximum number of players for the board game by design.                                      |
| min_players_rec  | Minimum number of players for the board game as recommended by the BGG community.            |
| max_players_rec  | Maximum number of players for the board game as recommended by the BGG community.            |
| min_players_best | Best number of players minimally for the board game as suggested by the BGG community.       |
| max_players_best | Best maximum number of players for the board game as suggested by the BGG community.         |
| min_age          | Minimum age for players to play the board game by design.                                    |
| min_age_rec      | Minimum age for players to play the board game as recommended by the BGG community.          |
| min_time         | Minimum time required for a single play-through of the board game as stated by the designer. |
| max_time         | Maximum time required for a single play-through of the board game as stated by the designer. |
| category         | Board game's associated categories (e.g. Adventure, Exploration, Fantasy, etc.).             |

| Feature             | Description   |
|---------------------|---|
| mechanic            | Board game's associated mechanics (e.g. Chaining, Drafting, Push Your Luck, etc.).  |
| cooperative         | Whether the board game has cooperative game play (0 means non-cooperative, 1 means cooperative).  |
| compilation         | Whether the board game is a compilation of others (0 means not compilation, 1 means compilation).   |
| compilation_of      | The set of items which the board game is a compilation of.  |
| family              | The broad families which the board game falls into (e.g. Two Player Only Games, Theme: Tropical Islands, etc.).   |
| implementation      | The bgg_id of the previous board game which this one is a re-implementation of.   |
| integration         | The bgg_id of another board game which this one integrates with.  |
| rank                | Board game's overall ranking on the BGG website.  |
| num_votes           | Total number of votes on rating the board game by the BGG community.  |
| avg_rating          | Board game's average rating given by the BGG community (On a scale of 1-10, 10 being the best while 1 being the worst).   |
| stddev_rating       | Standard deviation of board game's rating given by the BGG community.   |
| bayes_rating        | Board game's average rating using the Bayesian method.  |
| complexity          | Board game's average rating for how difficult the game is to understand, by the BGG community (On a scale of 1-5, the lower the rating, the easier the game is to understand).                                      |
| language_dependency | How language-dependent components (aside from the rules) are for those who do not speak the game published language (On a scale of 1-5, 5 means no necessary in-game text, 1 means unplayable in another language). |
| _id                 | Board game's associated ID with other websites (like BGA, WikiData, etc.).  |

