

# A friend Recommendation system using Machine Learning Algorithm

Khushboo Dawda<sup>1</sup> Mr. Swarndeep Saket<sup>2</sup>

<sup>1</sup>Student <sup>2</sup>Assistant Professor

<sup>1,2</sup>Department of Computer Engineering

<sup>1,2</sup>L. J. Institute of Engg. & Technology (Aff. to GTU), Ahmedabad, Gujarat, India

**Abstract**— Recommender systems are an important research area due to the various expansion possibilities that enhance the quality of the recommendations. In this paper we try to recommendation of friend on social network which friends recommendation friends to user based on their interest, their life style their status, their work and their activity on base social account like location, hast tag, challenges. here in our proposed access we are applying machine learning technique like clustering technique and KNN technique with collaboration clarification algorithm to get added accurateness in the results.

**Keywords:** Friend recommendation system, Collaboration filtering, KNN, K-Means

## I. INTRODUCTION

Machine learning is concerned with computer program that automatically improve their performance through experience. Machine learning is the study of computer system that learns from data and experience. In machine learning 4 type of learning categories are used i.e. supervised learning, unsupervised learning, semi-supervised learning, Reinforcement learning. This category has many types of Techniques like classification, clustering, regression. Recommender systems are an important class of machine learning algorithms that offer "relevant" suggestions to users. Categorized as either collaborative filtering or a content-based system

### A. Clustering

Clustering is the process of making a group of abstract objects into classes of similar objects. K-means clustering: k-means is one of the simplest unsupervised learning algorithms that solve the well-known clustering problem.

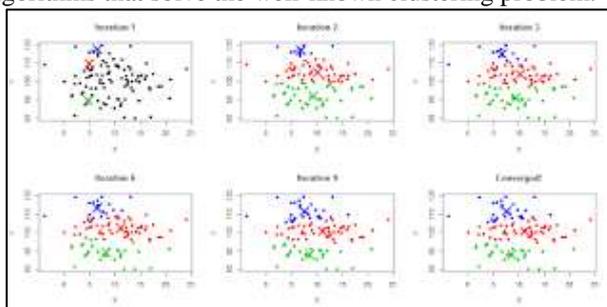


Fig. 1: K-means Clustering [37]

### B. Recommendation

Recommender systems are an important class of machine learning algorithms that offer "relevant" suggestions to users categorized as either collaborative filtering or a content-based system. Recommender system, an information filtering technology used in many items is presented in web sites as per the interest of users, and is implemented in applications like movies, music, venue, books, research articles, tourism and social media in general. In the present

scenario, people are not willing to spend a lot of time to specify their personal needs. So a system is needed which automatically suggest personalized things to users. The applications of recommender system include recommending movies, music, television programs, books, documents, websites, conferences, tourism scenic spots and learning materials, and involve the areas of e-commerce, e-learning, e-library, e-government and e-business services.

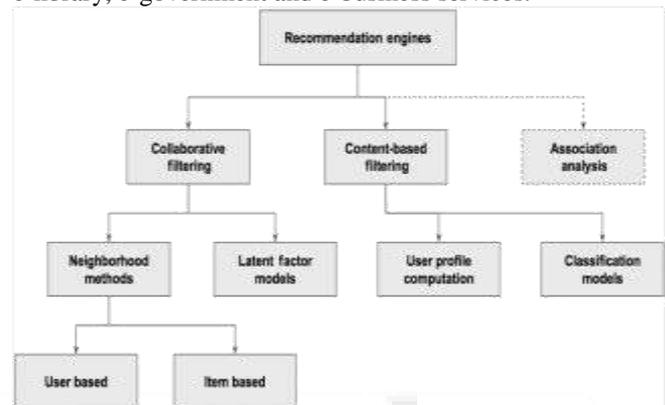


Fig. 2: Recommendation [38]

### C. Collaborative filtering:

Collaborative filtering is a class of recommenders that leverage only the past user-item interactions in the form of a ratings matrix. It operates under the assumption that similar users will have similar likes. It uses rating information from all other users to provide predictions for a user-item interaction and, thereby, whittles down the item choices for the users, from the complete item set. Hence, the name collaborative filtering. The collaborative filtering techniques can be further classified into:

#### 1) Neighbourhood methods

Neighbourhood methods predict the user-item preferences by first finding a cohort of users or items which are similar to the user or the item whose ratings are to be predicted. In the case of the user-based neighbourhood method, the algorithm is designed to find a cohort of users who have a similar rating pattern to the user in question and who have rated the item in question.

#### 2) Latent factor models

Actively managed mutual fund managers look for suitable companies to invest in their pursuit to outperform the market averages. Out of hundreds of thousands of publicly traded companies, the fund managers select dozens of companies using certain criteria or factors.[38]

## II. LITERATURE REVIEW

Friend recommendation is one of a lot of accepted characteristics of amusing arrangement platforms, which recommends agnate or accustomed humans to users.in this paper friend recommendation is use machine learning algorithms. for recommendation of friend in system. here in

proposed access, are applying hierarchical clustering technique with the collaboration clarification advocacy as well the principal component analysis adjustment is activated for abbreviation the ambit of abstracts to get added accurateness in the results. The Hierarchical cluster will suit more significant eventual outcomes in purposeful anecdote to the k-means cluster, as pronounced that in the various levelled cluster there is no charge to discover the measure of bunches at the alpha of the cluster and the PCA will be adjusted as the ambit edited version procedure to reduce the scope of the information. In the PCA on the dataset up to giving it as credit and a short time later tolerating the curve contraction this is acclimated as an attribute to the various levelled cluster and community explanation calculation will right off the bat achieve the PCA and a short time later that the various levelled clusters actuated and the last suggestions are made [5].

