

# Recommendation Systems:Issues and challenges

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**Abstract:**Recommendation systems (RS) serve the right item to the user in an automated fashion to satisfy long term objective.Major task of the recommender system is to present recommendations to users. The task is usually conducted by first predicting a user' s ratings for each item and then ranking all items in descending order.RS are the collaborative, query less discovery engines. They have become important area of research. There are many practical applications in this area. Each practical problem needs a different approach to cater to its dimension. This paper summarizes the various aspects of RS, problems /challenges. It also discusses certain issues specific to context-aware systems and the long tail problem of RS.

**Keywords:**—Recommendation systems, challenges, issues, long tail , context aware systems.

## I. INTRODUCTION

Recommender systems have become an important research area. The interest in this area high because it constitutes a problem-rich research area and because of the abundance of practical applications that help users to deal with information. Recommender systems have their relevance to information retrieval in different areas.[1]. They have been continuously researched upon and have vast potential of improving the business.

## II. SURVEY OF RECOMMENDER SYSTEMS

Most recommendation problems rely on the rating structure. In its most common formulations, the recommendation problem is reduced to the problem of estimating ratings for the items that have not been seen by a user. This estimation is usually based on the ratings given by this user to other items [1].

1. Movie recommendation [net flix]
2. Book recommendation [Amazon]
3. Music recommendations [pendura]
4. News recommendation [yahoo]

The engine in such software gives advice about what we might enjoy listening to or watching or reading next, based on what you have just listened to or watched or read. RS are usually classified into 3 categories, based on how recommendations are made:

- Content - based recommendations ; user will be recommended items similar to the ones preferred in the past
- Collaborative recommendations: user will be recommended items that people with similar tastes and preferences liked in the past.
- Hybrid Approaches: these methods combine collaborative and content based methods.

The challenges / limitations with the:

### (a)Content -based recommendations:

1. Overspecialization: system does not recommend these items that are different from anything that the user has seen before. Sometimes this might become problem because the user might want to try something new and the system would never make it happen. Serendipities (variety in recommendations ...) are ignored. So for this the user must be presented with range of options and not only few selected alternatives be made available.
2. Limited Content analysis problem; In this we might represent 2 different items with same set of attributes and they hence cannot be differentiated.
3. New User Problem: New users don't have sufficient ratings before so he would not be able to get accurate recommendations.

### (b)Collaboration based recommendations:

1. New user problem
2. New Item Problem
3. Sparsity in ratings: several filtering techniques may be applied such as demographic filtering.
4. Impact of power users lead to power user attack.

### (c) Hybrid Approaches:

They suffer from the limitations of both approaches while enjoying the advantages of both approaches.

## III. ISSUES IN RECOMMENDER SYSTEMS

**The identified Issues which needs to be addressed in recommendation systems through the literature survey:**

1. Cold start problem
2. Scalability of the approach.
3. Recommending the items in the Long tail
4. Accuracy of the prediction
5. Novelty and diversity of recommendation
6. Sparse ,Missing, Erroneous and Malicious data
7. Conflict resolution while using ensemble/ hybrid approaches.
8. Ranking of the recommendations
9. Impact of context-awareness
10. Impact of mobility and pervasiveness
11. Big-data
12. Privacy concerns.

## IV. RELATED WORK IN LONG TAIL PHENOMENON

Recommendation in the physical world is fairly simple. it is not possible to tailor the store to each individual customer. Thus, the choice of what is made available is done only by

the aggregate numbers. The difference between the physical and on-line worlds has been called the long tail phenomenon. The long-tail phenomenon forces on-line institutions to recommend items to individual users. Anderson in his book [3] coined a term-“The Long Tail”-to describe the phenomenon that niche products can grow to become a large share of total sales. In the book, he claimed that Internet technologies have made it easier for consumers to find and buy niche products, which renders a shift from the hit market into the niche market. In authors [2] proposed a novel suite of graph-based algorithms for the long tail recommendation. Using, user-item information with undirected edge-weighted graph for long tail item recommendation. To improve recommendation diversity and accuracy to help users find their favorite long tail items. In paper [5] ,author discussed the adaptive clustering algorithm to improve recommendations for items in the long tail in which , depending upon the data the items in the long tail are clustered and a recommendation is set out for the items in the entire cluster.

## V. RELATED WORK IN CONTEXT-AWARE SYSTEMS

User behavior in social network is studied in [6] where the authors demonstrated the effectiveness of context-aware review helpfulness rating prediction frame work (CAP) in solving the rating prediction problem. The paper [7] discusses the learning of the context information by explicit querying user and also from implicit learning. It also deals with one such probabilistic model that integrates user profiles, item representation and contextual information by computing the conditional probability of each item given the user profile and additional context.A spatial topic model that captures the correlation between users movements and between user interests and the function of location to improve precision of recommendations is proposed in [8].The importance of freshness of data is deemed more important than relevancy or context in certain recommendation systems is demonstrated in [12].

## VI. CONCLUSION

From [1] possible extension suggested is knowing more about user can improve the quality of recommendation. From [6] [7][8][12] we know that context-aware systems help us in improved understanding of user behavior and hence improves the recommendation. In addition to study of items in the long tail [3][4][5][10][2] and their behavior clubbed with context aware techniques improves the accuracy of recommendation for the long tail items ,thus contributing to “getting more of less”. Hence study of the impact of being context aware for the items in the long tail is proposed.

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