Books Recommender System

System recommends books using the K-Nearest Neighbours and Cosine Similarity algorithms from a list of 10000 books with 1 million ratings

Requirements

Python version: 3.10.2
Python modules: streamlit, numpy, Pillow, pandas, urllib3, scikit-learn

Dataset

- goodbooks-10k

Dataset contains ratings (go from 1 to 5) for 10000 books. Unique number of every book

The most important file is books.csv which has metadata for each book (goodreads IDs, authors, title, average rating, etc.).

I used book IDs and user IDs in recommending process. For books, they are 1-10000, for users, 1-53424. Every user has made at least two ratings.

Goals

- use 2 recommend methods: KNN, Cosine Similarity
- compare these 2 methods
- build web-app which display titles with some basic data and with picture of book cover

Files

- `app.py` the main file of streamlit web-app, have to be runned in by command 'streamlit run'
- `knn.py` python file containing a k-NN Algorithm
- `cossim.py` python file containing a Cosine Similarity Algorithm
- `Analysis of dataset.ipynb` draft jupyter notebook with some helpful charts, commands, not included in app.
- `requirements.txt` text file with names of needed python modules

Running application

- Clone repo
- Open cmd prompt in working directory
- Run command:

  ```
  pip install -r requirements.txt
  ```

- To run app, write following command in cmd prompt

```
streamlit run app.py
```

- Then wait a moment, after few seconds you shoulds following code:

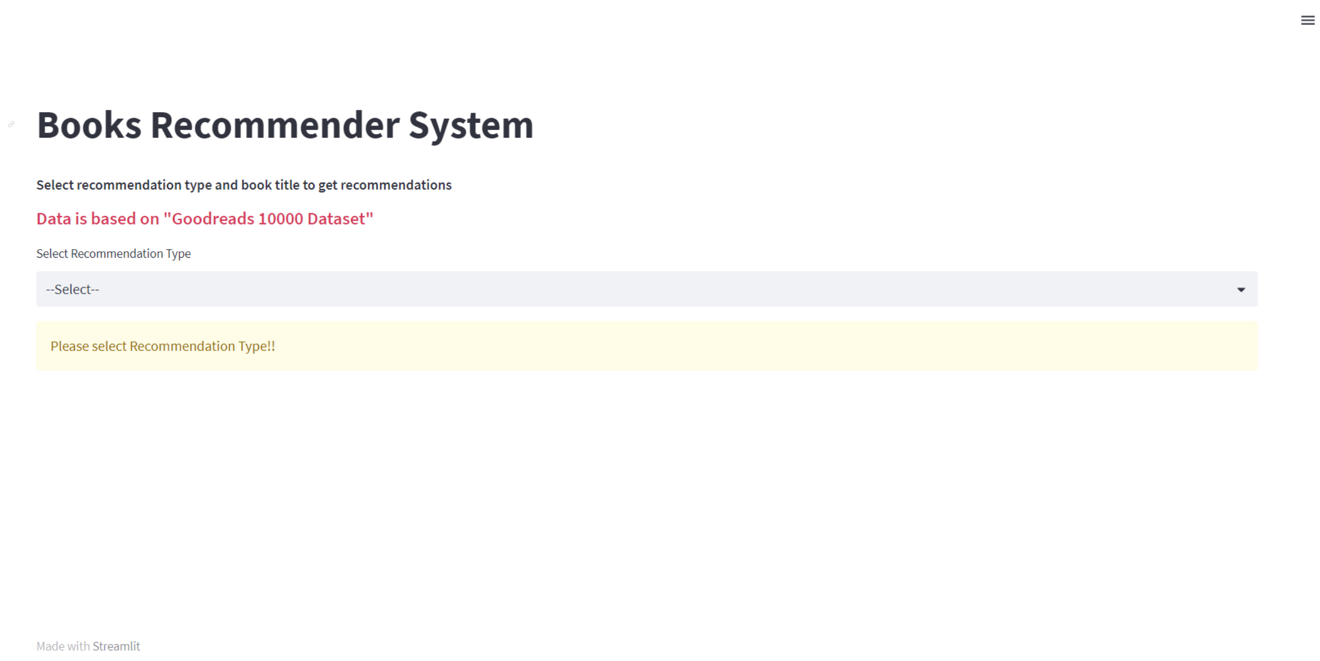
```
You can now view your Streamlit app in your browser.

Local URL: http://localhost:8501
Network URL: http://192.168.1.1:8501
```

