PRODUCT BASED RECOMMENDER SYSTEMS

**Abstract:**

In the present world as the technology is advancing there has been a drastic increase in the websites, which have numerous options for the products we wish to buy. When there a several options for a single product, one might be generally confused in making their choices. To avoid that, recommender systems plays a major role in recommending the items or products to the users, by using some algorithms and techniques. These recommender systems are used for various purposes like, in recommending music, movies, products, research papers, Youtube, Netflix, temporal recommendation and so on. A recommender System gives suggestions based on the user’s interest using some algorithms like Clustering, and suggests the items based on the generated interests of the user in the coarse of time.

**INTRODUCTION**

The introduction of recommender systems could be traced back to 1979 with relation to cognitive science. Recommender systems are used more widely than other areas like approximation theory information retrieval, forecasting theories.

The common problem faced by users is the information overloading, which means to have various options for a single product or interest.

To avoid this problem recommender systems, in the recent years are great in handling such problems. To resolve this, rs (recommender systems) guide user’s towards new and unknown items that may be relevant to the user’s current task.

Recommendation engines are mainly of three categories

I. Collaborative Filtering

II. Content based Filtering

III. Hybrid Recommendation system

In Collaborative filtering techniques information is collected on users’ search patterns, choices. This information is studied and recommendations are given based on exactly what customer needs when compared with others. Advantage of the collaborative filtering strategy is it does not depend on machine content and hence it accurately recommends for complex products.

Content-based filtering algorithms are limited to explanation of the product along with an overview of the user’s choices. Content-based recommendation system makes use of keywords and phrases to determine those products and a user profile is built to identify the kind of product an individual prefers.

A mix of both techniques can be employed in numerous ways, by making content-based and also collaborative-based predictions separately and combining the actual algorithms finally into a single model. Numerous studies have been carried out in order to compare the actual efficiency in the hybrid technique. By the accuracy results we can overcome problems like cold start and the sparsity problem.

1)

**TITLE:** Development of Product Recommendation Engine by Collaborative Filtering and Association Rule Mining Using Machine Learning Algorithms

**AUTHOR**: Abhiraj Biswas, Kaza Sai Vineeth, Ayush Jain, Mohana

**YEAR**: 2020

**JOURNAL**: IEEE

**OBJECTIVE**: There is a necessity for recommendation engine to be implemented in real time applications to fulfil user needs. This paper developed a product recommendation engine that uses collaborative filtering approach, It finds similarity between items bought by the customers with other set of customers, purchase pattern, and association rule mining framework. Selection of metrics and speed is important for quality recommendations.

Used cross sell technique for various items. The metrics used are distance based and matrix factorization based filtering

**LIMITATION/FURTHER SCOPE**: The code used for algorithm is little slow and complex. It can be made faster and less complex by programming in other languages. Methods like matrix factorization should be used to make efficient recommendations

2)

**TITLE**: A Collaborative Recommendation System for Online Courses Recommendation

**Authors**: Raghad Obeidat, Rehab Duwairi, Ahmad Al-Aiad

**JOURNAL**: IEEE

**YEAR**: 2020

**OBJECTIVE**: Uses data mining and clustering techniques to divide students into groups based on their course interests. By grouping in this manner, the associative rules derived are of high accuracy. The results obtained from SPADE algorithm and Apriori are similar and are used to suggest courses based on affinity among students using KNN algorithm.

**LIMITATION/FURTHER SCOPE:** When increasing the three parameters above 0.1 on datasets, the number of rules decreased, and in some cases, rules are not generated. Association rules may have high confidence and have low coverage on the dataset hence, one low coverage rule will affect the average coverage of the rules. Specifying minimum coverage

would perform better clustering dataset into similar clusters and apply theses algorithms on various domain to find its throughput.

3)

**TITLE**: A Systematic Study on the Recommender Systems in the E-Commerce

**Authors**: PEGAH MALEKPOUR ALAMDARI, NIMA JAFARI NAVIMIPOUR, MEHDI HOSSEINZADEH, ALI ASGHAR SAFAEI, AND ASO DARWESH

**JOURNAL**: IEEE

**YEAR**: 2020

**OBJECTIVE**: E-commerce is a major source which produces huge amount of information. So it is important to provide customised recommendations for users in order to have better user satisfaction. We reviewed the selected papers to identify the gaps and significant issues of the RSs' traditional methods, which guide the researchers to do future work. Also, the salient points of each selected paper are briefly reported. The publication time of the selected papers ranged from 2008 to 2019. Also, we provided a comparison table of important issues of the selected papers as well as the tables of advantages and disadvantages.

**LIMITATIONS/Research scope**: study and publication bias, study queries, classification

4)

**TITLE**: A Collaborative Filtering based Recommender System for Suggesting New Trends in Any Domain of Research

**AUTHOR**: M VISWA MURALI, VISHNU T G, NANCY VICTOR

**JOURNAL**: IEEE

**YEAR**: 2019

**OBJECTIVE:** Each day large amounts of papers are being published. In order to save time and fetch appropriate results of choice, there need to be some kind of recommendation system. So, here collaborative filtering technique is used to find similarity and dissimilarity between topics and researchers to give suggestions based on queries.

