

# An Efficient and Hybrid Collaborative Filtering For Agriculture

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**Abstract**— Agriculture prescription can be aim to solve problems in agricultural field for farmers, but in reality, agricultural technology personnel (ATP) or agricultural technology expert (ATE) are also shorthanded. So it is not easy to ensure that all farmers' problem is determined and the existing online agricultural services just tidy up some common recommendations, mostly without involving the tailored service. So this paper proposed an online agriculture prescription endorsement system which realizes three functions incorporate with the automated question answering, recommendation for agricultural technology personnel or agricultural technology expert and suggestion for similar users based on the construction of user interest model. By this system, when the questions are put forward by a farmer according to his requirement, can be solved timely and agricultural instruction can be better improved and shared.

**Keywords**— Agriculture technology prescription, ontology, collaborative filtering, word segmentation, similarity calculation.

## I. INTRODUCTION

Agricultural technology recommendation is targeted solution for problems in agricultural field. Actually, ATP or ATE's may not be sufficient to guarantee that all farmers' question is answered timely. And most of the available online agricultural services do not involve customized recommendation even not give farmers entryway to ask questions such as the basic-level agro-technique extension information platform [1] developed jointly by Ministry of Science and Technology, Ministry of Agriculture and Chinese Academy of Agricultural Sciences and Chinese Gardens Online system [2]. User interest model is an important part of the tailored recommendation system.

For example, adopted behaviour sequence and their relationships to express user interest model [3]. Used ontology to represent user interest model and they recorded users' behaviour information especially their method distinguished between short term and long term interest model [4]. Used concept network to represent user interest model [5].

Put forward a fine-grained user interest modelling method which could be divided into different small user interest classes [6]. Mao et al. built user interest model with weighted semantic network [7]. Constructed user interest model based on tree vector space model [8].

## II. RECOMMENDATION PROCESS OF THE SYSTEM

### A. Traditional Recommender Approaches Content-Based Filtering

Content-based recommender systems work with profiles of users that are created at the beginning. A profile has information about a user and his taste. Aftertaste is based on how the user graded items. Generally, when conceive a profile; recommended systems make a survey, to get initial data about a user in order to escape the new-user problem. In the recommendation process, the engine analyzes the items that were already certainly rated by the user with the items that he didn't rate and looks for comparison. Those items that are mostly similar to the positively rated ones, will be recommended to the user.

### Collaborative Filtering

Collaborative filtering wound up a standout amongst the most inquired about approach of suggested frameworks since this entrance was portrayed and depicted by Paul Resnick and Hal Varian in 1997. The possibility of collaborative filtering is in decision choice clients in an affiliation that offer thanks [6, 7]. If two users have same or essentially same rated items in accepted, then they have related tastes. Such users build a group or so called section. A user gets endorsement to those items that he/she hasn't rated before, but that were already certainly rated by users in his/her neighborhood [8].

For example, the users rate the movies positively and with similarities. That means that they have similar taste and build a neighborhood. The user A hasn't rated the movie "TRON: Legacy", which possibly mean that he hasn't watched it yet. As the movie was positively rated by alternate user, he will get this thing suggested. As contradicting to basic fundamental recommended structures where support is based on the most appealing thing and the most communicate think about, impart proposed systems, and consider the essence of client. The taste is recognizing to be standard or possibly change gradually.

### Hybrid Recommendation

This access for better results with some recommended systems associating different capacity of collaborative approaches and content based approaches [9]. Utilizing hybrid approach, can maintain a strategic distance from a few constraints and issues of recommended system, and suggested frameworks. The combination of approaches can continue in different ways [10]:

- i) Separate implementation of algorithms and joining the results.
- ii) Apply certain rules of content-based filtering in collaborative approach.
- iii) Apply certain rules of collaborative filtering in content based approach.
- iv) Create a coordinated recommended system, that brings stable both accesses for farmers and other end-users.

### B. RECOMMENDED APPROACH

Fig.1 shows recommended process of the system. The system consists of total three roles-farmers, intelligent recommendation agent, agricultural technology personnel or agricultural technology expert for providing the accurate information timely to the end-user.

The online agriculture prescription proposal framework has the accompanying features:

(A) Auto question - answer for prescription. Recommendation containing high similarity with the question will be send to the farmer after him or her sufficient to fill the question.

(B) Recommendation for agricultural technology personnel (ATP) or agricultural technology authority (ATA). Agricultural technology organization or agricultural technology authority with high interest with the question will be recommended to the farmer after he or she filled the question.

