

Mobile Video Recommendation System on Cloud with User behavior

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Abstract: Now a day, countless web videos are available on-line, but the problem is how to help users to find videos of their interest in an efficient way? Mobile user always wastes a lot of time to obtain their desired videos. The proposed system is a cloud-based mobile video recommendation system which can speed up the recommendation process and reduce network overhead. The Mobile properties are collected for context aware recommendation from video-sharing mobile application. The user based recommender system is created with the Mahout Machine learning library. Moreover, Mahout's core algorithms are used for classification, clustering and collaborative filtering. The System collects user, item, rating for creating clusters of user contexts and user profiles to generate video recommendation rules. User context and the profile clusters are used for finding video recommendation from the massive amount of video collection of cloud. Mahout provides better recommendation functions. Depending upon mobile properties and viewing time of video we create implicit preferences to generate recommendation rules. The system will provide a very good result with more accurate Recommendation Evaluation functions. The proposed system can recommend desired services with high recall, high precision and low response delay.

Keywords: Mahout Machine learning library, Cloud storage, video recommendation, clustering and collaborative filtering

1. Introduction

In the real world, users are facing massive multimedia content and services on the internet. Mobile users waste a lot of time to obtain their interests. Therefore, different recommendation systems have been proposed. Most of the systems deploy a large number of context collectors at terminals and access networks. However, Context collecting and exchanging results heavy network overhead and huge computation requirement. The solution to network overhead is Cloud storage. **Cloud storage** is a model of data storage where physical storage spans multiple servers and the digital data is stored in logical pools, the physical environment is typically owned and managed by a host company. These cloud storage providers are responsible for availability and protection of data. People and organizations buy or lease cloud storage capacity of the providers to store user and organization.

In recent year the video sharing websites (e.g. YouTube) has achieved great success. The video content may be similar or quite different in billions of video sharing websites. Users are always facing a problem of finding their favorites in less time. This situation is even worse for mobile users because of low bandwidth and screen limit. How to help mobile users obtain their desired content lists from billions of web pages in a short time is a very challenging issue. Some websites provide searching is based on the keywords. In that case Mobile users do not have any keyword when they process the search. It's very difficult to find there interested video. So in a big data environment, improve its scalability and efficiency with user preferences and user-based Collaborative Filtering algorithm to provide a recommendation.

In this paper, we proposed mahout technology for implementing a recommendation system with easier and faster. **Mahout** is a scalable machine-learning library which

is implemented on top of Apache Hadoop and using the MapReduce paradigm. It does not restrict contributions to Hadoop based implementations[11]. Mahout's core algorithms are used for classification, clustering and collaborative filtering. In addition Mahout is self managing and can easily handle hardware failures as well as scaling up or down its deployment without any change to the code base.

In the proposed system, the video sharing application is used to find the context information from a user's smartphone. Mahout recommender requires interactions between users and items. The userid, itemid and video ratings are used for user based recommendation of mahout by the collaborating filtering algorithm. User contexts and the profiles will be delivered collectors. Mahout creates a user profile cluster and the context cluster by using clustering rules. Then Mahout Recommender function is use data model, user similarity and user neighboring for recommendation rules.

Recommendation rules are reordered to improve scalability and real-time recommendation. Existing recommendation systems always recommend a ranked list for users after training from some given data. However, if the content changes or a new keyword appears, a fixed list is always provided. In our work, according to recommendation rules, the recommender searches a real time ranked list for users.

2. Related Work

In the early stage of Recommendation related studies, In general, four categories of algorithms have been exploited by the recommender system. Content based recommendation, Collaborative Filtering recommendation, Context-aware recommendation and Graph based recommendations.

For Example Google uses content based recommendation which takes similarities of content titles, descriptions, tags, or keywords. The Amazon has achieved great success in

recent years. They use collaborating filtering algorithm based on users transaction histories and content popularity to obtain the content rating, users 'similarity, statistics and feedback methods. Most of the e-commerce websites use CF to help users find their interested goods [4]. Users' Co tag behaviors and friendships in a social network can be described by a graph and social graph to recommend items with random walk restarts is applied [2], [3]. Context-aware recommendation systems complement user context sensed on Smartphone and long-time user profile to assist the user in selecting better services and videos dynamically. Context is a difficult concept to capture and describe; fuzzy ontologies and semantic reasoning are used to augment and enrich the description of context [1],[7],[8]. Users can access multimedia resources on only within P2P Network via DLNA. P2P is limited only for specific network [5]. As a stateless programming model, MapReduce cannot directly express Collaborative Filtering so it is performed on Hadoop[6]. To improve its scalability and efficiency in a big data environment, a widely-adopted distributed computing platform using the MapReduce parallel processing paradigm, KASR is implemented on Hadoop [9].

The code implemented on different node is complicated, so the proposed system implemented on mahout platform. Cloud Based recommendation on Hadoop it uses three user behavior context, interest group, user profile and for clustering SCA, Graph partition and K-mean separately. Hadoop clustering and Mapreduce is very difficult to create with user different behavior. In this paper user always make no comment after viewing the video its create errors during clustering [10]. We have proposed a User based recommender system for videos based on the Mahout platform. Distinguishing with other recommender systems, we have stored recommendation rules instead of recommending lists. The Recommender Evaluation function shows that the proposed system provides higher quality of the recommendation. Mahout will provide more efficient recommendation, then manually preparing recommendation rules with different nodes by Hadoop and MapReduce technology.

