International Journal for Rapid Research in Engineering Technology & Applied Science
Vol X Issue I January 2024
ISSN Online:- (2455-4723)

Hybrid Recommendation Architecture for Cloud Computing Applications

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ABSTRACT

The use of proposal frameworks in daily life direction is now commonplace. There is a significant role for online commerce and long-distance social networking. It's possible that extracting highlights from the aggregated dataset can help with the formation of new teams, the growth of the organization, and the acquisition of valuable knowledge. People's loving, hateful, and other activities can all be offered, observed, and audited by businesses and other organizations on online platforms including remote casual communication places and online commercial portals. This analysis project attempts to learn about the client's product through their regular activities and interactions with it, and then to make suggestions that are increasingly helpful and applicable beyond the client's current level of logic. In this paper, we provide a dynamic suggestion method for analyzing customer preference according to item premise. DBSCAN is combined with collaborative filtering and K-Means clustering for a deeper dive into more refined and superior outcomes. This article evaluates the importance of e-commerce-based product suggestions using accuracy, F-Score, and precision metrics.

Keywords— Collaborative Filtering; Product Recommendation; K-Mean Clustering; DBSCANI

1. INTRODUCTION

A web-based company's recommendation system is very important. Using a suggestion system to complete tasks and make purchases has already become popular. Though there are flaws in suggestion structure theory, massive data measurements can still be useful in finding relevant information. We are currently upgrading quickly to satisfy our clients' expectations. The proposal system is another innovation and pattern that assists clients in selecting the ideal solution for their needs. As a dealer, the buyer gains from the recommendation system. To draw attention to desired information, the data-shifting framework, also called the suggestion framework, is employed. This online tool allows the client to find what they need or have already seen. Making recommendations for things that a customer genuinely needs is the recommendation system's true objective. This structure for suggestions is helpful since it motivates consumers to purchase goods that fulfil their particular needs. Unnecessary or bulky data is evaluated for relevance within the proposal and removed if needed.

Because the proposal framework technique allows for data transfer to be dependent on the customer's ratings and leanings, every client can purchase the plot that best meets their needs. The manner in which the proposal is organised justifiably offers the customer a way to accomplish the goal; they can review the information at their convenience and discover the results of its applicability. The framework of the idea incorporates a substance-based transfer, community-oriented segregation, and affiliation guideline mining, with decisions based on people's use and enthusiasm. For those who lack the effort to sift through the plethora of options offered by the several websites, this method can be useful.

2. PROBLEM STATEMENT

In order to provide clients with recommendations for products that are most likely to fulfil their needs, Product Recommendation systems must first gather relevant data. Recommendations are affected by the item's content, price range, distributor, and inventor. In addition to interest, the product's star rating also matters. With this style, the client is able to extract all the relevant data and search suggestions from the proposal that are required to prescribe the optimal solution. The recommendation system helps the inexperienced user learn more about their alternatives. No guidance is given to the new user to help them locate the information they need. This makes it tough to provide suggestions to novice users. When faced with millions of results, it's easy for the user to become overwhelmed and bewildered.

Here, we employ a product proposal structure to offer advice. The client now expects product recommendations to be made using this technique. A Product Recommendation System serves as the underlying foundation for this proposal because of its focus on making product recommendations.

Our job is to create and supply a structure for making product suggestions to customers. This online algorithm takes into account user feedback and product rankings to provide a personalised suggestion. Customers may locate what they need fast and easily with the help of online product suggestion tools and the scanning of a big pool of data. In addition, consumers can access the opinions and ratings of previous customers.

• The proposed method deviates from the standard procedure for providing recommendations. Rather than prescribing the thing that is being evaluated, previous work only recommends things and rates them. The completed work addresses the problem of rating and audit in the current framework so that various systems can be evaluated to counteract the growing problem.

•The framework evaluated here has a critical flaw in that it uses random sampling for client rating and audits. This survey and rating system functions primarily as a trust-based proposal, where trust should be maintained for the proposal's success.