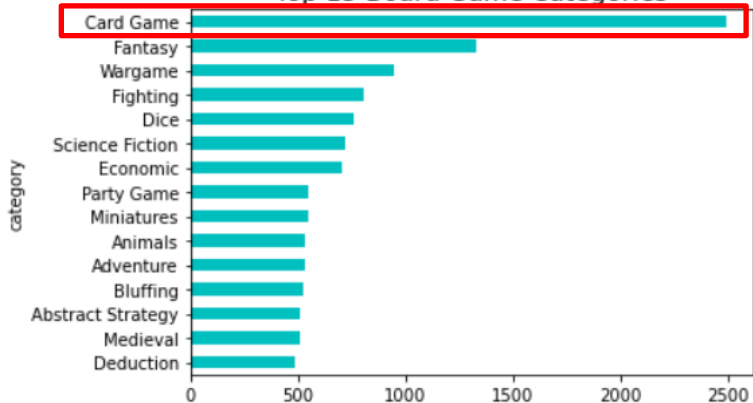


# Game Classifications

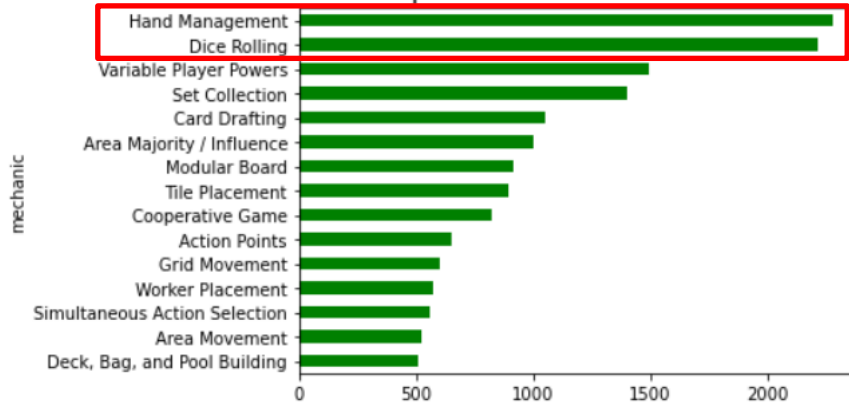
Board Game Types



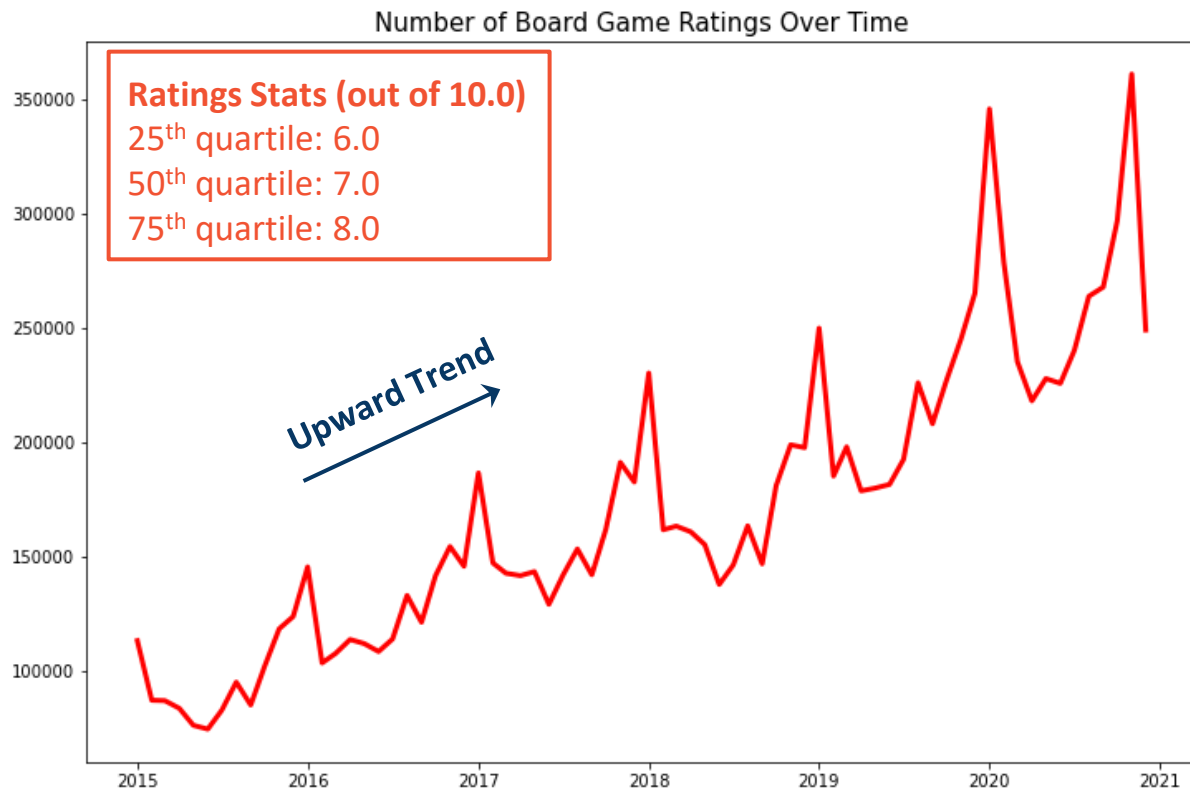
Top 15 Board Game Categories



Top 15 Board Game Mechanics



# User Ratings



- **General increasing trend** throughout the years.
- **Cyclical pattern**, number increases towards end of each year, decreases towards the mid-year.
- People generally more active on the website towards the end of each year.
- Common for youtubers to post year-end game reviews.



# Final Recommender System



01

## User Profiling

Process user selection and develop user profile.

02

## Collaborative Filtering

Locate similar BGG users in database.

03

## Deep Neural Network

Recommendations based on list of similar user profiles and board game features.

04

## User Criteria

Attend to user needs and provide personalization options, including diversifying games using topic model.



