

RECOMMENDATION SYSTEMS

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INTRODUCTION

Recommendation systems are a critical component of modern business strategies, playing a pivotal role in providing personalized experiences to users. These systems leverage data analysis techniques to predict user preferences and suggest products, services, or information that align with these preferences. They represent a powerful tool for businesses to understand their customers better and provide a tailored user experience.

Recommendation systems operate on the principle of finding patterns in user behavior data, which can be explicit, such as ratings, or implicit, like click-through rates. They use various algorithms to predict and recommend items that a user might find interesting.

BUSINESS UNDERSTANDING

Implementing a recommendation system can significantly enhance the user experience and can also drive business growth.

- Increased user engagement by providing personalized recommendations.
- Improved conversion rates when users are presented with products or services that align with their interests.
- Customer satisfaction a recommendation system enhances the user experience by making navigation easier and more personalized.
- Market position businesses that provide personalized experiences through recommendation systems can differentiate themselves from competitors

PROBLEM STATEMENT

Recommendation systems are applicable in many fields and are used in various ways to improve the business and maximize on profits. For instance they can be used for;

- **Personalization** businesses need to understand their customers' preferences and behaviors in order to provide personalized recommendations.
- **Sales growth** recommendation systems can help businesses increase their sales by suggesting relevant products or services to customers.
- **Improved user experience** by recommending relevant content, businesses can enhance the user experience on their platforms.
- **Data Analysis** businesses can gain valuable insights from the data collected through recommendation systems.

OBJECTIVES

MAIN OBJECTIVE

To build a model that provides top 5 movie recommendations to a user, based on their ratings of other movies.

