

ABSTRACT

Recommender systems play a crucial role in helping users discover content that matches their preferences amid the vast amount of available information. This study aims to compare the performance of two distinct recommender system approaches: Collaborative Filtering (CF) using the Singular Value Decomposition (SVD) algorithm, and Reinforcement Learning (RL) using the Deep Q-Network (DQN) algorithm. The primary objective is to evaluate the effectiveness of each method in generating relevant anime recommendations, particularly in scenarios involving both existing and cold-start users.

The dataset used in this research is sourced from Kaggle. Preprocessing steps include data cleaning, feature normalization, and genre encoding using one-hot encoding. The CF model is trained using tuned hyperparameters, while the RL model is built within a simulation environment and trained using a weighted reward function that incorporates user ratings, global anime scores, and genre similarity.

Evaluation is conducted using a Top-N Recommendation scenario with N values of 1, 3, 5, 10, 15, and 20. The evaluation metrics used include Precision@N, Recall@N, and F1-Score@N. For existing users, relevant items are defined as those with a reward equal to or above the 80th percentile of the user's reward distribution. For cold-start users, relevant items are defined as anime with a global score of at least 9.0.

The results show that the RL approach using DQN achieves competitive performance, especially in handling cold-start situations. Meanwhile, the CF model performs better for users with prior interaction history. This comparison highlights the strengths and limitations of each approach and provides insights into selecting the appropriate recommendation strategy based on user context.

Keywords: *Deep Q-Network, Reinforcement Learning, Collaborative Filtering, Anime Recommendation System.*