In this paper we are using latent Dirichlet allocation for recommendation system. Here designed a friend recommendation approach combining interest-based features and interaction-based topologies with liner time complexity. In this paper, Chinese micro-blogging is referred to as the study platform. There are many common words in the text corpora of micro-blogs, such as modal particles, auxiliary verbs, and interjections. the recommended friends should be those who not only share a large number of common interests with the target user but are also the influential ones in the related fields. Consequently, we only needed to keep the records of individuals with a relatively large impact in the descending order on each topic for identifying potential candidates with similar inclinations. Characterizing the users' existing social relationships as 1-hop social ties, we located the potential friends with graph approximation by exploiting 2-hop social chains, i.e., friends-of-friends. The current design of the proposed method takes into account only the semantic similarities and the "following" relationships among users in a social network, leaving several aspects to be improved in the future.[2]

With the development of HCC, recommendation has become common in social networks. Information available in recommendation system is also increasing. the mode of man-machine collaborative work has become more and more popular. A recommendation based on trust is an important human-computer interaction recommendation application in a social network and previous studies generally assume that the trust value between users is static, unable to respond to the dynamic changes of user trust and preferences in a timely manner. Based on the dynamics of trust and the changing process of trust between users, this paper proposes a trust boost method through reinforcement learning. Recursive least squares (RLS) algorithm is used to learn the dynamic impact of evaluation difference on user's trust. In addition, a reinforcement learning method Deep Q-Learning (DQN) is studied to simulate the process of learning user's preferences and boosting trust value. In general, most methods focus on the propagation of trust and trust recommendation systems. They treat trust values as static and immutable parameters, which makes it impossible for the recommendation system to make better user-centered

personalized recommendation. This method has better accuracy on recommendation.[3]

In this paper, for friend recommendation with using machine learning techniques like SVM and also use binary classification. The user-location and user-user information in location based social network are both too sparse which contributes to a big challenge for recommendation. a new multi-feature SVM based friend recommendation model (MF-SVM) is proposed which regarded as a binary classification problem to tackle this challenge. Here three features of each user by new methods respectively. Then the social feature is extracted by considering the diversity of common friends. After that a new topic model improved by LDA is proposed which both considers user reviews and corresponding service description to extract textual feature. on real-world datasets demonstrate that the proposed method in this paper outperforms the state-of-art friend recommendation methods under different types of evaluation metrics.[4]

In this paper, recommendation they are using association rules mining and clustering and collaboration filtering for friend recommendation. The recommender systems are recently becoming more significant in the age of rapid development of the Internet technology due to their ability in making a decision to users on appropriate choices. CF may lead to the poor recommendation when user ratings on items are very sparse in comparison with the huge number of users and items in user-item matrix. To overcome this problem, this research applies the users' implicit interaction records with items to efficiently process massive data by employing association rules mining. s, a modified pre-processing is implemented to discover similar interest patterns among users based on multiple purchases done. In addition, the clustering technique has been employed in our technique to reduce the size of data and dimensionality of the item space as the performance of association rules mining. The experiments were conducted and the results were compared with basic CF and other extended version of CF techniques including K-Means clustering, hybrid representation, and probabilistic learning by using public dataset, namely, Million Song dataset. The experimental results demonstrated that our technique achieves the better performance when compared to the basic CF and other extended version of CF techniques in terms of Precision, recall metrics, even when the data is very sparse.[1]

### III. PROBLEM STATEMENT

As per research paper we show that many different algorithms are used for recommendation for user. They give recommendation base on different algorithm like PCA, hierarchical clustering, SVM, recursive least squares, LDA. so, our problem is that the accuracy is shorten improving 79.5% we can use different algorithms to improve accuracy.

### IV. PROPOSED SYSTEM

Following are the stages of the above proposed System:

*State 1: Dataset*

Input dataset from Kaggle.

*State 2: Pre-processing data*

In this state we are remove extra data and empty space and ready data for next step.

State 3: Collaboration filtering

Data create base on collaboration filtering.

State 4: K-Means Clustering

In this state create clusters for similar friend.

State 5: KNN Algorithm

In this step check user profile for similarities.

State 6: Prediction

Assign highest priority to user and arrange in descending order and see the result of recommendation.