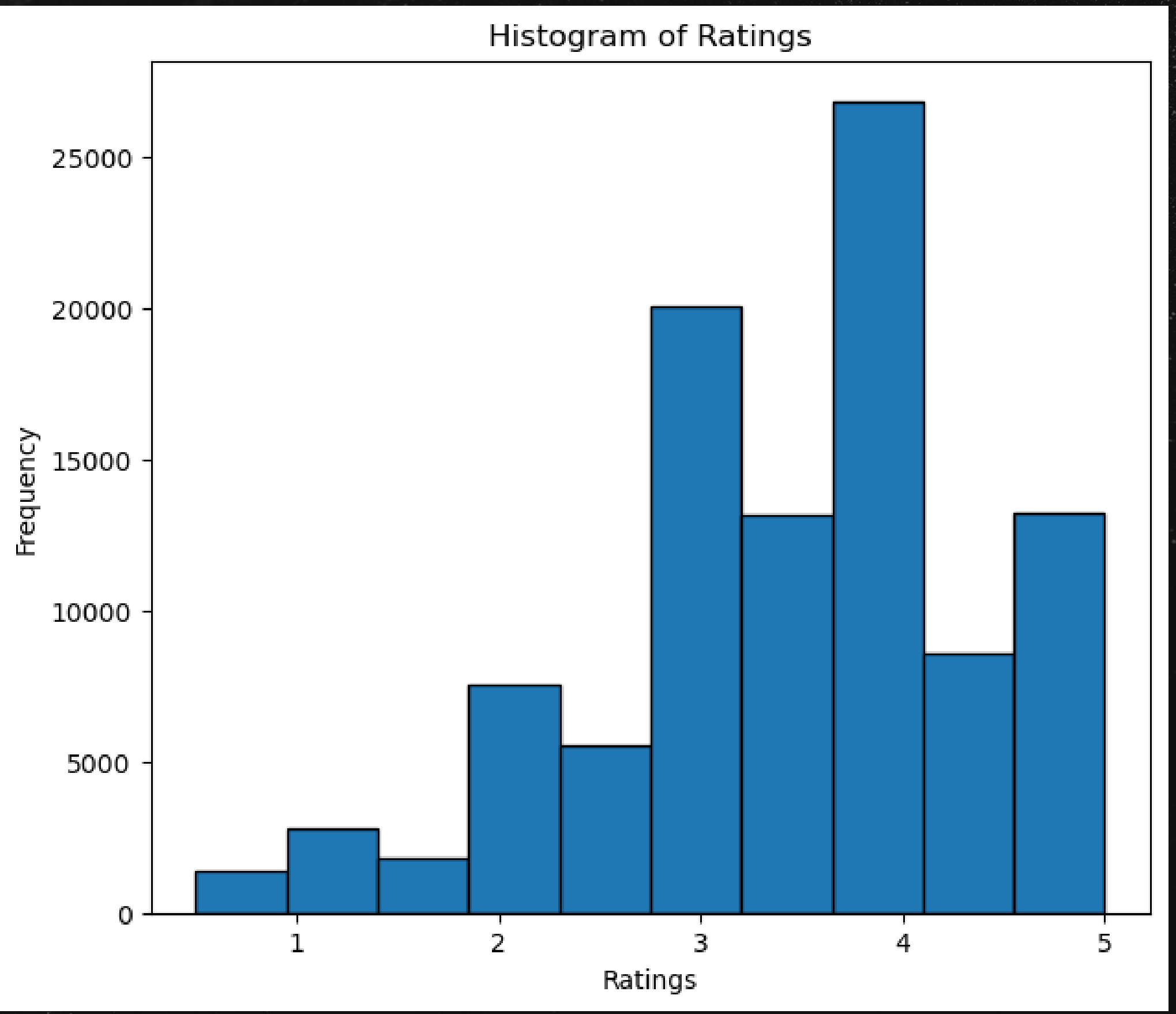
SPECIFIC OBJECTIVES

- To provide distributions of the ratings and the year released.
- To provide analysis of the movies that received the most rating and rated highly.
- To provide an analysis on which models did well to build the recommendation system through their error analysis.