•The biggest problem now is data over-burdening and extracting irrelevant info. There is a tremendous volume of data sent for many Subjects, and it comes through data entrances and eminent sources. Clients are drained by a hectic schedule and a lack of knowledge about new technologies when searching for and recovering data. When a client unexpectedly signs up for a platform for global casual communication, it often has unintended consequences. It may seem pointless and tiresome to the client at first, given that the client record starts at zero. Here, searching through a huge database for an old item is impossible. As a result, customers may have to find people all over the world who are a good fit for their Product and can assist them with their problem.

3. METHODOLOGY

Product-based recommendations, user-based recommendations, registered-user recommendations, and guest-user recommendations are all key components of the current system. In conclusion, a user's accuracy is assessed at 70% for an unregistered account, and at 87% for a registered one. For both registered and unregistered users of E-commerce sites, Prajyoti Lopes [1] devised a dynamic recommendation strategy based on changing user behaviour. The author successfully dealt with the cache memory and binary rating problems.

• Existing work has the problem of focusing solely on either product recommendations or user recommendations. The proposed method is effective in enhancing user and product interaction.

Performance in presented work can be enhanced by clustering similarity discovered after user and product engagement. Here, the user's review point is the subject of interaction.

• This technique is employed in flipkart and other web portals on the basis of the collaborative filtering offered work.

The proposed study utilised a descriptive clustering approach.

• The current method mostly uses frequency to judge the efficacy of action based rational recommendation. After identifying the similarities and commonalities between the user and the product, the proposed work is assessed for its frequency and quality.

• A clustering-based parallel procedure is used to arrive at a final recommendation. Based on our research, we decided to use the K-mean and DBASAN algorithms to cluster our data.

• K-mean clustering uses multiple iterations to get results, while DBSCAN generates results after filtering out unwanted background noise. Therefore, we compared two methods that combined collaborative filtering with clustering.

Using K-means clustering and collaborative filtering, the results are analysed, and the intersection of the two is then used to establish an outcome.

• DBSCAN and collaborative filtering are used to analyse results, and the intersection of those results is then defined.

• This establishes which of the two yields the most precise result by calculating accuracy, precision, and F-score.

Sessions on a website are a great addition to any strategy. Data mining concerns were taken into account during the design process of the user interface. Not only should the relative importance of the users be taken into account when implementing some crucial features in retail e-commerce, such as the automatic time out session owing to perceived inactivity on the user end, but also the data mining method.

The products provide the basis for the cluster. Document clustering is obtained when product clustering is completed. This procedure is repeated for each product in order to establish the primary clusters. After then, both good and negative feedback are factored into the final rating and review. Clusters are used to make suggestions, and both subclusters and non-subclusters can be included. The most important cluster's data is parsed out and organised into useful cluster data. The data we have will be quite specific. In this method of making suggestions, feelings are not taken into account. Clustering is accomplished with DBSCAN and K-mean, while rating is handled with Collaborative Filtering. We are working on a content mining and clustering technique to get around this problem that they have solely worked on user mining to solve.

The two most prevalent characteristics that can be used for product suggestion are product and activity.

Since K-Mean operates on an iterative model and DBSCAN operates directly on an Epsilon model, the results indicate that DBSCAN-based collaborative filtering is superior to K-Mean-based collaborative filtering.

When comparing K-mean with DBSCAN, the former requires more iterations because it is based on an iterative model, while the latter requires less iterations because it does not rely on any iterative model at all.

• K-mean necessitates model count calculations and does not filter out noise. While DBSCAN does not necessitate predicting the number of clusters, it does eliminate noise.

