

INDENG 243 Project - Module 3

GoodReads: Book Analytics & Recommendation System User Interface

@Group: 18

@Member: Yanbo Wang, Wenxuan Yang, Yinuo Hu, Shichen Wu, Xinlin Huang, Jiaming Xiong

@GitHub: <https://github.com/YanboWang0204/GoodReads-Recommendation-System>

Agenda

- System Introduction
- Visualization & Exploratory Analysis
- Recommendation System User Interface
- Summary & Future Plans

Part 1) System Introduction

In order to provide better user experience with our Book Analytics and Recommendation system, our group decided to develop an interactive web-based user interface and deploy it online such that every user can access our system and enjoy the functions to help build their next to-read book lists.

You can directly access our system online through the following link:

[GoodReads: Book Analytics & Recommendation System website](#)

** In case you have any problems accessing the website, it might be because our web page meets the resource limit and need to reboot it for new users. In that case, please contact us by [email](#) to let us know, thank you.*



Fig 1.1: Snapshot of system welcome page

1.1 System Pages Overview

The system can be broken down mainly into three parts (see Fig 1.2):

- 1) **Visualization and Exploratory Analysis** of book information and reader reviews data from the source website *GoodReads.com*;
- 2) **Recommendation System** which will provide a list of book recommendations for book lovers given certain user input, and demonstrates helpful snapshots of recommended books' information;
- 3) **Documentation** about the technical details on building the website and the recommendation models.

You can switch on the left-hand sidebar on the welcome page to play with different functions as you like.

Visualization & Exploratory Analysis

In this module, we conducted data visualization & exploratory data analysis on crawled data from [GoodReads.com](https://www.goodreads.com).

Here we provide an overview of datasets and classify books by their genres where you can select the book genres you are curious about in the multi-select boxes for more specific visualization.

Recommendation System

This is the main module for our recommendation system. You can try our system by following up procedures described in pages. The main models used in our system are described as follows:

- Recommendation models
 - Popularity model (Baseline)
 - Content-based filtering
 - Collaborative filtering
 - Ensemble model

Documentation

Explanation of several important components of project, including:

- Data source
- Data Visualization & Exploratory Analysis
- Recommendation System
- Interaction tool vis Streamlit

Fig 1.2: System pages overview

1.2 Target Audience & Impacts

Our system provides services for several categories of audience and help make beneficial impacts to their reading or research experiences, including:

- 1) **Researchers and professionals** with technical background and expertise who wish to explore more reading patterns and statistical trends of book lovers for research use. For this group, they can investigate our “Visualization & Exploratory Analysis” page to view clear visualizations of the datasets and insightful analytics from various perspectives to comprehensively grasp readers' preferences.
- 2) **Non-technical book lovers** who simply wish to build their next to-read book lists. For this group, they can use our “Recommendation System” page and follow the prompts for several questions about their past reading history, and then our system will output a list of recommended books for them, which is easier to use and highly accurate to cater for different users' reading tastes.

Part 2) Visualization & Exploratory Analysis

In order to better assist book enthusiasts in understanding the information contained in our database system, we conducted a visualization of the data in Module 1 and integrate this part in our interactive website. We invite you to explore our [Jupyter notebook](#) for more information on visualization and exploratory analysis.

2.1 Overview of All Books

To gain a broad understanding of books, we firstly developed an overview visualization of important book metrics and explored their relationships on the “Visualization & Exploratory Analysis” page.

Here are some topics we conclude in this part:

- Average Rating v.s. Genres
- Rating distribution among genres
- Rating/Review Number v.s. Genres
- Awards across genres

The following are some visualization examples:

- The bubble chart helps users to learn more about relationships between the *review number* and *rating* for books of different genres.

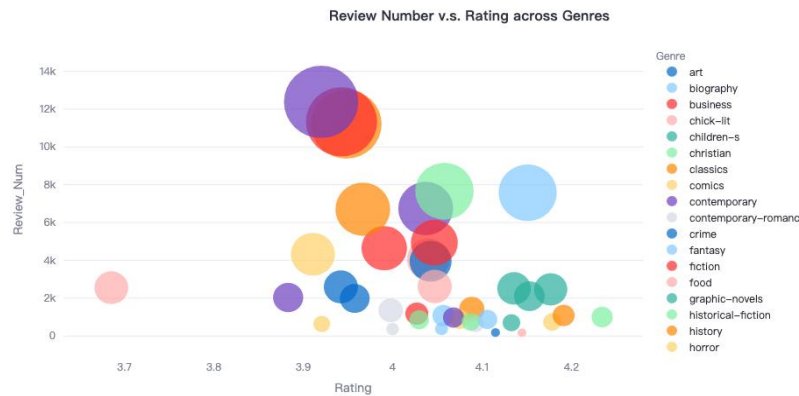


Fig 2.1: Review Number v.s. Rating across Genres

- To visualize genre distributions in individual awards, our system enables users to choose the awards they are curious about and give back the results, which is friendly for user interactions.