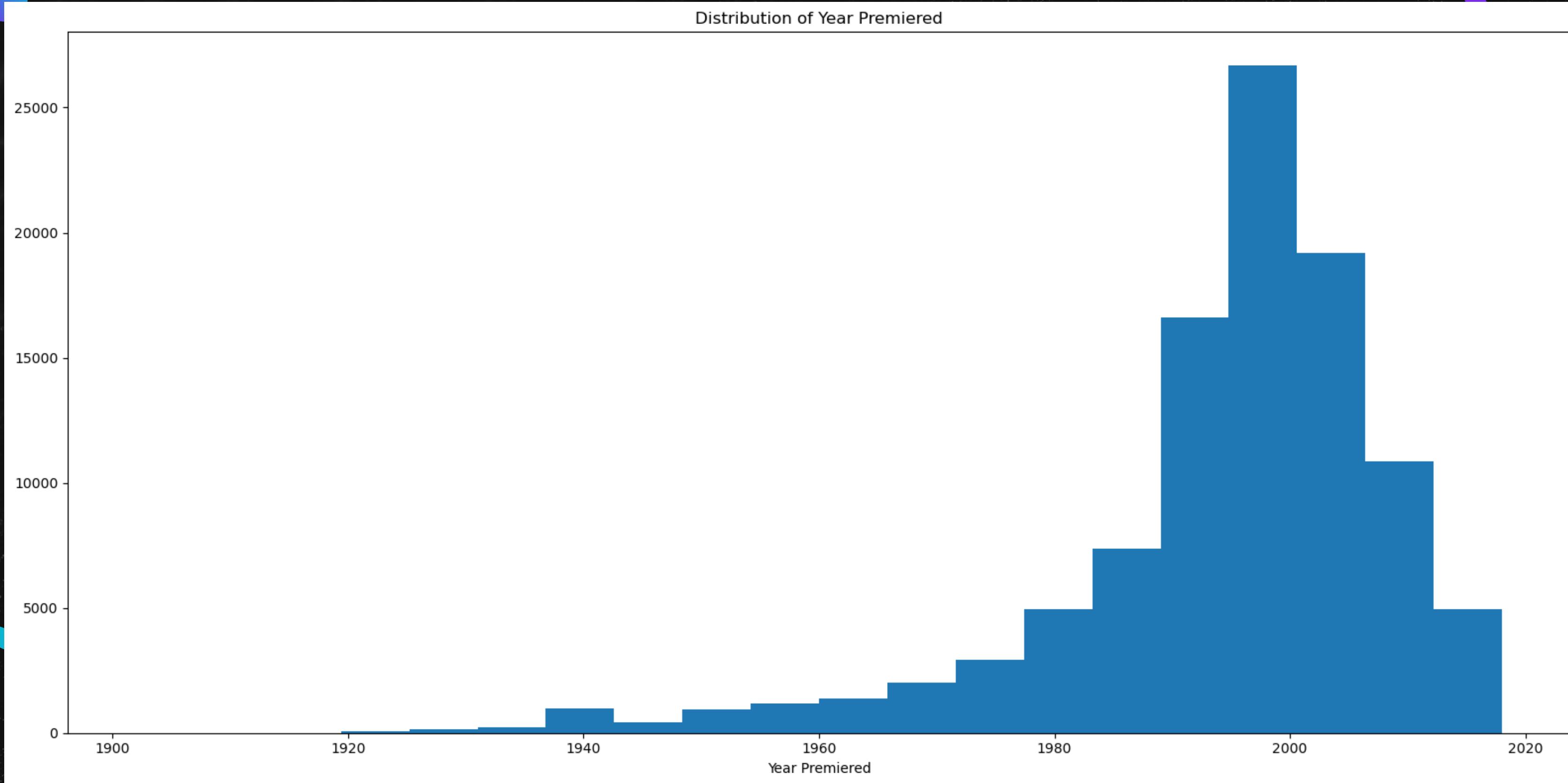
RESEARCH QUESTIONS

- **Accuracy:** How accurate are the recommendations in terms of user satisfaction? Are the recommended movies actually watched and liked by the users?
- **Diversity:** How diverse are the recommendations? Are they all from the same genre or do they span multiple genres?
- **Novelty:** Are the recommendations introducing users to new movies that they might not have discovered on their own?
- **Serendipity:** How often does the system recommend unexpected or surprising movies that the user ends up liking?
- **Scalability:** Can the system handle a large number of users and movies? How does it perform as the dataset grows?