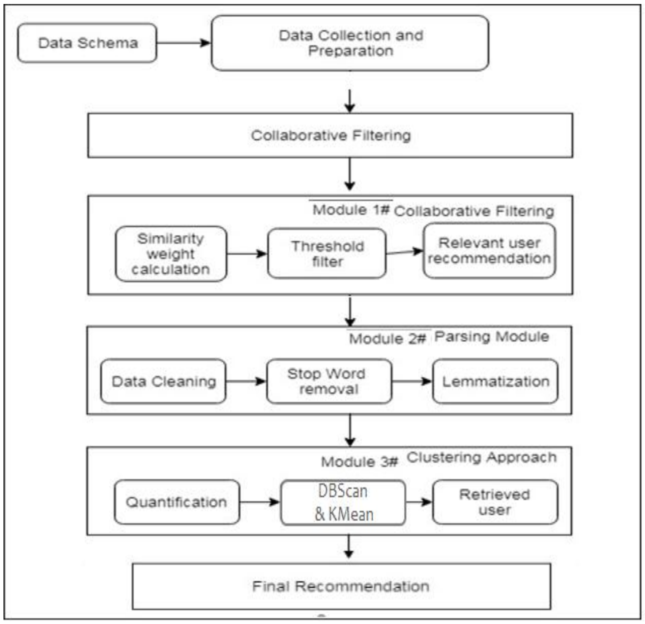

Figure 3.1: Proposed Architecture

Proposed architecture works in the flow:

- Data schema is used as an input.
- Data collection and preparation using input data is performed for data cleaning purpose
- Then, Collaborative Filtering is applied on the processed data.
- Process follows three modules:
    - **Module 1: Collaborative Filtering**

      Similarity Weight Calculation:

      Threshold Filter

      Relevant user recommendation
    - **Module 2: Parsing Module**

      Data Cleaning

      Stop word removal

      Lemmatization
    - **Module 3: Clustering Module**

      Quantification

      DBSCAN & K-Mean

      Retrieved user
- Final Recommendation

4. RESULT ANALYSIS

Evaluating the efficacy of a proposed solution is essential to the success of any research project. In this case, filtered data is grouped using two different clustering algorithms. Both the K-Mean Clustering and DBSCAN algorithms are included into the collaborative filtering technique in one method. The full recommendation implementation takes care of the two most typical outcomes. The primary goal of this section is to evaluate the results of two approaches to implementing a product recommendation technique, taking into account differences in Collaborative filtering time and clustering time, as well as accuracy and precision. Accuracy, precision, and f-score have all been measured in percentage terms, whereas time has been measured in milliseconds. There are two parts to this chapter: experimental analysis and implementation examples.

Table 1: Comparison Table for Average Recall/Accuracy

Average Recall/Accuracy	Existing Work	C.F + K-Mean	C.F + DBSCAN
Cluster	60%	85%	92%

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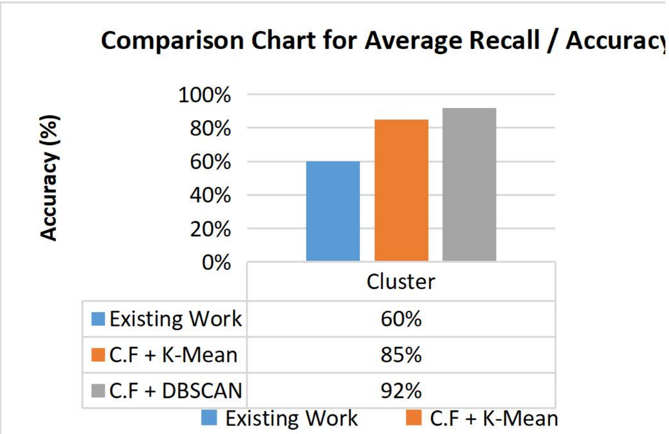