# Stage 1: User Profiling



New User



New User Profile

|          | 3   | 9   | 10  | 11  | 12  | 13  | 14  | 16  | 17  | 25  | ... | 317519 | 317985 | 318472 | 318553 | 318977 | 318983 | 319114 | 319966 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| new_user | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |





# Stage 2: Collaborative Filtering

## New User Profile

|          | 3   | 9   | 10  | 11  | 12  | 13  | 14  | 16  | 17  | 25  | ... | 317519 | 317985 | 318472 | 318553 | 318977 | 318983 | 319114 | 319966 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| new_user | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |



## BGG User Profiles

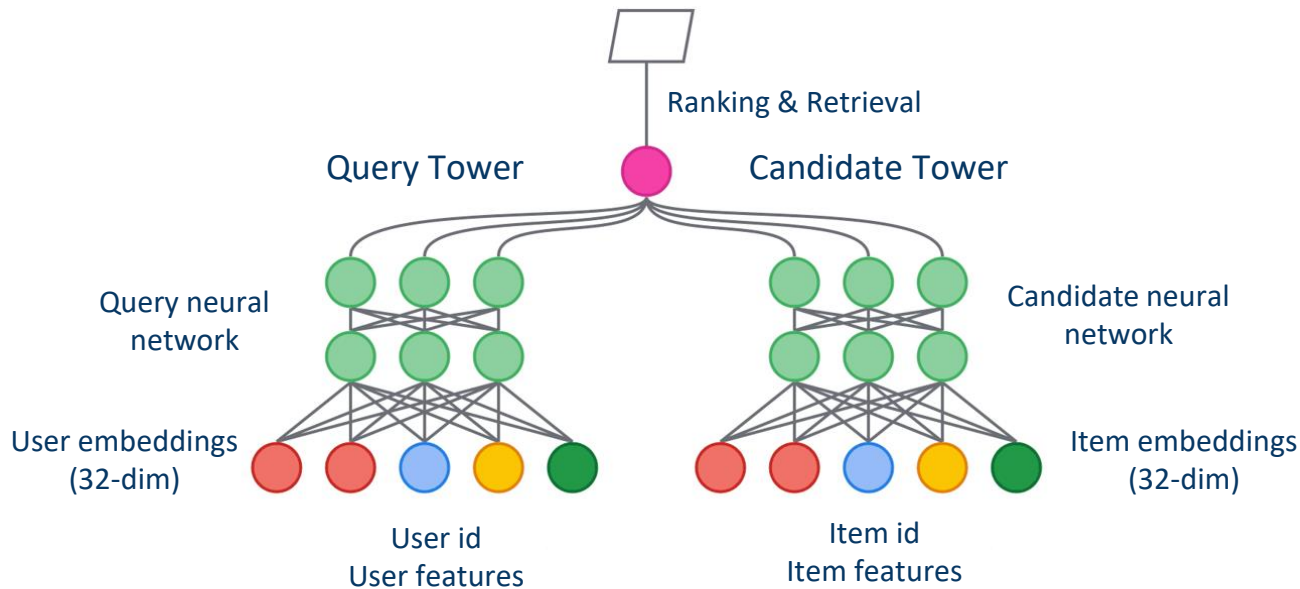
| bgg_id        | 3   | 9   | 10  | 11  | 12  | 13  | 14  | 16  | 17  | 25  | ... | 317519 | 317985 | 318472 | 318553 | 318977 | 318983 | 319114 | 319966 |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| bgg_user_name |     |     |     |     |     |     |     |     |     |     |     |        |        |        |        |        |        |        |        |
| ...hammer     | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| 0492372665    | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| 0815spieler   | NaN | NaN | NaN | NaN | NaN | 8.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| 0b1_ita       | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| 0xa8e         | NaN | NaN | NaN | NaN | NaN | 6.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| ...           | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...    | ...    | ...    | ...    | ...    | ...    | ...    | ...    |
| zyxbg         | 8.0 | NaN | NaN | NaN | NaN | 5.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| zzap1977      | NaN | NaN | NaN | NaN | NaN | 5.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| zzgamer11     | NaN | NaN | NaN | NaN | NaN | 5.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| zztap         | NaN | NaN | NaN | NaN | NaN | 7.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |
| zzzabiss      | NaN | NaN | NaN | 5.0 | NaN | 7.0 | NaN | NaN | NaN | NaN | ... | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    | NaN    |