FINDINGS

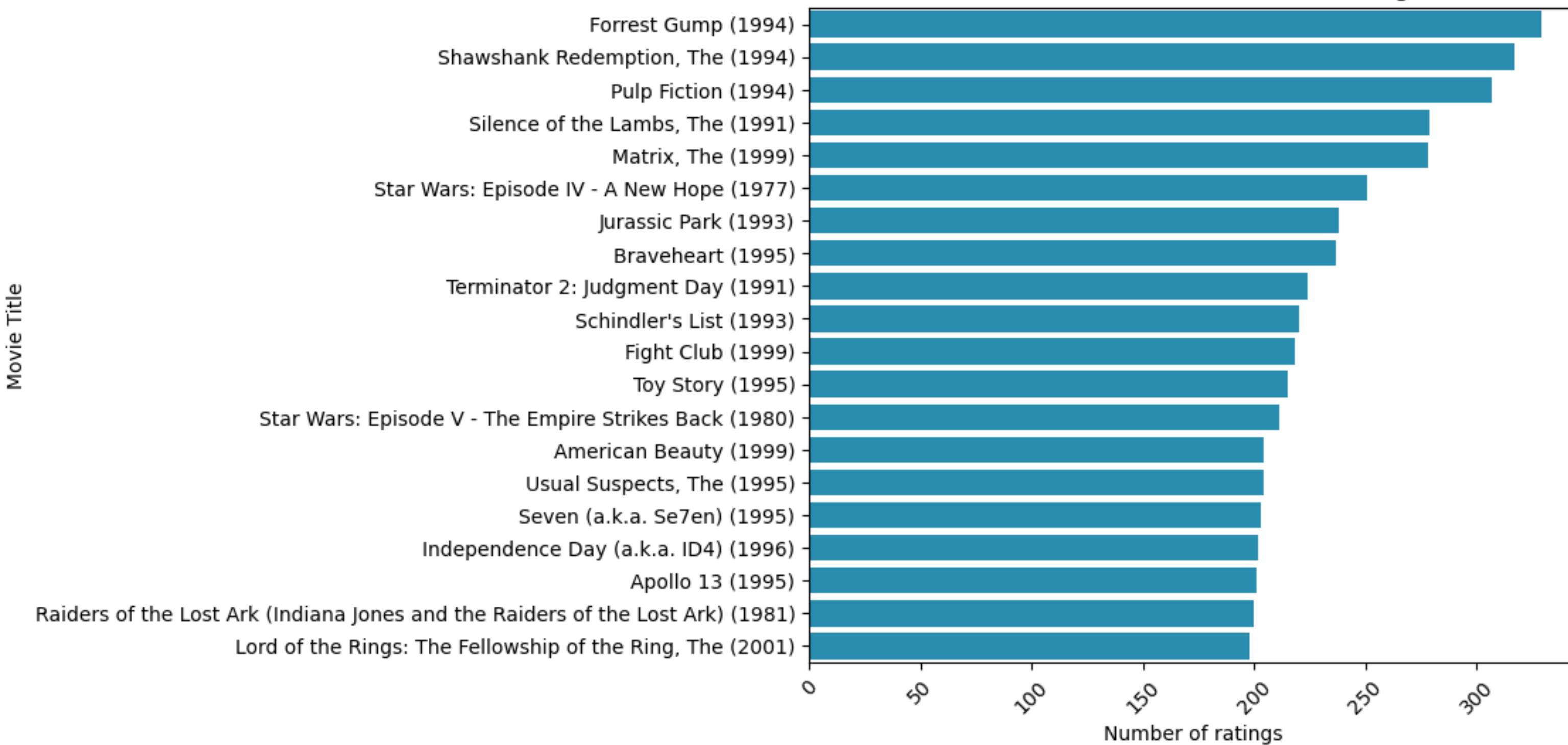


YEAR RELEASED DISTRIBUTION

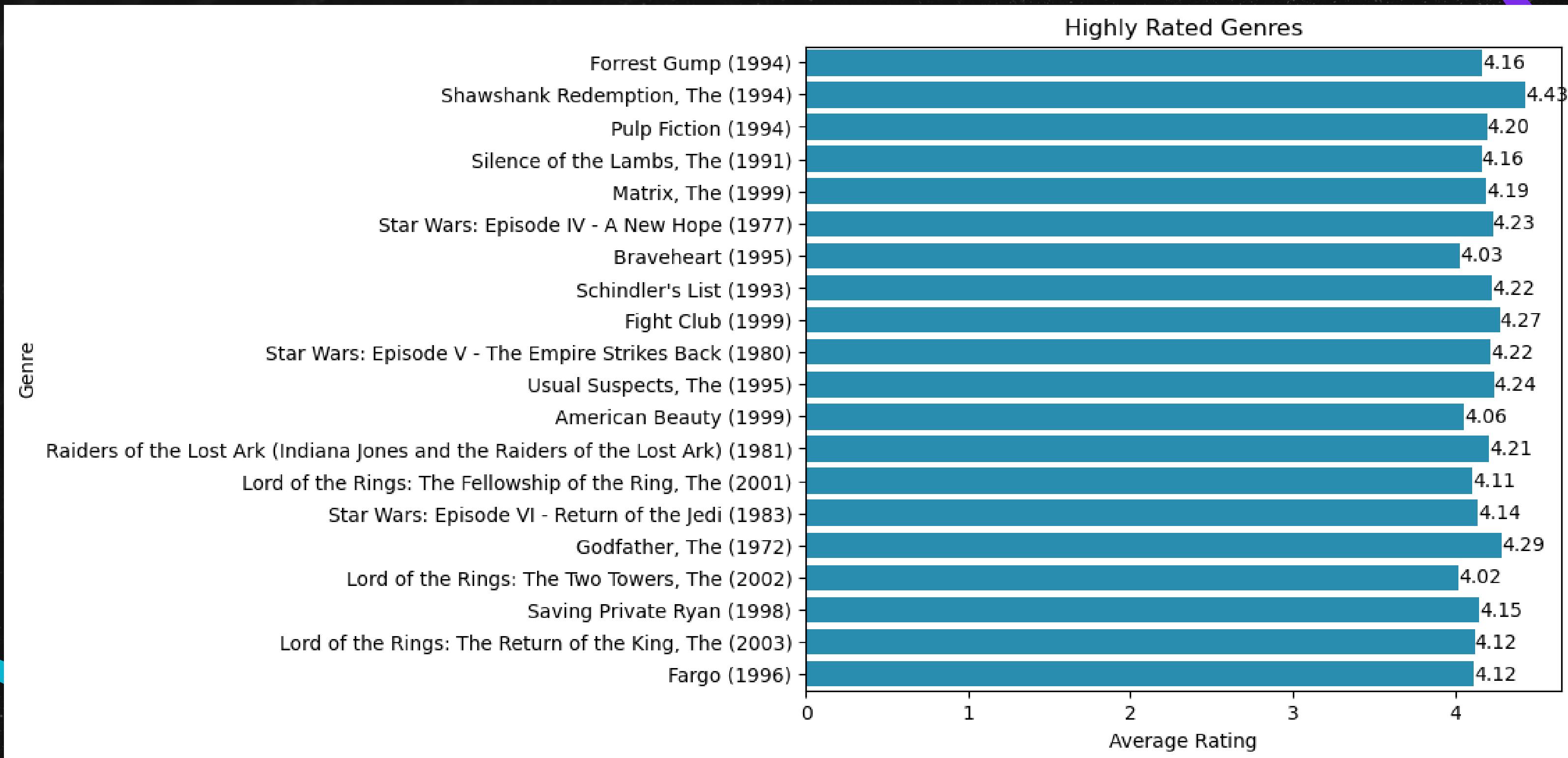


MOST RATINGS

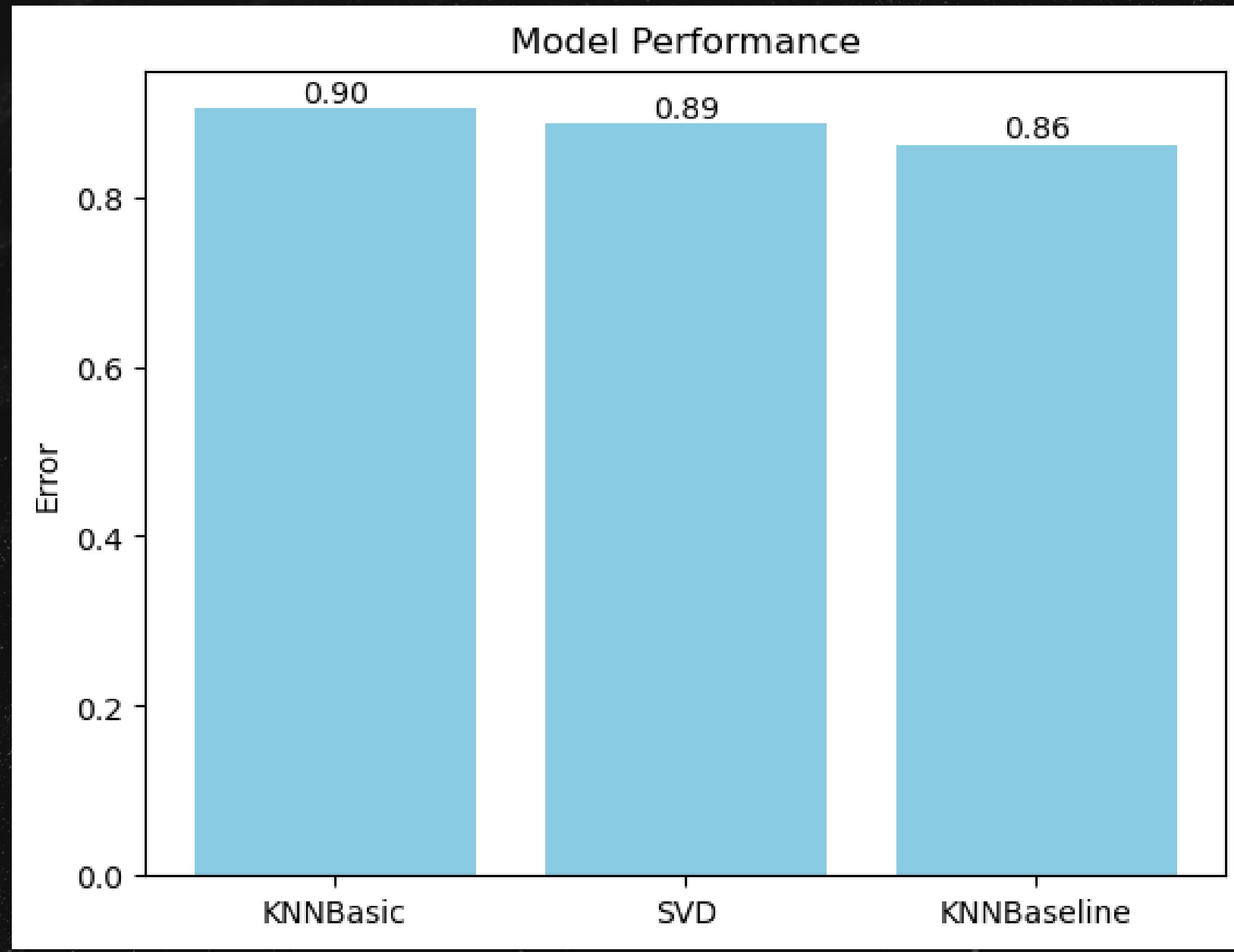
Movies that received the most Ratings



HIGHLY RATED MOVIES



MODEL PERFORMANCE



CONCLUSIONS

- The quest to build an optimal recommendation model started with the KNNBasic, SVD, KNNBaseline, all yielding an initial average RMSE of 0.89.
- After gridsearchCV, the KNNBaseline model has the lowest RMSE of 0.86 and MAE of 0.66 on test data. However, it took significantly longer to compute (300 minutes).
- In terms of accuracy, the KNNBaseline model is the best choice. However, if computation time is a critical factor, then the SVD model might be a better choice as it has slightly higher error rates but likely much lower computation time.

RECOMMENDATIONS

- If accuracy is your top priority and you can afford the computational time, KNNBaseline is the best-performing model among the three.
- If computational efficiency is a concern and a slightly lower level of accuracy is acceptable, SVD is a good compromise. It offers reasonable accuracy without the extensive computational requirements of KNNBaseline.
- Solve the cold start problem by employing strategies like content-based recommendations for new users or items.
- Evaluate the model using a variety of metrics like precision, recall, MAP and NCGD.