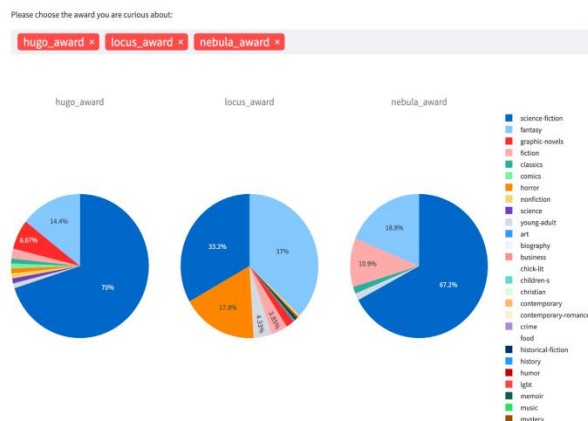


Fig 2.2: Genre distribution in individual awards

2.2 Books of Selected Genres

In this section, we will look into the visualization and exploratory analysis by genres. By using this interactive visualization page, readers will easily comprehend the distribution of ratings and the prevailing trend in the genres that they find interesting.

In order to start the analytical process, we provide a selection box for users to select a book genre of interest. A dashboard will show the general rating information of this genre (see Fig 2.2), including the average rating, average rating number, average review number and the rating distribution (1~5 stars percentage) of the selected genre.

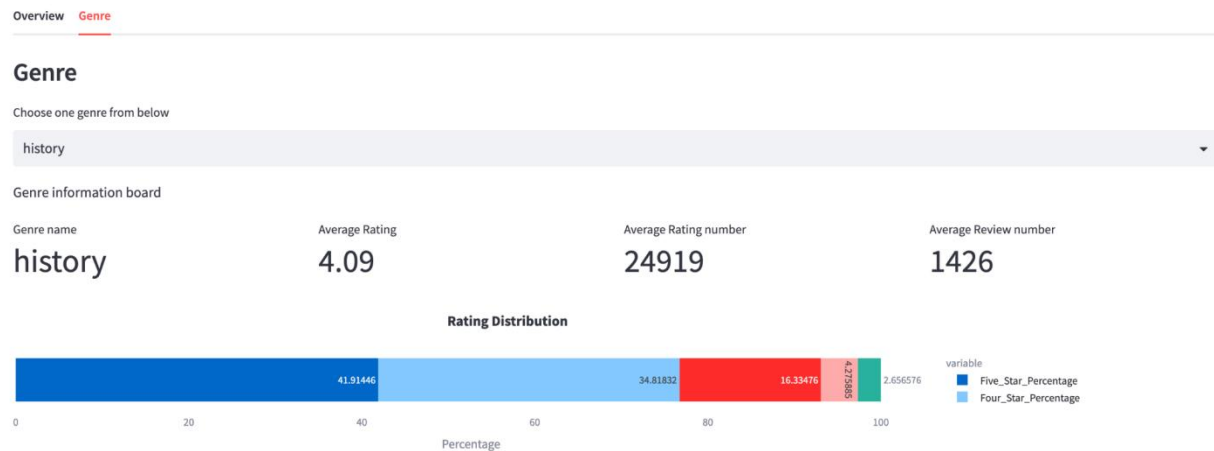


Fig 2.2: book information dashboard of selected genre

As winning awards signifies the official recognition of a book's merit, we compile a list of the total number of awards won by books in this genre and arrange them in descending order. Users can refer to the most commonly awarded prizes in the genre of interest as a guide to select well-regarded books.

Award_Name	Num
pulitzer_prize	27
national_book_critics_circle_award	22
national_book_award_finalist	15
los_angeles_times_book_prize	13
cundill_history_prize	10
national_book_award	10
ambassador_book_award	8
mark_lynton_history_prize	8
samuel_johnson_prize_for_nonfiction	7
lionel_gelber_prize	7
hesseltitman_prize	7
duke_of_westminster_medal_for_military_literature	7
wolfson_history_prize	6

Fig 2.3: Award & Number of times winning in selected genre

We also enable users to refer to visualizations for statistics about a specific book in their preferred genre. This feature enables users to track a book's trend by examining the total number and time-based statistics of added to shelves, ratings, reviews, and want-to read counts (see Fig 2.4).