And web-app should open in your browser. If not just copy and paste link `Local URL` or `Network URL`

Screenshots

After page is loaded you shold see following view:



Books Recommender System

Select recommendation type and book title to get recommendations

Data is based on "Goodreads 10000 Dataset"

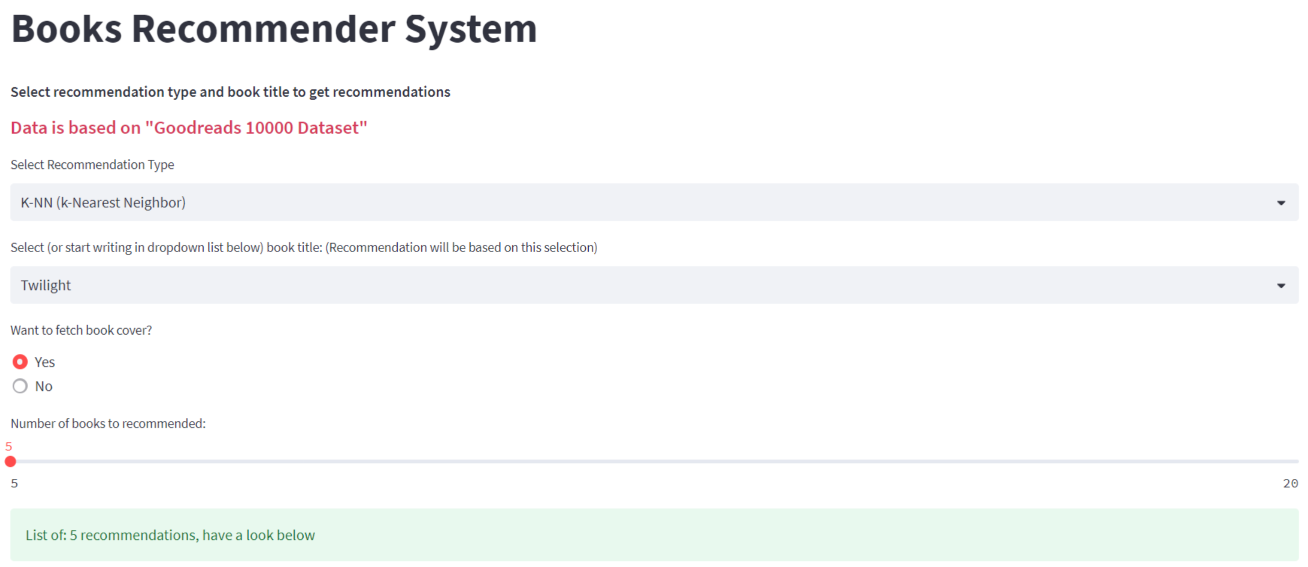
Select Recommendation Type

--Select--

Please select Recommendation Type!!

Made with Streamlit

Input page for k-NN (same for Cosine Similarity)



Books Recommender System

Select recommendation type and book title to get recommendations

Data is based on "Goodreads 10000 Dataset"

Select Recommendation Type

K-NN (k-Nearest Neighbor)

Select (or start writing in dropdown list below) book title: (Recommendation will be based on this selection)