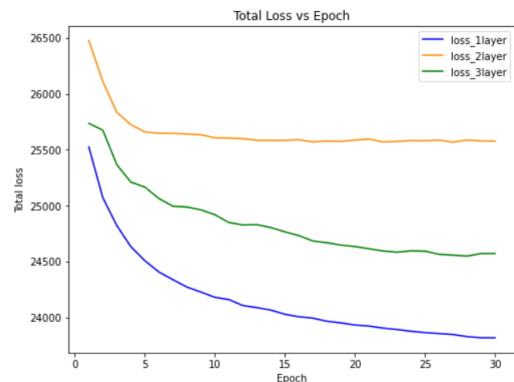
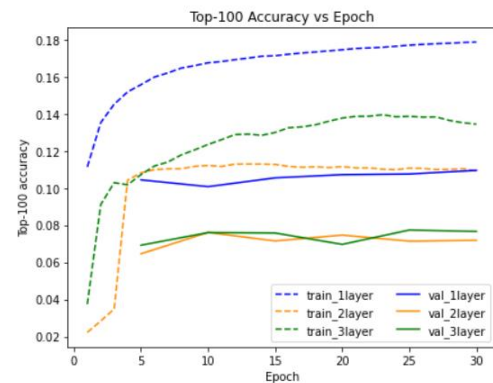
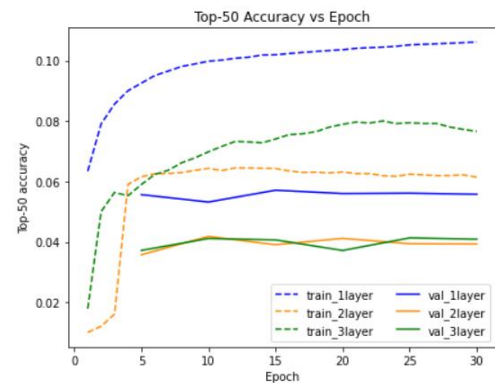
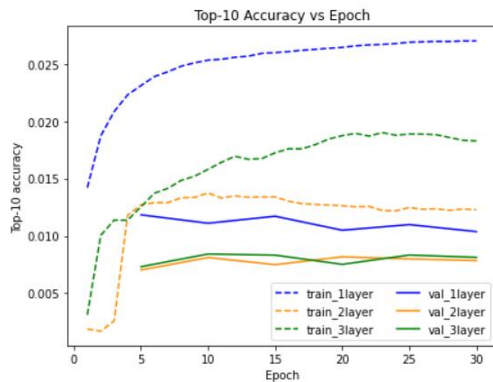
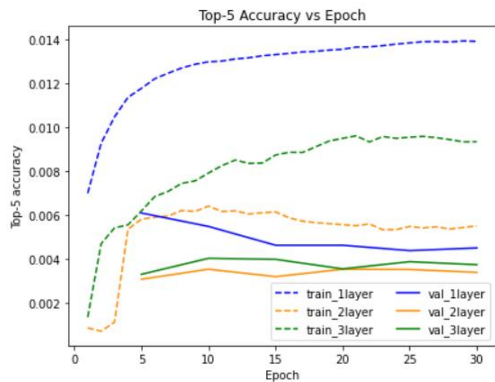
Similar Users



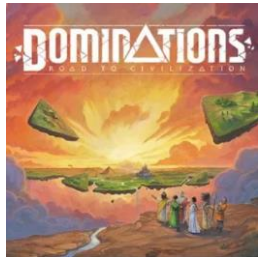
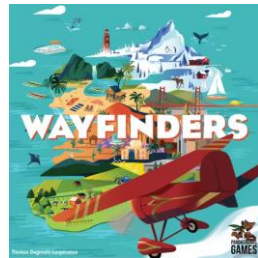
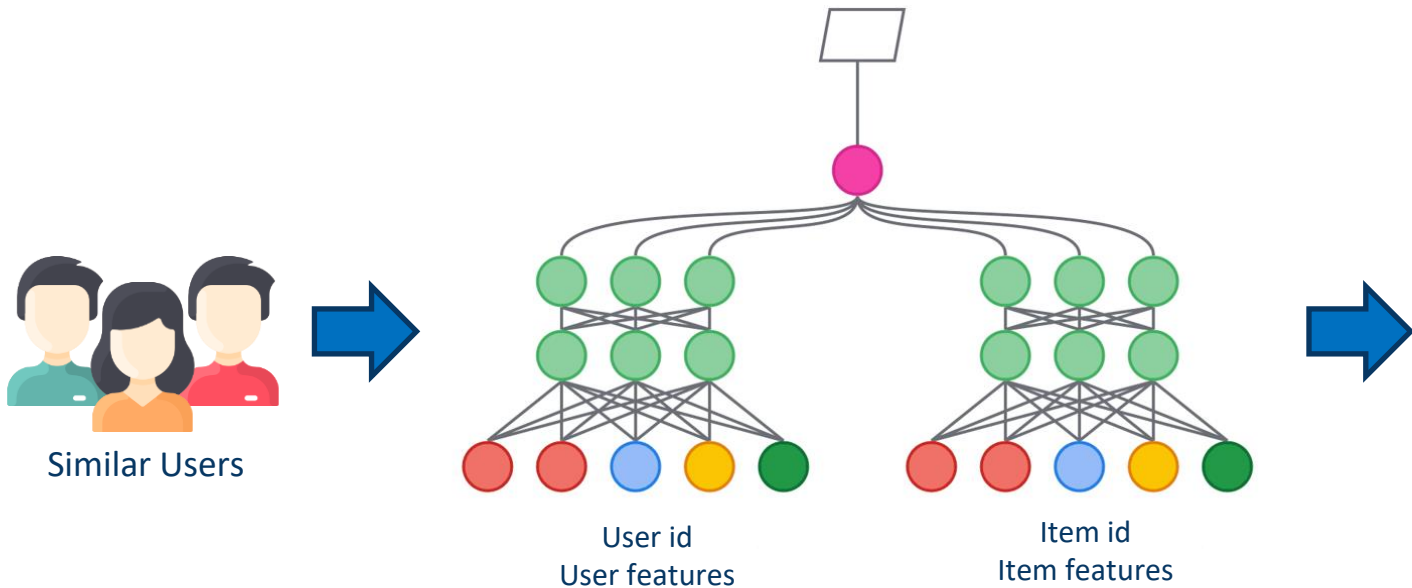
# Stage 3: Deep Neural Network



