



Collaborative Filtering Recommender System Report

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1. Function Descriptions

- ***get_top_similar_movies(movie_id, n = 10)***

This function returns the top n movies most similar to a given movie ID using **cosine similarity** computed from the movie-user matrix. It avoids self-comparison by removing the input movie from the results.

- ***recommend_to_user(user_id, n = 3)***

This function recommends n movies to a specified user by predicting ratings for movies the user hasn't rated. It uses a weighted average of similar movies the user has rated, weighted by cosine similarity values.

2. Preprocessing and Matrix Creation

- The ratings dataset was **filtered to include only the first 200 users**.
- The top movies were selected based on the number of ratings, but it was ensured that **Movie ID 1 (Toy Story)** and **Movie ID 4 (Waiting to Exhale)** are **included** even if they aren't in the top 200 by default.
- A **user-movie rating matrix** was constructed, where rows represent users and columns represent movies.
- The matrix was transposed to form a **movie-user matrix**, with each row representing a movie vector.
- **Cosine similarity** was computed between all pairs of movie vectors to create the **movie similarity matrix**.

3. Output

Top 10 movies similar to *Toy Story (1995)*:

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Top 10 similar to Toy Story (1995):
  movieId      title
0      260  Star Wars: Episode IV - A New Hope (1977)
1      296                Pulp Fiction (1994)
2      367                Mask, The (1994)
3      480                Jurassic Park (1993)
4      588                Aladdin (1992)
5      648                Mission: Impossible (1996)
6      780  Independence Day (a.k.a. ID4) (1996)
7     1265                Groundhog Day (1993)
8     3114                Toy Story 2 (1999)
9     4306                Shrek (2001)
```

Top 10 movies similar to *Waiting to Exhale (1995)*:

```
Top 10 similar to Waiting to Exhale (1995):
  movieId      title
0       25  Leaving Las Vegas (1995)
1       36  Dead Man Walking (1995)
2       62  Mr. Holland's Opus (1995)
3       95  Broken Arrow (1996)
4      150  Apollo 13 (1995)
5      266  Legends of the Fall (1994)
6      337  What's Eating Gilbert Grape (1993)
7      539  Sleepless in Seattle (1993)
8      587  Ghost (1990)
9      590  Dances with Wolves (1990)
```

Top 3 movie recommendations for user ID 200:

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Recommended movies for user 200:
      movieId      title
2945      3949 Requiem for a Dream (2000)
6315      48516      Departed, The (2006)
7372      79132      Inception (2010)
```