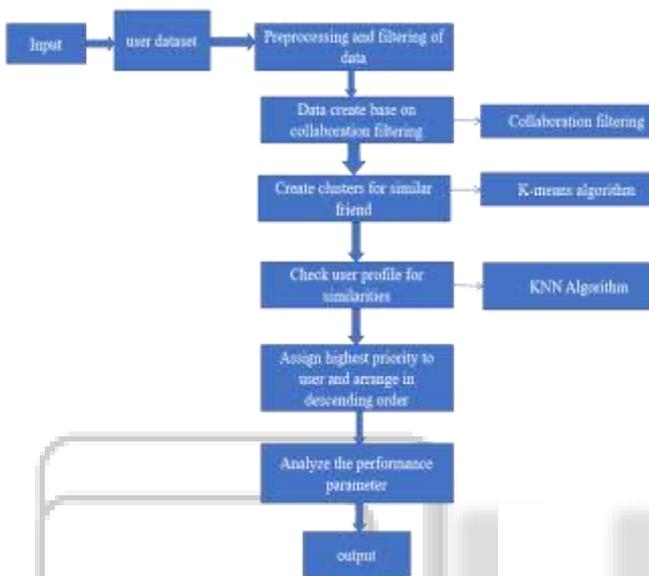


Fig. 3: Block diagram of Proposed Method

## V. RESULT ANALYSIS

Here, using proposed system we get accuracy system. We also get recall, support, F1-score and precision for both the system. Following graphs more than existing system is less of proposed shows the comparison of existing system and Proposed system.

Existing System	Proposed System
79.9%	81.8%

Table. 1: Comparison of accuracy

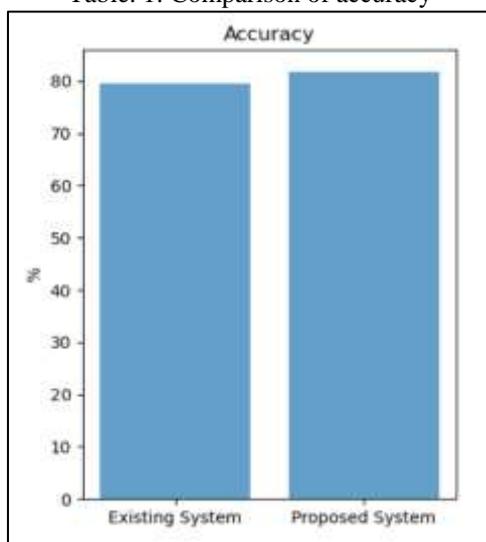


Fig. 4: Comparison of accuracy

	Existing system	Proposed system
Precision	0.50	0.90
Recall	0.79	0.90

Table. 2: Comparison of Precision and Recall

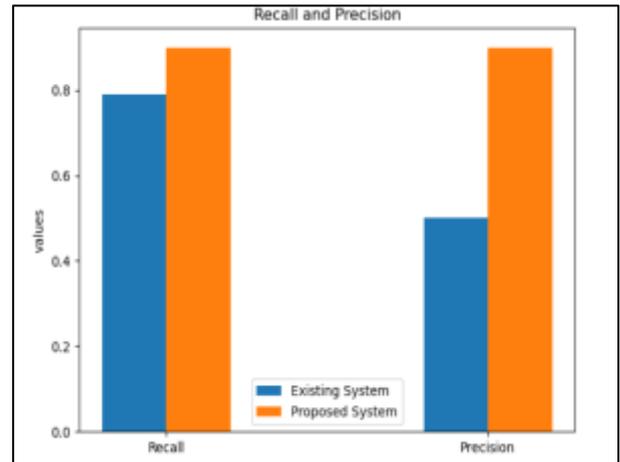


Fig. 5: Comparison of Recall and Precision

	Existing System	Proposed System
F1-Score	0.90	1
Support	0.85	0.90

Table. 3: Comparison of F1-score and support

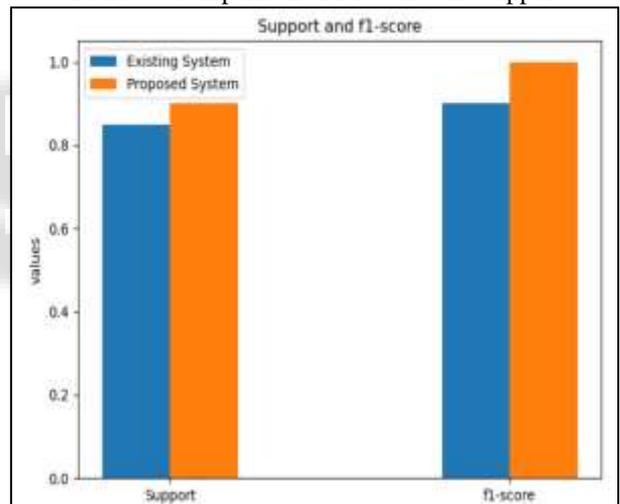


Fig. 6: Comparison of f1-score and support

## VI. CONCLUSION

Apply machine learning techniques on the data Maximum Analysis for more accuracy. We Proposed Model That Applies collaboration filtering, KNN and K-means Algorithms Friend similarly accurately and predict the type of more accurate friends. These techniques have been analyzed and integrated for Friend recommendation. With The help of these techniques we derive the statistical model for friend recommendation. By using mentioned techniques in the proposed system, we will definitely find help in better prediction of friend recommendation and providing higher accuracy.

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