Choose a book under this genre you are interested in

Alexander Hamilton

Added

512384

Ratings

168562

Reviews

9689

To-read

288464

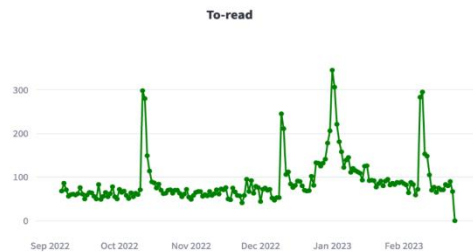
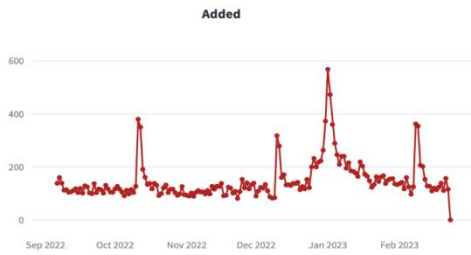


Fig 2.4: Statistics of a specific book

Part 3) Application of Recommendation System

The recommendation system page of our website is an interactive platform built for a non-technical audience. Based on users' input, it will be able to offer personalized book recommendations. This platform can be directly adopted in a variety of real-life situations such as bookstores.

Homepage

Visualization & Exploratory Analysis

Recommendation System

Documentation

Recommendation System

Welcome to our recommendation engines!

With our recommendation system, we will first request you to choose some book genres you are curious about. Our system will then provide a list of books of those genres from our database and ask you to give ratings on books you might have read before.

Then our fine-tuned models will recommend books you might be interested in and provide you with some snapshots of their detailed information.

🤔 What if you have not read any books in the list but still want recommendations?

Don't worry! In that case, we will recommend the highest rated books in your selected genres based on reader reviews from *GoodReads.com*.

Hi, please choose the book genres that you are curious for reading:

fiction x

art x

Please select the books that you have read and provide a rating for each book on a scale of 1 (worst) to 5 (best) to indicate your satisfaction level

Choose an option

I have read none of these books

Fig 3.1: Interactive recommendation system page

3.1 Collect User Information

Our recommendation system will first ask users which book genres they are interested in and then the system will display the books of those selected genres in our database and ask users whether they have read any of them.

- **If the user has come across none of them before**, he/she can click the button “**I have read none of these books**” In this case, the system will recommend the top ten books with the highest ratings in selected genres.
- **If the user has already read some of the books shown**, they can select the ones they have read and give ratings from 1 (worst) to 5 (best). This information will be the input for back-end recommendation models and help output more personalized recommendations.

For instance, suppose we want to get recommendations to explore more books in **science fiction**.

- **Step 1**: Select **science fiction** from the first drop-down box asking for genres;
- **Step 2**: Suppose we have read *The Threebody Problem* and *Way Station*, so we should select these two in the second drop-down box;

Here, we can surely take a glance at all the books to find them, but that could be time-consuming. *Instead, our recommendation system allows you to quickly find the books by simply typing part of the title.*

As illustrated in Fig 3.2, if we type “way”, *Way Station* will pop up there.

The screenshot shows a web interface for selecting book genres and searching for books. At the top, there is a prompt: "Hi, please choose the book genres that you are curious for reading:". Below this is a search bar containing "science-fiction" with a red "x" button to clear it. Below the search bar is a prompt: "Please select the books that you have read and provide a rating for each book on a scale of 1 (worst) to 5 (best) to indicate your satisfaction level". Below this is a search bar containing "way". Below the search bar is a list of book titles: "Wayward", "Way Station", "The Long Way to a Small Angry Planet", and "Gateway".

Fig 3.2: Select book genres & Quick search for books

- **Step 3**: Then we can just rate each of the books from 1 to 5;

The screenshot shows the user interface for rating books. At the top, there is a prompt: "Hi, please choose the book genres that you are curious for reading:". Below this is a search bar containing "science-fiction" with a red "x" button to clear it. Below the search bar is a prompt: "Please select the books that you have read and provide a rating for each book on a scale of 1 (worst) to 5 (best) to indicate your satisfaction level". Below this is a search bar containing "Way Station" and "The ThreeBody ...". Below the search bar is a table with two rows. The first row is for "Way Station" and the second row is for "The ThreeBody Problem". Each row has a "Book name" column and a "What's your rating for this book?" column. The "Way Station" row has a rating of 4, and the "The ThreeBody Problem" row has a rating of 5. The ratings are shown on a scale from 1 to 5 with a red dot indicating the selected rating.