# Stage 3: Deep Neural Network



## Stage 3: Deep Neural Network



## Stage 4: User Criteria

### Default Recommendations

|  | name                                     | freq | rank   |
|--|--|------|--------|
|  | Robin of Locksley                        | 4    | 2771.0 |
|  | Wayfinders                               | 4    | 4781.0 |
|  | Catacombs Cubes                          | 4    | 6784.0 |
|  | Deep Vents                               | 4    | 7478.0 |
|  | Totemic                                  | 4    | 8792.0 |
|  | Clank! Legacy: Acquisitions Incorporated | 3    | 73.0   |
|  | King of Tokyo: Dark Edition              | 3    | 804.0  |
|  | Marvel United                            | 3    | 1945.0 |
|  | Wreck Raiders                            | 3    | 2000.0 |
|  | Dominations: Road to Civilization        | 3    | 2208.0 |

### Recommendations by Popularity

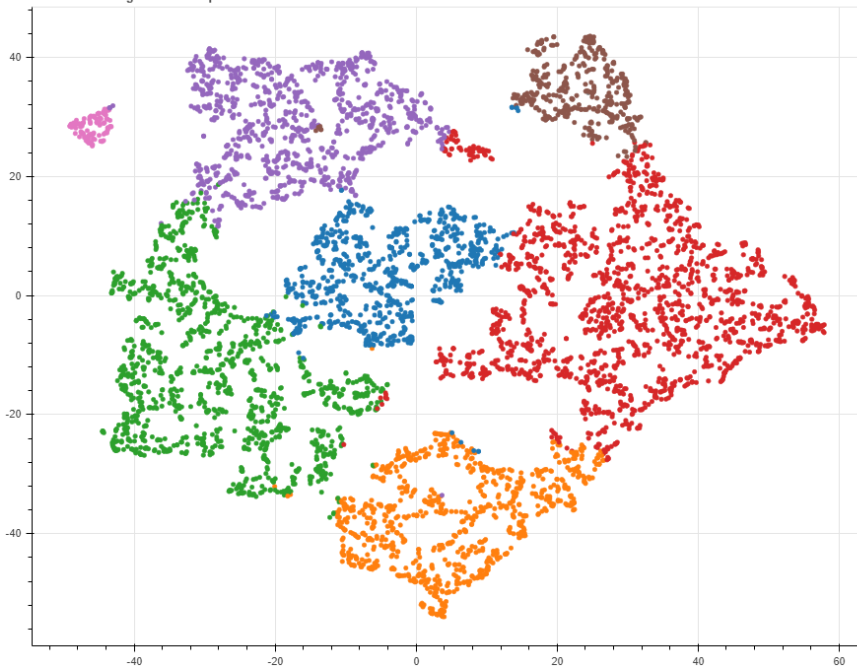
|     | name                                     | rank |
|-----|--|------|
| 400 | Pandemic Legacy: Season 1                | 2.0  |
| 242 | Gloomhaven: Jaws of the Lion             | 13.0 |
| 14  | Root                                     | 28.0 |
| 65  | The 7th Continent                        | 31.0 |
| 79  | Everdell                                 | 36.0 |
| 73  | Mechs vs. Minions                        | 40.0 |
| 446 | The Crew: The Quest for Planet Nine      | 45.0 |
| 389 | The Quacks of Quedlinburg                | 69.0 |
| 54  | Clank! Legacy: Acquisitions Incorporated | 73.0 |
| 711 | Paladins of the West Kingdom             | 75.0 |