Figure 4.3 Comparison Chart for Average accuracy/recall

Table 2: Comparison Table for F-Score

F-Score	Existing Work	C.F + K-Mean	C.F + DBSCAN
Cluster	63%	88%	93%

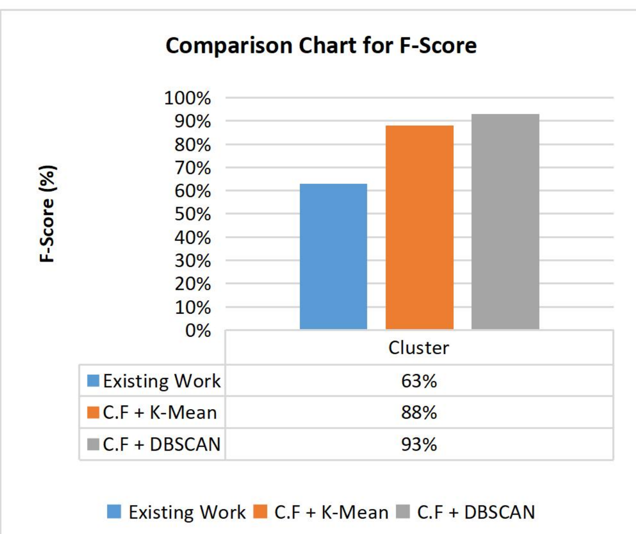

Figure 4.4 Comparison Chart for F-Score

Table 3: Comparison Table for Precision

Precision	Existing Work	C.F + K-Mean	C.F + DBSCAN
Cluster	67%	72%	82%

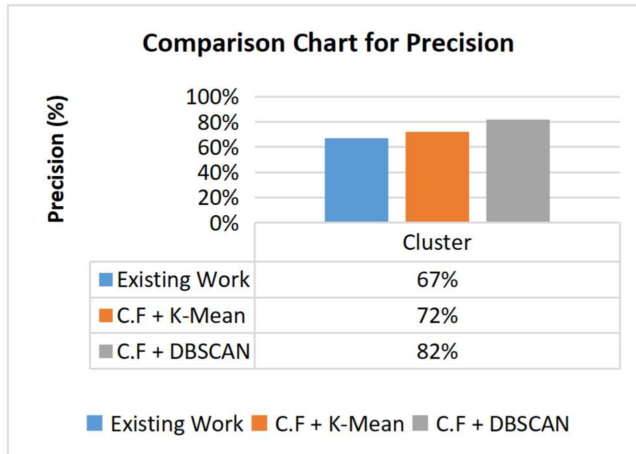

Figure 4.5 Comparison Chart for Precision

Result Observation

• Since DBSCAN operates directly on the Epsilon model, while K-Mean employs an iterative model, the results indicate that DBSCAN-based collaborative filtering is superior to K-Mean-based collaborative filtering.
When comparing K-mean with DBSCAN, the former requires more iterations because it is based on an iterative model, while the latter requires less iterations because it does not rely on any iterative model at all.
• K-mean necessitates model count calculations and does not filter out noise. While DBSCAN does not necessitate predicting the number of clusters, it does eliminate noise.

CONCLUSION

The research team came to the conclusion that integrating an e-commerce based product recommendation system into existing intranet communications or social networking sites would be a great way to improve these channels. In this study, we provide a revised clustering and filtering strategy for accomplishing this goal. Therefore, a clustering strategy has been shown to streamline the recommendation procedure while maintaining high performance standards. The performance of a Java-based recommendation tool is measured in terms of its accuracy, precision, and F-score. The proposed system will rectify every problem with the current method of making suggestions.

The system's effectiveness has been measured on a daily basis over its many years of service. Product recommendation, in which users are given suggestions for goods to buy, forms the basis of the suggested job. The system takes into account the user's preferences and saves product suggestions in a personal profile. This system remembers everything about the product, including which user bought it before and when, and it displays the appropriate product category to the user based on their previous purchases and other activity. Collaborative filtering and content-based filtering are used to search the list of products based on their ratings and content. Product ratings and reviews from current customers are crucial to the success of the recommendation system.

Although user ratings and reviews are the sole basis for our work, we are aware that recommendations are the finest method for finding just about anything online. Only things that have been rated by users will be recommended, and unrated items will not even be shown to the user. This is a problem that can be fixed in the future so that the system's performance isn't negatively affected. Therefore, this implementation can be done later to improve overall performance; this is the next step in the proposed work.

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