

## LITERATURE SURVEY

**Introduction** The recommender system is becoming part of every business. The business tries to increase its revenue by raising the user's interaction by recommending new items based on user preferences. We have witnessed the rise of Netflix in the entertainment domain, using their strategies to implement a recommender system into their existing ecosystem. But there has been a minimal study in the hiring field from the perspective of a job seeker. To start any research, it is quintessential to review relevant work in the domain and technology.

**Recommender Systems** As discussed previously, Recommendation Systems are the system that analyses user preference history and caters them with different options of services related to the requirement. Recommender systems emerged as an independent research area in the mid-1990s (Ricci et al., 2011). In recent years, the interest in recommender systems has dramatically increased. In the Recommendation algorithm, it classifies into four types: Content-based filtering, Collaborative filtering, Rule-based, and Hybrid approaches (Mobasher, 2007; Al-Otaibi and Ykhlef, 2012).

**Recommendation Systems 7 Collaborative Filtering (CF):** Collaborative Filtering is a technique is based on the human ratings that are given to an item by a user and find similarity between different users who have given similar ratings to an items (Hu and Pu, 2011). The essential operation used here is the memory-based nearest neighbour approach to group users who have a similar interest. As the volume of data grows gradually, there will be high latency in generating recommendations Mobasher (2007); Herlocker et al. (1999).

Collaborative filtering has an advantage over content-based filtering techniques, but due to the nature of the hiring process, a job cannot be rated by the user and will not be possible to create a similarity matrix. **Content-based filtering (CBF):** These are the most subjective and descriptive based filtering. Content-based filtering can also be called as attribute-based recommender as it uses the explicitly defined property of an item. It is an approach to an information retrieval or machine learning problem. The assumption made in content-based filtering is that user prefers item with similar properties. Content-based filtering recommends items to the user whose properties are similar to the item which the user has previously shown interest.

Mobasher (2007) express that drawback of this filtering technique is their tendency to over-specialize in suggesting the item to a user profile as user profiles are relayed on an attribute of the previous item opted by the user. Nevertheless, in the job domain, the job listed in the job board be available only for few days; due to the nature of the domain, the tendency to over-specialize in recommending the same item would not be any problem in the job domain recommender system. In domains like entertainment, user preference are tends to change depending on various factors, but In Job domain, the user tends to look for the job where he can use his previous skills.

New recommendation of jobs can be made when there is a change in user preference, i.e. if a user thinks to change his/her job domain by updating his new skills and the job domain if he/she wishes. Another scenario of new recommendation is when new jobs are listed in the database; system would identify the properties of the job listed, such as Recommendation Systems 8 job domain and skills required for the job and matches with the users with a high similarity score. **Rule-based Filtering (RBF):** These filtering techniques depend upon decision rules such as an automatic or manual decision rule that are manipulated to obtain a recommendation for the user profile. Currently, the E-commerce industry uses a rule-based filtering technique to recommend an item

based on the demographic region of a user, purchase history, and other attributes that can be used to profile a user.

A drawback in rule-based filtering is user feeds the information to the system. These inputs are utilized as a description of a user profile or can be considered as a preference of a user, defined by the user. Thus the data acquired is prone to bias. With the age of the user's profile, recommendation tends to hit the saturation and become static Mobasher (2007). Hybrid filtering (HF): As the title describe, its incorporation of multiple techniques to improve the performance of recommendation. The previously discussed recommendation technique has its weakness and strengths. In order to get a better recommendation and overcome the challenges posed by earlier techniques, this technique is sought after. All of the learning/model-based techniques suffer from cold-start in one or other form. It is a problem related to handling a new user or new item. These and other shortcomings of the CBF and RBF could be resolved by using hybrid filtering techniques Burke (2007); Jain and Kakkar (2019); Dhameliya and Desai (2019). The surveys conducted by Burke (2002) and Dhameliya and Desai (2019) have identified different types of hybrid filtering techniques that could be used by integrating CF, CBF, and RBF. 1. Weighted: The similarity score obtained from different recommendation components are coupled numerically to get one better recommendation. 2. Mixed: Recommendations obtained from different recommending techniques are put together and presented as one recommendation.

2RecSys 9 3. Switching: choosing one among the recommendation components based on the scenarios where it suits best. 4. Feature Combination: Attributes derived from diverse knowledge origins are fused and supplied to a recommendation algorithm. 5. Feature Augmentation: One recommendation technique is used to compute a set of attributes of user or item, which is then part of the input to the next recommendation technique. Two or more recommendation techniques are serialised to get on recommendation. 6. Cascade: Recommending systems are given strict priority, with the lower priority ones breaking ties in the scoring of the higher ones. Here one Recsys technique refines recommendation of another. There had been attempts to develop a recommendation system by several researchers. One such implementation was done by Rafter et al. (2000). They had devised a hybrid Recsys CASPER for Job finding search engine. They had implemented an automated collaborative filtering module and personalized case retrieval module in their job recommendation system. ACF module utilized user behavior information such as read time and activity on the page during his time on the system to profile the user. Similarity measure such as the Jaccard index and other clustering algorithms was used for similar grouping user against target user. Their other module PCR finds the similarity between the user's query and jobs in the system. The module computes similarity with a target user's query and jobs from the job case base using different similarity measures. This system has faced sparsity and scalability problems.