Fig 3.3: Rate books read before

But what if some readers have not read any of the books provided?

Under such cases, users can simply click the button “**I have read none of these books**” under the second drop-down box illustrated by Fig 3.4 (As detailed later, we can select books from the list to get more detailed information).

Hi, please choose the book genres that you are curious for reading:

science-fiction ×

Please select the books that you have read and provide a rating for each book on a scale of 1 (worst) to 5 (best) to indicate your satisfaction level

Choose an option

I have read none of these books

If have read none of the books listed, please take a look at the top-rating books in your curious genres:

	Title	Rating
4,475	Hyperion	4.25
1,434	The Hitchhikers Guide to the Galaxy	4.23
2,244	Foundation	4.17
4,530	The Martian Chronicles	4.15
4,537	The Sirens of Titan	4.15
4,546	Ubik	4.1
4,527	The Left Hand of Darkness	4.09
2,248	Jurassic Park	4.08
4,444	A Scanner Darkly	4.02
4,161	A Canticle for Leibowitz	3.98

Are there any books in the above list that sparks your interest? Select them for more information!

Choose an option

Fig 3.4: Recommendations if users read none of the books provided

3.2 Choose Recommendation Approach

After collected user’s reading history, we provided three recommendation approaches as follows:

- 1) Based on your previous reading list and ratings: (**Content-based model**)
- 2) Based on readers with similar reading tastes: (**Collaborative filtering model**)
- 3) Based on the above two perspectives: (**Hybrid model**)

In a real-life situation, we will provide recommendations by taking results from these three models together. The users can choose to use different recommendation approaches by clicking the corresponding buttons (see Fig 3.5).

* Here we provide difference choices, because in a real-life situation, different users might have different preferences to find their next to-read books. Some users might want to listen to other users’ advice and some might be more stick to his own tastes. To cater to different needs, we offer these choices to increase the flexibility of our system.

Please select a recommendation approach for you:

☐ Based on your previous reading list and ratings
☒ Based on readers with similar reading tastes
☐ Based on the above two perspectives

Run

Your reading list recommendation is on the way!

Based on users who have similar tastes as you, we guess the following books might be your favourites!

	Title	Rating
4,541	The Windup Girl	3.75
2,738	At the Mountains of Madness	3.84
2,005	The City the City	3.9
6,392	Stand on Zanzibar	3.94
4,161	A Canticle for Leibowitz	3.98
2,883	The Willows	4.08
4,490	Rendezvous with Rama	4.11
4,537	The Sirens of Titan	4.15
4,517	The Diamond Age Or a Young Ladys Illustrated Primer	4.16
4,533	The Player of Games	4.28

Fig 3.5: Recommendation approaches and the result list demo

For example, if we choose “**Based on readers with similar reading tastes**” and click “**Run**”, the system will return the recommendation list of top 10 books that models guess the user is more probably like to read. Then the user can choose any books he is interested in for more detailed information:

Are there any books in the above list that sparks your interest? Select them for more information!

Choose an option ▼

Fig 3.6: Drop-down box for choosing books the user has interest in

For example, he/she chooses *the Player of Games* and *the Willows*:

The City the City

At the Mountains of Madness

A Canticle for Leibowitz

Rendezvous with Rama

The Diamond Age Or a Young Ladys Illustrated Primer

The Sirens of Titan

The Windup Girl

Stand on Zanzibar

The Player of Games × The Willows ×

The Player of Games ▼

The Willows ▼

Fig 3.7 Two books chosen

If the user clicks each box with book name (Fig 3.7), it will show the information overview of each book, including the book basics, statistics, book tags and selected book reviews (see Fig 3.8):

- **Book basics:** Title, Author, Rating (also distribution), Review/Rating number;
- **Book statistics:** Times of Added to Shelves, Rating number, Reviews number, Times marked as To-read;
- **Book tags & selected reviews:** the top representative keywords and reviews extracted by NLP techniques.