(C) Recommendation for similar users. Users with high similarity with the farmer and prescriptions of mutual interest of the farmer's similar users will be recommended to the farmers when they login system and the farmers can also view his or her similar users' information.

## III. CONTRIBUTIONS

The recommended system comprise of four key methods:

- i) Model construction. It contains client or user interest model technology, issue model technology and remedy model establishment technology.
- ii) Word segmentation algorithm. It implements forward maximum matching word segmentation algorithm to segment title and text of recommendations and questions based on domain dictionary. Word segmentation algorithm is basic of model construction..
- iii) Similarity calculation method. The system determines whether or not to implement recommendation according to the size of similarity. Similarity calculation method is the core of the recommendation engine as shown in Fig.1. Update similarity calculation will be utilized to provide with best prescription to the end-user.
- iv) Collaborative filtering. The system uses collaborative filtering to look at new interest from similar users for the farmer when a question is put forward by him for the best prescription.

## IV. PROPOSED SYSTEM

The proposed system tries to overcome the peculiarities of conventional system by being dynamic, flexible and adaptive. The recommend system is that this system makes is based upon the recent characteristics exhibited by ATP and ATE, senior farmers. Since the process of collection and analysis of data is continuous, makes the proposed system efficient and effective enough to make predictions not only on the basis of empirical data but also the data being collected by the system over the period of time. This effectively makes the system, a smart recommendation engine that keeps on getting better as it learns more and more with time. The engine restlessly feeds upon the data and monitors the factors like suitable crops and it's diseases and remedies etc. The comparative/ performance analysis of recommendation techniques are shown in the following graphs.

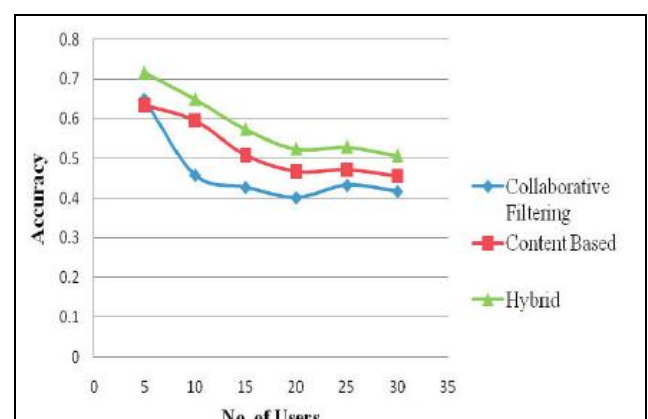
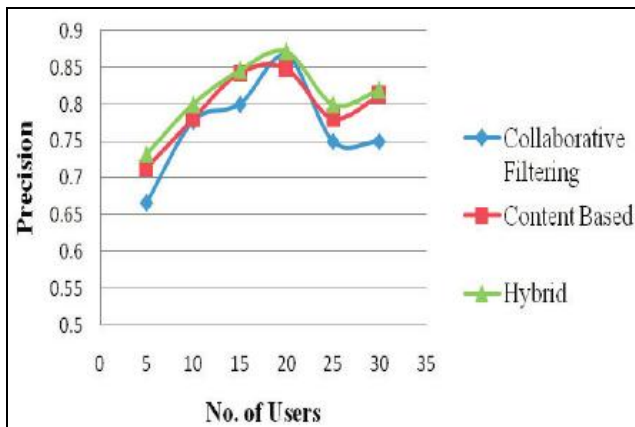


Fig. 2 Accuracy of Recommender System

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**Fig. 3 Precision for Recommender System**

## V. CONCLUSIONS

This paper provides with online agriculture prescription endorsement system. Farmers may get valuable and handy information from these recommended similar prescriptions to timely solve problems in the agricultural production. Farmers can view recommended agriculture technical personnel and expert information and online communication with expert to get suitable prescriptions within the time. The farmers can view similar users and find new interest from their similar users through collaborative filtering. This system provides a quick channel for farmers to look for best prescriptions and provides useful agricultural information for farmers, which obviously that the system can have great practical value.

This recommendation engine intended to be built on predictive modelling is to support farmers and agricultural sector to overcome the problems faced in cultivation due to improper or incomplete knowledge. Agriculture has been considered as a major source of employment in India and back bone of Indian economy. But now, as the scenario has changed drastically over the past few decades, immediate measures are required to tackle this grave problem. So, application of this recommendation engine in agriculture could be one such important and ever desired solution to the problem. With the time we plan on not only let the farmers know “which” crop to grow but also “how” to grow. This can majorly affect the effort to profit ratio as it can help in reducing over-use of resources and streamlining of essential requirements for farming.

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Fig. 1 Recommendation process of the system

