



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)*:

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)
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