**LIMITATIONS/FURTHER SCOPE**:

The recommender system for research paper does not exist. Though, models are published, they are only partially implemented. The increase in literatures and models poses a challenging task to find the most accurate model and most applicable paper. There is no pre-prepared dataset for user ratings of research papers. If it is available implementation can be more effective.

5)

**TITLE**: Improving Collaborative Filtering Recommender Systems Using Semantic Information

**AUTHOR**: Bushra Alhijawi, Nadim Obeid, Arafat Awajan

**JOURNAL**: IEEE

**YEAR**: 2018

**OBJECTIVE**: In this digital world where there is a huge data inflow, it is complex for users to search and get accurate products of their choice. A new hybrid algorithm that depends on the item’s semantic information and the users historical rating data. This information is used to derive the strength of the semantic similarity between users w.r.t to preferred and non-preferred items.

**LIMITATIONS /FURTHER SCOPE**: Full dependency on user-item rating matrix leads to sparsity and cold start problems depending more on the semantic similarity may affect the accuracy. We should also consider satisfaction-based similarity to avoid this problem.

6)

**TITLE**: Research on Movie Rating Prediction Algorithms

**AUTHORS:** Xiaoyue Li, Haonan Zhao, Zhuo Wang and Zhezhou Yu

**JOURNAL**: IEEE

**YEAR**: 2020

**OBJECTIVE:** In the recent times many websites have been evolved for movies and videos. When there is a larger availability of data the user might get confused for making a choice. This paper solves this issue using users activity and rating, using various recommendation algorithms. This paper mainly focuses on the movie recommendations for the users.

**LIMITATIONS/FUTURE SCOPE:** Multidimensional models can be used in modelling the recommender systems.

**7)**

**TITLE:** A Content-based Movie Recommender System based on Temporal User Preferences

**JOURNAL**: 3rd Iranian Conference on Signal Processing and Intelligent Systems (ICSPIS)

**YEAR**: 2017

**AUTHORS**: Bagher Rahimpour Cami, Hamid Hassanpour, Hoda Mashayekhi

**OBJECTIVE**: Predicting an item to a user is difficult when there is a large availability of items over the web. In this paper a Dirichlet Mixture model is used. This model has a user centered framework and includes the attributes like rated movies. This paper used the Movie Lens dataset to make the predictions. By using this, and based on the temporal preference of the user, a movie recommendation can be made.

**LIMITATIONS/FUTURE SCOPE**: NIL.

**8)**

**TITLE**: Content-based Recommender System using Social Networks for Cold-start Users

**JOURNAL**: Knowledge Engineering and Knowledge Management (KDIR )

**YEAR**: 2017

**AUTHORS**: Alan V. Prando, Felipe G. Contratres, Solange N. A. Souza and Luiz S. de Souza

**OBJECTIVE**: In E-commerce recommendation systems are used in helping the customers finding their desired products. The common problem which is faced by the recommender systems is the cold start that is not recommending the products due to lesser user ratings. This paper applied a content-based approach by improving the recommendation using the data collected from the user’s social network.

**LIMITATIONS/FUTURE SCOPE**: The recommender system requires a high computational capacity, as it might have large and varied data sets.

**9)**

**TITLE**: Scientific Paper Recommendation: A Survey

**JOURNAL**: IEEE

**YEAR**: 2019

**AUTHORS**: XIAOMEI BAI, MENGYANG WANG2, IVAN LEE, ZHUO YANG2, XIANGJIE KONG, AND FENG XIA

**OBJECTIVE**: Now a days recommender systems have been supporting various fields like e-commerce, education, career, movies and scientific research so on. This paper first disusses about the importance of paper recommendation. Then it reviews the paper recommendation based on various recommender systems, and points out the issues in each of the recommender algorithms.

**LIMITATIONS/FUTURE SCOPE**: The problems like cold start, scalability, privacy, serendipity, and sparsity using further improvements in the existing methodologies.

**10)**

**TITLE**: Career Recommendation Systems using Content based Filtering

**JOURNAL**: IEEE

**YEAR**: 2020

**AUTHORS**: Tanya V Yadalam Vaishnavi M Gowda Vanditha Shiva Kumar Disha Girish, Namratha M

**OBJECTIVE**: In this paper machine learning techniques are used to recommend a student a job based on their interest and skillset. Many such websites already exist, and is extremely tedious as there would be heap of information. This paper examines existing career recommendation system and highlights the drawbacks of these systems.

**LIMITATIONS/FUTURE SCOPE**: The student’s profile could be dealt in a secured way by providing data encryption. It can also be implemented using collaborative systems. This paper majorly focuses upon engineering students, can also be extended to streams such as business, arts.