Building a board game recommender app

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Presented at:

PDSG Applied Data Science Session: Data Stories

Code on Github: johnmburt/boardgame_recommender

Web app: jmb-boardgame-recommender.herokuapp.com

Talk video: https://youtu.be/EuVLhfaE8xE

The board game hobby

Huge number of games: > 1 million published*

Many genres, difficulty levels, mechanics, etc.

* boardgamegeek.com

How do people find good games?

Game store: expert staff recommendations

Online: ????

Recommender systems

"If you liked that, then you might also like this…"

Collaborative filtering

Use product ratings from many users to guess what to recommend

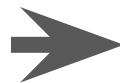Common method: matrix factorization

Matrix factorization

Utility matrix:

	Bob	Pat	Jill	Fred
Agricola	9			1
Catan	6	10	9	2
Pandemic	4		10	3
Monopoly	1			10

Matrix factorization

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	Bob	Pat	Jill	Fred
Agricola	**9**			**1**
Catan	**6**	**10**	**9**	**2**
Pandemic	**4**		**10**	**3**
Monopoly	**1**			**10**

Item factors

f1	**f2**
1.2	.8
.5	.4
.7	.2
1.6	1.2

X

User factors

f1	.3	1.2	.6
f2	.8	.1	1.5

Matrix factorization

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Dimensionality reduction: SVD

Utility matrix:

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Pandemic	**4**	**2**	**10**	**3**
Monopoly	**1**	**1**	**1**	**10**

Item feature "coordinates"

F1	**F2**	**F3**	**F4**	**F5**
1.2	.8	.4	.6	1.2
.5	.4	.2	1.7	.3
.7	.2	.6	.5	.5
1.6	1.2	1.2	.9	.2

Nearest neighbor search of game feature space for recommendations

Item feature "coordinates"

	F1	F2	F3	F4	F5
Agricola	1.2	.8	.4	.6	1.2
Catan	.5	.4	.2	1.7	.3
Pandemic	.7	.2	.6	.5	.5
Monopoly	1.6	1.2	1.2	.9	.2

First two dimensions of board game feature space

mean_rating
- 0.0
- 3.0
- 6.0
- 9.0
- 12.0
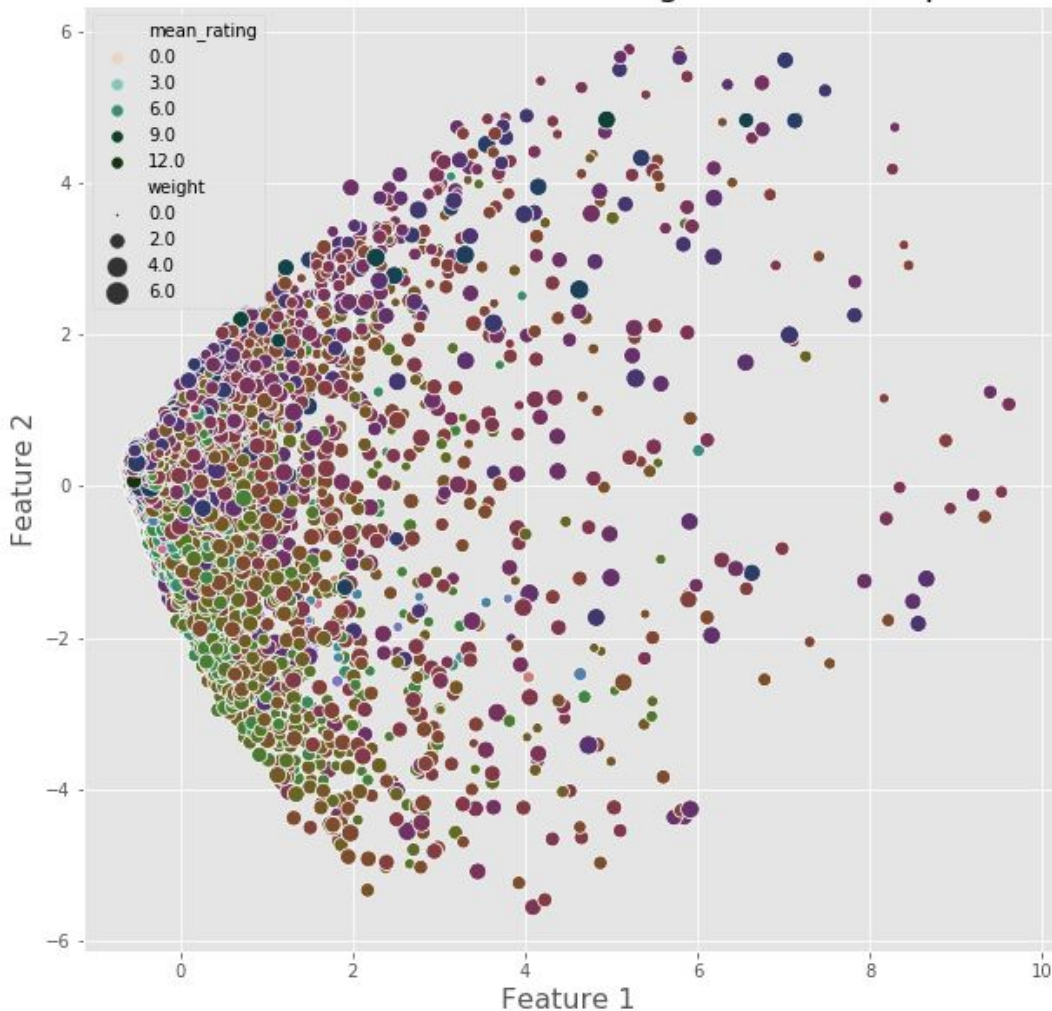
weight
- 0.0
- 2.0
- 4.0
- 6.0