Twilight

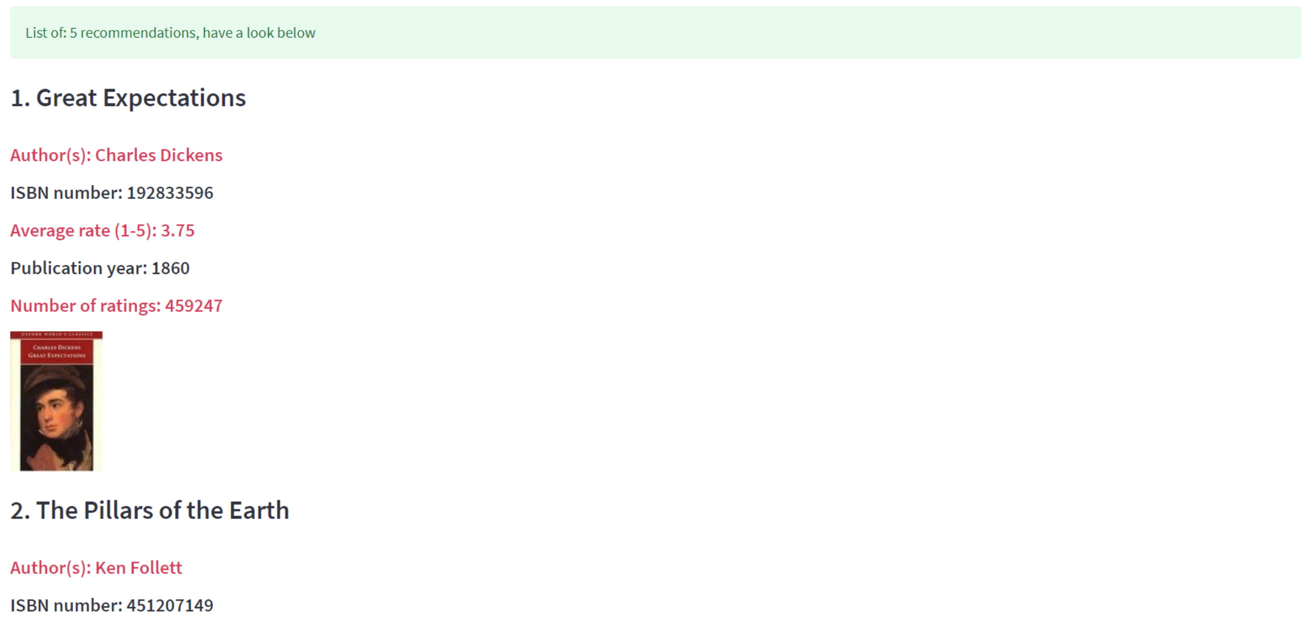
Want to fetch book cover?

● Yes
○ No

Number of books to recommended:

List of: 5 recommendations, have a look below

Example results of recommendation:



List of: 5 recommendations, have a look below

1. Great Expectations

Author(s): Charles Dickens

ISBN number: 192833596

Average rate (1-5): 3.75

Publication year: 1860

Number of ratings: 459247

2. The Pillars of the Earth

Author(s): Ken Follett

ISBN number: 451207149

Web-app

App is also available on this link: https://lukecolt-books-recommender-app-jq49ty.streamlit.app/

Recommenders

I used two very popular ways to build a recommendation system:

Content Based Filtering

Content-based filtering is to use content or different attributes e.g tag products, keywords. To understand behaviour of the single user, method looks up keywords in the database and recommend products with the identical attributes.

Cosine Similarity

To perform this I used the Cosine Similarity to calculate a numeric distance between two books. Cosine Similarity, it is defined as following:

$cosine(x,y) = \frac{x. y^\intercal}{||x||.||y||} $

It computes similarity between every pair of books and then suggests books by simply choosing and compering similarity values to a particular book that user liked. Books with the lowest result of similarity are (according to system) recommendable. To build this recommender used the following book's attributes: *title*, *authors* and *average_rating*.

Collaborative Filtering

Collaborative Filtering is using the idea that next user's choice will be similar as previous choices. In this method the features are not used to recommend, rather clustering is used.

KNN

A recommender system k-Nearest Neighbor (k-NN) based is a one of collaborative filtering systems that uses the ratings (from users) to recommend. k-NN calculate the similarity between each pair of items, and then system (using these values) try to estimate how this specific user will rate a given item. k-NN is used here to find clusters of similar users based on *book_id*, *rating* and *user_id* and make predictions using rating of top-k nearest neighbors.

Conclusion

For these data I think that Cosine Similarity gives better recommensations than k-NN. It can be caused by the fact that some user didn't rate so many books e.g some users give ratings only to 2 books.