# **INTRODUCTION**

AI recommends the product for the user so they don’t have to scroll through the whole website. Recommendation system is a subclass for information filtering that seeks to predict rating and preference of an item or social element by using a model built around the feature of item or the buyer’s social environment. (Singh, 2021). Recommendation algorithms have changed the way websites and users connect in recent years. The recommendation engine sifts through massive amounts of data to locate users' areas of interest and makes information retrieval easier. Movie recommendation sites like Netflix and Hulu uses product item based collaborative filtering to predict the movies that we might watch. Like movies you might get recommended caused you watch this movie. For example Netflix Recommendation Engine (NRE), is made up of algorithms which filter content based on each individual user profile. (Meltzer, 2021). NRE uses a linear combination of Matrix Factorization (a.k.a. SVD) and Restricted Boltzmann Machines, the RMSE was 0.88 but could not be published due to high computation capability that was required. (Chong, April 30, 2020)

The internet contains a vast collection of unstructured data which makes it very hard to search a valuable information. Recommendation system can be further classified into two groups. Firstly, content-based filtering focuses solely on the features of the objects and offer suggestions based on their similarity. Here we have data of what the user previously like and watched/ listened. The system comprises a big database called Item Profile, which contains the items to be recommended as well as their attributes. The contents of the item, as well as the ratings assigned to it, are used as training data in content-based filtering, which is a regression modeling issue or user-specific classification. Based on the user's prior selection behavior, the training data supplied for each user corresponds to the contents of the item. (Thomas Hofmann, 2004)

Collaborative filtering helps filtering for information or patterns using techniques that require collaboration across diverse players, perspectives, and data sources. Here we don’t take past data or preference of group or an individual user. In collaborative filtering there may include problems that forces us of predicting unrated items, for such similarities between items and users are calculated using different approach. Basically collaborating filtering method is to make similarity assumption between users or between products, according to their past selection behavior of item or past ratings. (Thomas Hofmann, 2004)

## **Overview of recommender pipeline**

* Pre-processing

In pre-processing first we normalize the data and the pick a model (matrix factorization) suitable for the data type then pick evaluation metric. (Cates, 2019)

* Hyper parameter tuning

We can use Grid search or random search for hyper parameter tuning for example. (sklerarn.model\_selection.GridSearchCV) (Cates, 2019)

Sequential Model-Based Optimization is an alternative smarter way for hyper tuning parameter.

* Model training and prediction

Using the value given by the optimal hyper parameter we can train our model to get predicted ratings so that we get optimal output or prediction in this case.

* Post- processing

In post-processing we will be filtering out the products or items that the user have purchased or watched/interacted.

* Evaluation

In traditional ML we split the data into half training set and validation set but doesn’t work in recommendation system because the model won’t work if we train all our data on a separate user population than the validation set. So we compare the predicted value with the actual value we have to evaluate the data. (Cates, 2019)

# References

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