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AIE425 Intelligent Recommender Systems
Assignment#1:Neighborhood CF models (user, item-based CF)
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1.Introduction
Built an intelligent recommender system for this assignment that makes game recommendations based on user reviews and ratings. Finding comparable games that fit each user's interests and analyzing trends in user preferences were the main goals. The algorithm is able to successfully recommend games that users are likely to like by analyzing user interactions and feedback on a variety of games. Collaborative filtering (CF) models—more especially, user-based and item-based strategies with both cosine and Pearson similarity measures—were used to complete this recommendation process.
2.Recommender Systems Ideas
When I went back to the lectures and searched, I found that there are many recommender systems like:
Netflix Recommender System
Amazon Recommender System
Spotify Recommender System
Google News Recommendations
RAWG Game Recommender, and many more.
But for this assignment, I chose to work on the RAWG Game Recommender.
3.Customer Feedback Collection and Rating System on RAWG
Users can rate games on a scale (usually out of five stars) and write reviews about their experiences, which is how RAWG, a well-known game recommendation platform, gathers customer feedback. This information is crucial for understanding user satisfaction and game popularity because it provides direct insight into each user's preferences and opinions. The ratings are typically displayed in an aggregated average, which summarizes how the game is received by the larger user base.

4.Prepare The Collected Data
We use a lot of techniques to gather data, such as databases, web scrapers, web crawlers, and APIs.
I made the decision to develop an API. Getting the API key and registering for an account on the RAWG Video
Game Database API was the first step.After that, we created the code to
get information from the website.The coding then made it clear to me that I wanted the data organized with 7 games in colu
5.Data Collection & Preparation
We use a lot of techniques to collect data, such as databases, web scrapers, web crawlers, and APIs.
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The coding then made it clear to me that I wanted the data organized with seven games in columns and fifty users in rows.
5.1. Data Collection

Made the choice to develop an API.
Getting the API key and registering for an account on the RAWG Video Game Database API was the first step.
5.2.Data Structuring
Aimed to create a dataset where 50 users in rows and 7 games in columns.
5.3.Data Preprocessing
5.3.1.Encoding
Changed numerical values from category reviews.
Example:
Poor = 1
Average = 2
Good = 3
Very Good = 4
Excellent = 5
5.4.Dataset Preparation
50 users represented in the rows.
7 games represented in the columns.
6.Comparison User-based and item-based CF algorithms
6.1. User-Based CF: Using the preferences of other users who are similar to the user, user-based collaborative filtering suggests products to the user. It finds individuals who share similar preferences and makes recommendations for products they enjoyed.
How It Operates:
Similarity Calculation: Determine how similar users are to one another using metrics such as the Jaccard index, cosine similarity, or Pearson correlation.
Choose a neighborhood of people that are similar to you (for example, the top N similar users).
Recommendation Generation: Create suggestions for the intended user by combining the ratings of users who are similar.
6.2.Item-Based CF: Based on the similarities between items that the user has previously assessed, item-based collaborative filtering suggests items to the user. It finds and recommends products that are comparable to those the consumer enjoys.
How It Operates:
Similarity Calculation: Use metrics such as adjusted cosine similarity or cosine similarity to determine how similar two things are.
Recommendation Generation: Identify related products for each user-rated item and provide recommendations based on the ratings.

7.Description about Dataset
7.1. Dataset Overview
User reviews of a chosen 7 video games make up the dataset. It is organized in a matrix way, with the games shown in columns and users in rows. An integer number that represents a user's rating of a particular game is contained in each cell of the matrix. From 1 to 5, the ratings may be found where:
Poor = 1
Average = 2
Good = 3
Very Good = 4
Excellent = 5
7.2.Sample From Dataset

7.3.Data Collection
We use a lot of techniques to collect data, such as databases, web scrapers, web crawlers, and APIs.
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7.4.Data Preprocessing
To make matrix operations and similarity computations easier, user and game IDs were numerically encoded.

7.5. Rating Type
With integer values ranging from 1 to 5, the dataset employs a discrete rating system.
8.User-Based & Item-Based CF (Analytical Solution)
8.1. User-Based CF
9.1.1. Similarity Calculation (Pearson Correlation)

8.1.2. Rating Prediction

8.2.Item-Based CF
8.2.1.Similarity Calculation (Cosine Similarity)

8.2.2.Rating Prediction

9.Cosine Similarity & Pearson Correlation Coefficient
9.1. Cosine Similarity
9.1.1 User-Based CF
Cosine Similarity is Computed as:

A cosine similarity value close to 1 indicates that the users have similar rating patterns, while a value close to 0 indicates little to no similarity.
9.1.2 Item-Based CF
As with the user-based instance, each item is represented as a vector of ratings across all users, and you can identify which items are scored similarly by users by computing the cosine similarity between items based on how users have rated them.

9.2.Pearson Correlation Coefficient
9.2.1 User-Based CF
This metric evaluates how well a linear function captures the relationship between two users. It takes into consideration the users' average ratings.
Pearson Correlation Coefficient is Computed as: