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ANIME RECOMMENDATION SYSTEM

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Abstract: Anime could be a hand-drawn pc animation originating from Japan that has drawn a cult following round the world. Japanese culture has long been dominated by anime and manga, with a similar wave of recognition between generations. Over recent years, the recognition for anime and its sketch counterpart manga has grown up significantly within the United Kingdom and therefore the West. Due to its distinctive ability to grow with viewers, anime is without a doubt one amongst the reasons why it has survived the test of time and grown in quality throughout the world. Though anime is well-liked in United Kingdom and Western countries, there are still few people who don't have any plan on what anime is. This paper aims to develop a recommendation or choice system that offers suggestion to those who are new to the anime world by using KNN and SVD algorithms.

Index Terms **- Anime, Recommendation/opinion system, KNN, SVD.**

I. INTRODUCTION

Anime Recommendation System is associate manga managing system that contains information about the manga and also contains information about the user's favorite and watched shows. It helps the user to organize and to add their rating to the shows that have watched. This method helps users to find anime that they are interested in. This project can explore the contents the dataset to realize insights. Later on, associate cooperative filtering algorithms like KNN and SVD are used to produce a list that contains the user favorite anime in a tabular manner along with its rating. Analysis is going to be done on the recommender system to ascertain however well it performs once recommending things

The purpose of this project is to advocate and build predictions based on the preferences of the users. This recommendation system tries to satisfy the customers or users future needs by analyzing the activities. As the system predicts such needs, a giant amount of user knowledge is required to search out patterns and associate previous tastes knowledge that affects future selections. At times like this, it's tough to produce smart recommendations if user's data is not enough for the recommendation system. When the user data is limited the concept of sparsity occurs. In order to solve such problems and to produce meaningful content, techniques like KNN and SVD are used. The system are going to be enforced in Python employing a coaching and check set with a magnitude relation of 80%:20% severally. The error for every model is going to be according as Root Mean Square Error (RMSE) as a live for performance.

II. MATERIALS

The data was obtained from Kaggle.com and contains data from 73,516 users along with their ratings. The scores/ratings vary from one - ten with ten being the most effective. A rating of -1 indicates that the user did not rate the item.

III. METHODS

3.1 Recommendation system

The recommendation system is popular among companies like Netflix, Amazon and YouTube etc. as it helps the user to find their choice of movies. The recommendation system uses the knowledge of users past history or watched films and does an analysis, using that knowledge and analysis it recommends a movie to the user. Figure 1 is a visual representation of the recommendation system. Various recommendations systems have been extensively studied and proven to be valuable to internet businesses and consumers. In fact, Netflix awarded a developer team a $1 million prize in 2009 for developing a recommendation system that increased the accuracy of the company's recommendations by 15%.

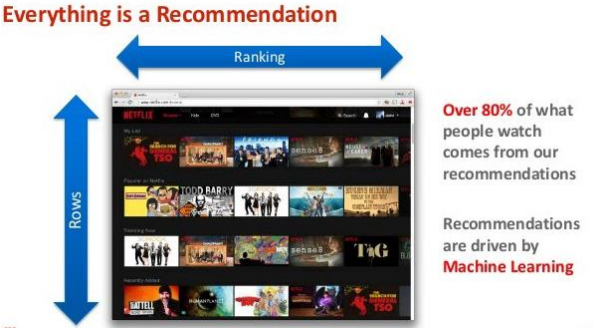

Fig.1. Example for recommendation system

The recommendation system tries to get a rating for an anime in this paper. It uses collaborative filtering system algorithm such as KNN and SVD to make an accurate recommendation to the users.

3.2. Collaborative Filtering

Based on past behavior, this approach builds a model of the user. Users may have watched videos, purchased items, or given ratings on items in the past. Using this model, the model can predict the item or a rating for the item that a user might be interested in based on an association between the user and the item.KNN and Singular value decomposition is used as a collaborative filtering approach in recommender systems.

IV.KNN

Collaborative filtering systems use the actions of users to recommend other most liked anime to the users. User-based approaches and item-based approaches can both be used. However, item-based approaches are usually preferred. Users are often more difficult to scale due to their dynamic nature, whereas items usually don't change too much and can be computed offline and served without constantly retraining. KNN can be used to develop a collaborative filtering system based on itemsIn order to make inferences about new samples; it uses a database in which data points are grouped into several clusters.

