GRAPH THEORY APPROACHES ON MOVIE RECOMMENDATION SYSTEM

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This study presents a comprehensive evaluation of a movie recommendation system utilizing three graph theory approaches: Genre-based correlation approach, User-movie ratings approach, and Genre distribution using in-degree approach. Movie recommendation systems are designed to suggest movies that users are likely to enjoy based on their viewing history and expressed preferences. Traditionally, these systems have relied on content-based filtering, and collaborative filtering. However, these techniques have some limitations; content-based filtering often lacks diversity and novelty in recommendations, while collaborative filtering struggles with the 'cold start problem'. Graph theory, with its ability to analyze the intricate relationships between users, movies, and genres, offers a promising alternative to these traditional techniques. The primary objective of this study is to explore the capabilities of these three approaches in generating personalized movie recommendations. The use of graph theory in movie recommendation systems involve representing the movie data set as a graph structure. This study utilizes a subset of the 'MovieLens' dataset, focusing on 40 movies from the year 2018 across 14 genres, rated by six hypothetical users assuming that they all have watched and rated all movies. In the first approach, similarity between two movies is quantified using a correlation metric. Highly correlated edges suggest that users who liked one movie might like other movie, while low correlated edges imply that liking one movie might not imply liking the other movie. In the second approach, movies are ranked by average user rating values, with ties sharing the same rank. Thus, we can recommend top-ranked movies for the users who have not watched any of these movies. From the third approach, we measured the number of movies in the data set belonging to each genre using in-degree value of each genre node in movie-genre bipartite graph. From that, we observed that recommendation system performs well for the higher in-degree valued genres, offering a wide range of options that align with users' interests. Despite the computational complexity involved, graph theory approaches offer more effective recommendation systems, balancing the limitations of traditional techniques and providing more personalized and diverse recommendations.

Key words: *Bipartite graph, Correlation, Ranking*