3. Proposed System

3.1 System Architecture

The proposed system is a video sharing application includes two parts: mahout recommender and real time recommendation. Mahout recommender is providing collection clustering recommendation rules according to the user context and user profile information. Real time recommendation components will extend requests to recommendation rules and will return the recommendation lists in accordance with optimized rules of Mahout. The framework of the proposed system is illustrated in fig 1.

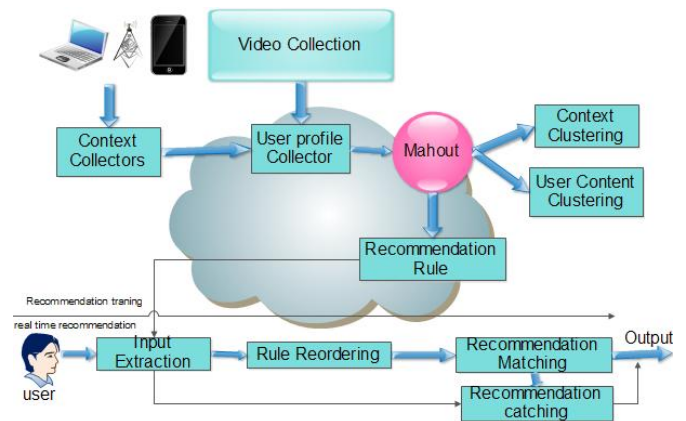


Figure 1: Conceptual overview of proposed system

1. Initially the video sharing application is used to finding their context information from user Smartphone. User Context and access preference are collected by context collector based on time, location, network type and screen resolution etc.
2. The User Profile collector is created by watching history, user rating, viewing time, and similar users.
3. User contexts and the profiles will be delivered collectors. Mahout creates a user profile cluster and the context cluster by using clustering rules. Then Mahout Recommender function is use data model, user similarity and user neighboring for recommendation rules.
4. The Rules will extracted from user input and perform the rule reordering to obtain a real time recommendation.
5. Recommended videos are collected from Cloud storage and shown to end user and the User will select a video to play.
6. Recommendation matching and catching is used to find best expected recommendations are provided to the end user.

3.2 Implementation Details

In the Proposed system Cloud of **Eucalyptus** is free and open source computer software for building Amazon web Services (AWS). The Dataset is created with Userid Itemid and rating in mysql database. **Apache Mahout** is a project of the apache software foundation to produce free implementations of distributed environments.

The four major components in our framework are described as follows.

3.2.1 Data Model

The Data Model is consisting of dataset which is stored on cloud storage. The Dataset is a collection of data. The Dataset is corresponds to the contents of a single database table, or a single statistical data matrix, where each column of the table represents a particular variable, and each row is represents a given member of the data set in question.

3.2.2 User behavior collection

Mahout's recommenders use an interface called Data Model to handle interaction data. User interest is varies according to time, location, emotions etc. User always watches the videos with specific types in particular context which indicates that user has unique access preferences. User

Context is collected from android Smartphone with context of Network type, location, device screen resolution etc. User profile is created with the help of mahout recommender and data model of cloud storage. And also watching history, rating and viewing time is used to create the user profiles

3.2.3 User based recommender

The idea behind this system is that when we want to compute recommendations for particular users, we look for other users with a similar taste and pick the recommendations from their items. For finding similar users are clustered by comparing their interactions. There are several methods for doing this. The collaborating filtering algorithm recommendation based on abundant user transaction histories and content popularity. To obtain the content rating and users' similarity, statistics and feedback methods are used. The Mahout recommender is expecting the interaction between user and item as input. The User based recommender Function uses the userid, itemid and the rating to provide recommendations The user similarly and threshold of user neighborhood is used to create Recommendation rules with user context clusters and profile clusters.

3.2.4 Real-time recommendation

The real-time component accepts the user's requests and returns the recommendation lists to the user. The procedure translates the user's request into recommendation rules on the basis of request keywords and implicit user contexts and user profile, then searches for the user's favorite according to the rules. The Rule Reordering is performed to get expected results. The user selects to play, then view time is also calculated for next recommendation function.

In this proposed system Dataset is video collections with their specification details. The Userid, itemid and the rating are used in the recommendation process. User Context and access preference are collected based on time, location, network type and screen resolution, etc. User Profile is created by watching history, user rating, viewing time, and similar users.

3.2 Expected Results

A cloud-based mobile video recommendation system which can speed up the recommendation process and reduce network overhead to obtain a useful recommendation in less time. The system will provide a very good result with more accurate Recommendation Evaluation functions. The results will recommend desired services with high recall, high precision and low response delay. As compared to YouTube the proposed system will provide better results with user behavior preference (eg. Bollywood Movie videos). Compare the clustering latency with a clustering algorithm with cloud and without a cloud with different cluster size. It will perform better for large numbers of clustering.

4. Conclusion

We have proposed a User based recommender system for videos based on the Mahout platform. Distinguishing with

other recommender systems, we have stored recommendation rules instead of recommending lists. Cloud storage is used which can reduce network overhead and speed up the recommendation process to obtain a useful recommendation in less time. The Recommender Evaluation function shows that the proposed system provides higher quality of the recommendation. Mahout will provide more efficient recommendation, then manually preparing recommendation rules. Cloud Platform does not reduce clustering latency when cluster number is small but it helps in improving the performance of the system with an increment of the cluster number.

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