Recommender web app

App URL: jmb-boardgame-recommender.herokuapp.com

Python code on Bokeh server, hosted on Heroku.

Tabbed dashboard style: Simple and Advanced game search tabs.

Simple Game Recommender:

- User enters up to eight game titles they like, and clicks "Recommend".

- App does nearest neighbor search to each liked game.

- Randomly selects five games from most common neighbors.

- Presents recommended in list with game box thumbnail, title, an info link and
  Amazon buy link.

Games you like:

pandemic

catan

Enter some game names you like:

Reset game list

Recommend some games!

Games we recommend:

Acquire
Info   Buy on Amazon

Ascension: Deckbuilding Game
Info   Buy on Amazon

Dominion
Info   Buy on Amazon
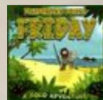
Friday
Info   Buy on Amazon

Mansions of Madness: Second Edition
Info   Buy on Amazon

Recommender web app

Advanced Game Recommender:

- Same search as Simple, but filters searched games by user selected game parameters

Games you like:

terra mystica

agricola

terraforming mars

Enter some game names you like:

Reset game list

Game weight range: 3.80 .. 5

Minimum average rating: 7

☐ Include game expansions

Game Categories:

Recommend some games!

☑ Any category   ☐ Party Game
☐ Card Game   ☐ Medieval
☐ Fantasy   ☐ Bluffing
☐ Wargame   ☐ Exploration
☐ Fighting   ☐ Humor
☐ Science Fiction   ☐ Animals
☐ Economic   ☐ Abstract Strategy
☐ Dice   ☐ Horror
☐ Adventure   ☐ Deduction
☐ Miniatures   ☐ Children's Game

Game Mechanics:

☑ Any mechanism   ☐ Simultaneous Action Selection
☐ Dice Rolling   ☐ Hexagon Grid
☐ Hand Management   ☐ Action Points
☐ Variable Player Powers   ☐ Auction/Bidding
☐ Set Collection   ☐ none
☐ Modular Board   ☐ Grid Movement
☐ Card Drafting   ☐ Deck
☐ Area Majority / Influence   ☐ Bag
☐ Cooperative Game   ☐ and Pool Building
☐ Tile Placement   ☐ Worker Placement

Games we recommend:

A Feast for Odin
Info   Buy on Amazon

Anachrony
Info   Buy on Amazon

Dominant Species
Info   Buy on Amazon

Food Chain Magnate
Info   Buy on Amazon

Liberty or Death: The American Insurrection
Info   Buy on Amazon

Future work

- Try different recommender models

- Port to "real" web server (Flask) with analytics

- Advertise to Boardgamegeek community

- Run some A/B testing with different models

jmb-boardgame-recommender.herokuapp.com