# Anime Recommender System

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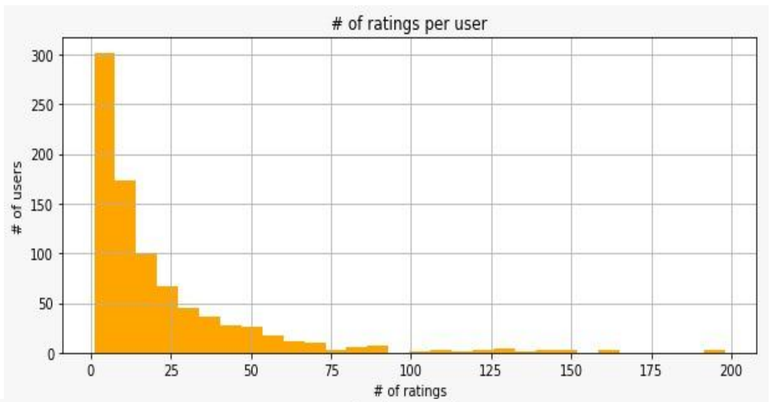
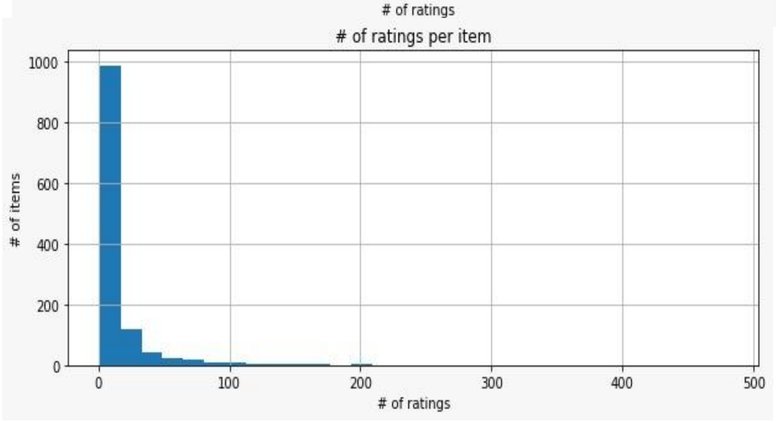
## INTRODUCTION

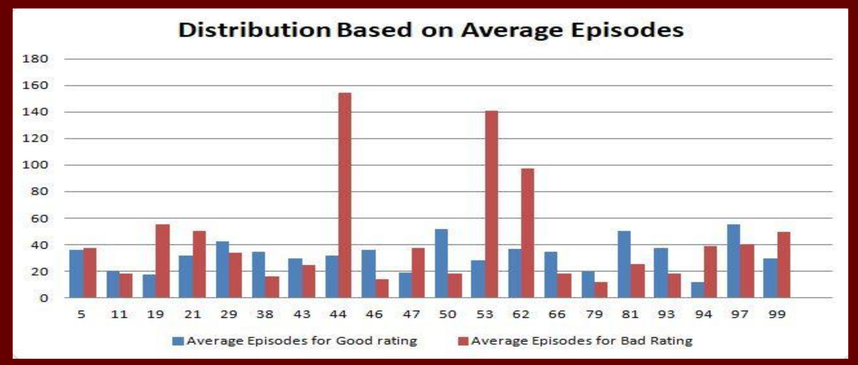
Our objective is to design a recommendation system that predicts anime TV series ratings for a user based on previous anime ratings given by that user. In this project, we exploit the Neural Collaborative Filtering and implicit features like number of episodes to design a framework, based on user-anime, which recommends popular anime TV series.

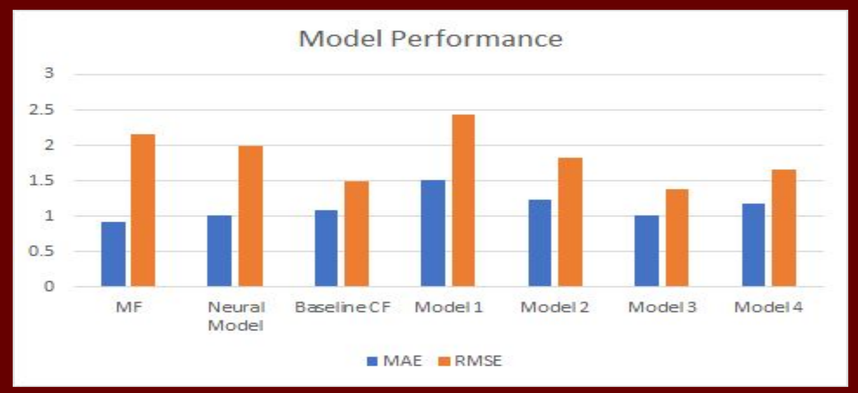
## DATASET

The Anime Database has been used for the project which comprises 73,516 users and 12,294 anime. Because of time complexity a subset of data was used to design the proposed framework with 1000 users and 2000 anime with a testing split of 0.25.
[https://www.kaggle.com/CooperUnion/anime-recommendations-database#anime.csv]

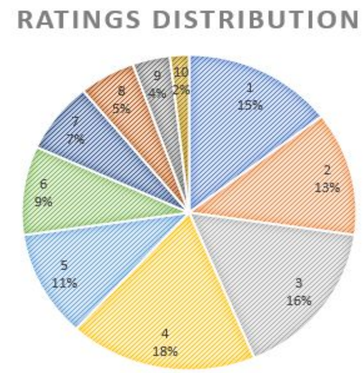



| Design | MAE | RMSE |
|---|---|---|
| Matrix Factorization | 0.93 | 2.15 |
| Neural Model | 1.02 | 2.00 |
| Rating Cosine Similarity | 1.08 | 1.50 |
| Cosine Similarity(Rating + #episodes) Model 1 | 1.51 | 2.43 |
| Cosine Similarity (0.8* rating + 0.2*Episode count) Model 2 | 1.24 | 1.83 |
| Cosine Similarity (rating X #episodes) Model 3 | 1.02 | 1.39 |
| Cosine Rating Similarity with closeness of episodes in prediction Model 4 | 1.18 | 1.66 |




## METHOD

- Matrix Factorization
- Neural Collaborative Filtering
- Baseline Collaborative Filtering
- Cosine Similarity with Number of Episodes
- Adding Weighting Mechanism to incorporate feature

The idea behind the last 2 methods was to use the number of episodes as a feature in calculating similarity between users or to use this feature in rating prediction as well.

## RESULTS

MAE and RMSE evaluation with different models are shown above and the best performance we observed was on collaborative filtering using similarity between user calculated with multiplication of ratings similarity and average # of episodes similarity between users.

## TAKE AWAY

We got the understanding of recommendation system and rating predictions with base models and further working to incorporate a feature in user similarity calculation and rating prediction helped us to understand how to choose a feature and to analyse its impact.

## FUTURE WORK

We can extend our work further to try more combinations of calculated similarity and incorporate them into neural network for collaborative filtering. Another major challenge we faced was the cold start which we are planning to work with content based approach.