4.1. Working of KNN

Based on item feature similarity, KNN makes no assumptions about the distribution of the underlying data. As shown in figure 2, it calculates the "distance" between the target most rated anime and every other anime in the database, then ranks their distances and returns the most liked anime's as recommendations.

```
In [67]: give_rec('Dragon Ball Z')
Out[67]:
```

	Anime name	Rating
0	Dragon Ball Kai (2014)	8.01
1	Dragon Ball Kai	7.95
2	Dragon Ball Z Movie 15: Fukkatsu no F	7.55
3	Dragon Ball Super	7.40
4	Dragon Ball Z: Summer Vacation Special	7.05
5	Dragon Ball Z: Atsumare! Gokuu World	6.76
6	Dragon Ball GT: Goku Gaiden! Yuuki no Akashi w...	6.75
7	Dragon Ball Z Movie 11: Super Senshi Gekiha!! ...	6.28
8	Dragon Ball	8.16
9	Dragon Ball Z Movie 14: Kami to Kami	7.62

Fig.2 Top 10 recommendations of anime as per the user request

V.SVD

From the user-item matrix, single value decomposition (SVD) is used to extract features and correlations. In the case of different anime categories, Singular Value Decomposition (SVD) would focus on the latent factors for the Singular Value Decomposition (SVD) approach, for example.

5.1. Working of SVD

The singular value decomposition (SVD) is a linear algebraic method used in machine learning as a way of reducing dimensionality. By reducing the space dimension of a dataset from N-dimension to K-dimension (where K*N) the SVD technique reduces the number of features of a dataset. An SVD-based recommender system uses collaborative filtering to enhance user experience. Users are represented by rows and items by columns, in an array structure. This matrix is made up of the ratings that users give items.

The factorization of this matrix is done by the singular value decomposition. It finds factors of matrices from the factorization of a high-level (user-item-rating) matrix.

Implementation of singular value decomposition (SVD) based on collaborative filtering in the task of anime recommendation is implemented in Python. It uses anime and rating dataset for the recommendation system. This dataset has been chosen because it does not require any preprocessing as the main focus of this paper is on SVD and recommender systems.

In order to predict accurate recommendation it trains the data and reduces the error between the user value and the top recommended system

$$Min(x,\ y) \sum_{(u,\ i)\in K} (r_{ui} - x_i^T . y_u)^2 + \lambda(||x_i||^2 + ||y_u||^2) \quad (1.1)$$

The recommendation system uses an average rating system as the basis and calculates the highest rating for an anime using the above formula from the users rating. It also displays the top K anime's that are popular to the users as per their request. The output of the SVD is also depicted in a diagrammatic way in the following figure 3

```
Recommendations for GoldenEye (1995):

GoldenEye (1995)
Tomorrow Never Dies (1997)
World Is Not Enough, The (1999)
Mission: Impossible (1996)
Mask of Zorro, The (1998)
Clear and Present Danger (1994)
Enemy of the State (1998)
Licence to Kill (1989)
Rush Hour (1998)
Thunderball (1965)
```

Fig.3. Top 10 Recommendations of anime as per the user request

VI. RESULTS AND DISCUSSION

In this section the results of KNN and SVD are compared with other algorithms and their results are discussed

	Best Setting	RMSE
CoClustering	n_citr_u= 5, n_citr_i= 150, n_epochs= 20	1.1775
KNNWithMeans	k=5, 'name': 'pearson','Item_based','min_support': 10	1.0805
SVD	n_factors= 300, n_epochs= 20, lr_all= 0.02, reg_all= 0.02	1.0687

Fig.4. RMSE values of algorithms.

As mention in the above figure 4, both KNN and SVD has low RMSE value and highly efficient. Thus anime recommendation system is implemented using both KNN and SVD among all other recommendation algorithms like CoClustering, hybrid recommendation system, content based system etc..,

VII. CONCLUSION

Recommender systems open new opportunities of retrieving personalized information using datasets and algorithms. It also helps to alleviate the problem of information overload which is a very common circumstance with information retrieval systems and enables users to have access to products and services which are not readily available to users on the system. This project discussed the two recommendation techniques and highlighted their strengths and weaknesses. Various learning algorithms used in generating the recommendation models and evaluation metrics were used to measure the quality and Performance of the algorithms discussed.

VIII. FUTURE SCOPE

This project is scalable. The future developers can use various types of algorithms and can also include user interface designs for a better experience

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