# Topic Modelling

t-SNE Clustering of 9 LDA Topics



Topic 0  
gain resource  
good player  
end victory  
place point city new  
build turn  
building phase  
action

Topic 3  
turn command war  
army battle  
fight combat cover  
map system  
force attack  
unit scale rule

Topic 6  
number card win  
point play hand  
publisher  
score draw turn  
round player  
game place  
end

Topic 1  
street car ring  
piece circle  
sky dig grid train  
crash wheel track donkey line  
rail

Topic 4  
description must  
team action may  
player character  
time ability game  
try use  
take

Topic 7  
stock say find  
factory case  
deliver team  
ever treasure never  
information  
want ingredient  
agent question

Topic 2  
control power  
game play  
include event set  
feature player use  
hero card new  
rule unique

Topic 5  
gather familiar  
competition know  
family guess town  
enemy think  
field village ally  
experience  
coin word

Topic 8  
ship tile sea  
enemy item  
island crew  
space local  
explore place  
board survive  
reputation



## Stage 4: User Criteria

### Recommendations BEFORE Diversifying

|  | name                                     | rank | topic_no |
|--|--|------|----------|
|  | Pandemic Legacy: Season 1                | 2.0  | 4        |
|  | Gloomhaven: Jaws of the Lion             | 13.0 | 2        |
|  | Root                                     | 28.0 | 4        |
|  | The 7th Continent                        | 31.0 | 4        |
|  | Everdell                                 | 36.0 | 0        |
|  | Mechs vs. Minions                        | 40.0 | 4        |
|  | The Crew: The Quest for Planet Nine      | 45.0 | 4        |
|  | The Quacks of Quedlinburg                | 69.0 | 6        |
|  | Clank! Legacy: Acquisitions Incorporated | 73.0 | 2        |
|  | Paladins of the West Kingdom             | 75.0 | 4        |

### Recommendations AFTER Diversifying

|  | name                                     | rank   | topic_no |
|--|--|--------|----------|
|  | Pandemic Legacy: Season 1                | 2.0    | 4        |
|  | Gloomhaven: Jaws of the Lion             | 13.0   | 2        |
|  | Everdell                                 | 36.0   | 0        |
|  | The Quacks of Quedlinburg                | 69.0   | 6        |
|  | PitchCar                                 | 377.0  | 1        |
|  | Undaunted: North Africa                  | 1581.0 | 3        |
|  | ShipShape                                | 4458.0 | 8        |
|  | Root                                     | 28.0   | 4        |
|  | Clank! Legacy: Acquisitions Incorporated | 73.0   | 2        |
|  | Targi                                    | 122.0  | 6        |



# Conclusions



## Goals

- Reduce user churn.
- Increase time spent on website.
- Attract new users to BGG community.
- Attend to every users' personal needs.



## Moving Forward


- A/B Testing.
- Constant update of database with new user ratings and board games.
- Include data from other major websites.
- Analyse online discussions using NLP techniques.





# THANKS !

Do you have any questions?



CREDITS: This presentation template was created by **Slidesgo**, including icons from **Flaticon**, and infographics & images by **Freepik**.

# Deployment: Web Application

Filter Options

Player age (min)

5.0015.00

Player count (max)

210

Play time (max)

30.001200.00

Complexity


1.005.00

Year

19902020

Filter

Clear filters



## board game nomads

Enter Board Games You Like

List of games

Wingspan (2019) XLost Ruins of Arkak (2... XArchitects of the Veil... X

Advanced filter options

Filter is: OFF

Select recommendation type

☒ Default

☐ By popularity

Recommend

Cancel

☐ Diversify games!

Recommended games

#1. Robin of Locksley (2019)

#2. Wayfinders (2019)

#3. Catacombs Cubes (2020)

#4. Deep Vents (2020)

#5. Totemic (2020)

#6. Clank! Legacy: Acquisitions Incorporated (2019)

#7. King of Tokyo: Dark Edition (2020)

#8. Marvel United (2020)

#9. Wreck Raiders (2019)

#10. Dominations: Road to Civilization (2019)

#11. Cetan: Starfarers (2019)

#12. Infinity Gauntlet: A Love Letter Game (2020)

prev

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next

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