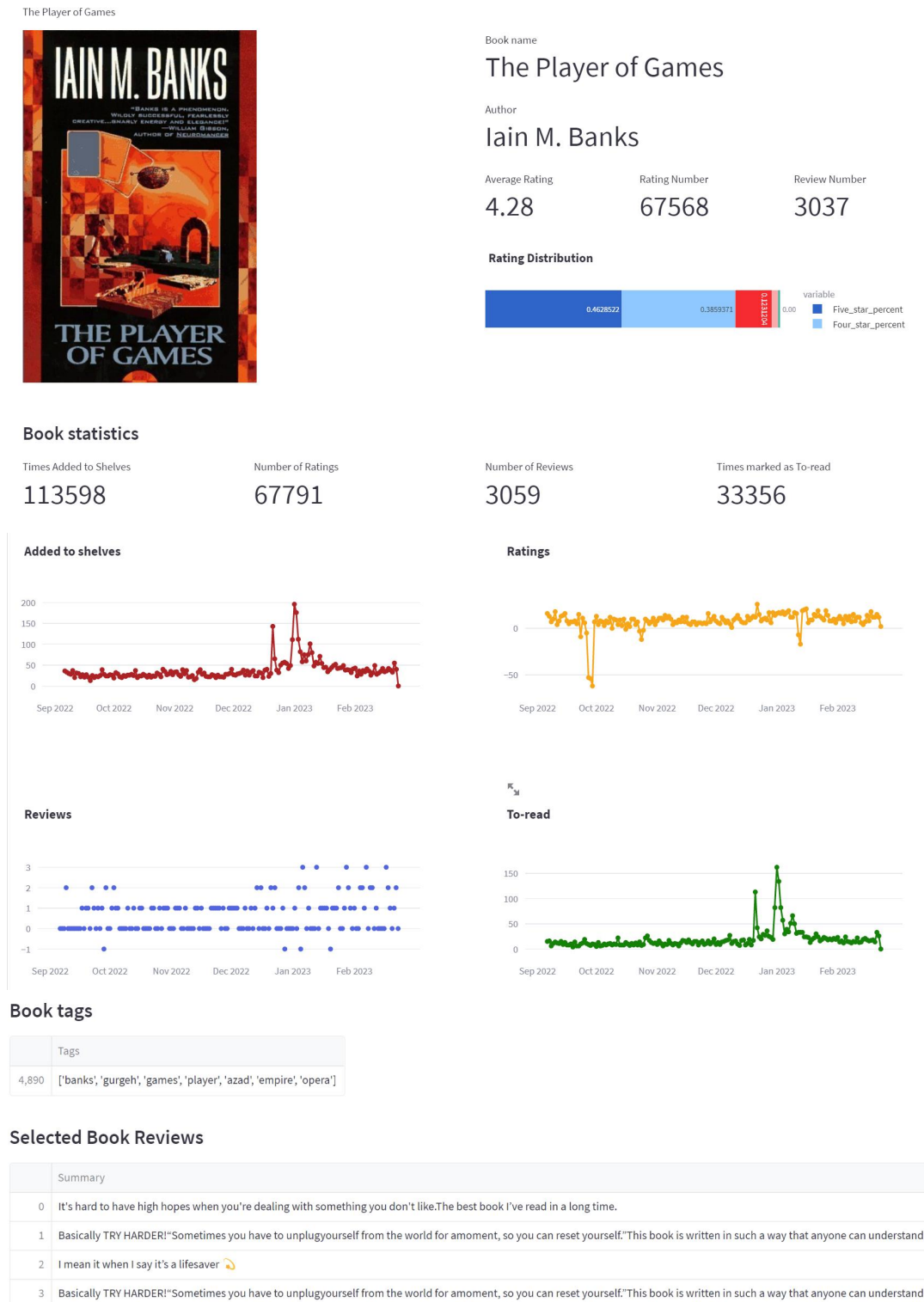


Fig 3.8 Book basic information, statistics, tags & selected reviews

Part 4) Summary & Future plans

In this module, we developed an online interactive user interface to truly help potential users more easily access our recommendation system and generate their next to-read book lists. We hope this website can at least contribute to users' better reading experiences in the following bullet points:

- Save time wasting in web searching for books cater to personal reading tastes;
- More accurate recommendation taking past reading history into account;
- User-friendly easy-use system to generate recommendations at few clicks;
- Automated information extraction to grasp a whole picture of books recommended, precisely targeting the next to-read books.

As a next step, we will consider to build a more fine-tuning system by:

- Broader our current book database and crawl more data from helpful websites to support analytics;
- Pursue a higher recommendation accuracy by considering more sophisticated models and retrieving more user interactions to provide more precise recommendations;
- Improve the appearance and functions of our website to build better experiences.