Application of Information System and Computer Internet Technology in Integration of Geographical Indication Agricultural Products

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Abstract. This article discusses the connotation and core value of geographical indications to protect agricultural product brands, analyses its brand marketing strategies, and proposes several supporting marketing strategies. At the same time, based on the big data Internet technology and research on the related technologies of the agricultural product brand e-commerce recommendation system, the paper proposes an explicit and implicit combination of agricultural product brand strategy recommendation hybrid collaborative filtering method. This method improves the traditional collaborative filtering method based on the subjective scores of customers. Based on subjective scores, it also combines the time of customers browsing website pages to find the user's nearest neighbours. The research results found that the system can not only help users quickly recommend agricultural products that meet their needs in the massive information, but also provide more similar information for users to identify.

Keywords: Computer internet, geographical indication, agricultural product brand, collaborative recommendation algorithm, computer platform, big data technology.

1. Introduction
A geographical indication agricultural product brand refers to a public brand used by a group of agricultural producers and operators in a region after applying for registration with the General Administration of Quality Supervision, Inspection and Quarantine in the name of a certain agricultural product industry association. The foundation must have a specific agricultural industry or many agricultural products [1]. Gathered in a specific administrative or economic area, a stable, continuous, and obvious competition aggregate has been formed. Many famous, high-quality, and special agricultural products have obvious regional characteristics and are branded with geographical indications. If they are separated from a specific area, the market recognition of these products will be greatly reduced, and they may even be considered counterfeit and inferior products. Therefore, agricultural products brands are mostly used regional brands, and registered as geographical indication products, are protected by law.

The agricultural product expert system AES (also known as agricultural intelligent system) based on geographic indication marketing is one of the most practical applications in expert system research. It is the use of artificial intelligence expert system technology to gather knowledge, models, and expert
experience in the agricultural field [2]. Adopt appropriate knowledge representation technology and reasoning strategy, and use the information network as the carrier to provide agricultural production managers with consulting services and scientific farming guidance. With the rapid development of the Internet and its wide range of applications, various agricultural expert systems and agricultural expert system development platforms based on Web technology browsers/servers have become an important aspect of network application technology research, the network has become popular. One of the media AES. The application developed from this has many advantages: the client only needs to be equipped with a browser to access the AES site, the client is not demanding, and it has a unified interactive interface, easy to operate, easy to install and maintain.

2. The brand connotation and core value of agricultural products protected by geographical indications

2.1. Quality and safety
The core of the protection of agricultural product brands by geographical indications is quality and safety. Agricultural products will form consumer credit in the long-term consumption process. This credit is related to the place of origin and quality. If there are hidden dangers in the quality and safety of agricultural products, it will directly harm the interests of consumers and seriously damage the credit image of the agricultural products themselves [3]. In recent years, China has put forward the strategy of agricultural economic development of "one village, one product", which is gradually becoming a major form of realization of geographical indications of agricultural products, and increasingly becoming a synonym or business card for local economic development. For example, Xiangtan and Xiangshan Portus’s, Jinhua and Jinhua Ham are all based on the quality and safety of agricultural products, and they are also an affirmation and promotion of the protection of geographical indications of agricultural products.

2.2. Ecological environment and intangible cultural heritage
The raw materials of agricultural products that have been certified for protection of geographical indications come from the original ecological planting (cultivation) area, and rarely (or never) use environmentally polluting pesticides and fertilizers. They are pure natural green and pollution-free products, plus geographical indications Protecting agricultural products has a unique regional character, and its traditional culture is an asset left over from history [4]. The intangible cultural heritage of agricultural products protected by geographical indications is intangible, regional, and specific. The implementation of dual protection of geographical indications and intangible cultural heritage for agricultural products not only protects the intellectual property rights and trademarks of agricultural products, but also protects their technology and traditional culture. For example, protecting the brewing skills of Shaoxing rice wine can effectively prevent the passing of related traditional culture and help create a "famous, high-quality, and special" product brand.

3. Computer Geographical Indication Agricultural Products Strategic System Based on Collaborative Algorithm

3.1. Algorithm design
The user-based collaborative filtering algorithm is mainly divided into three steps: building a user rating matrix, finding a set of similar users, and generating recommended items.

3.1.1. Construct user project scoring matrix. The first step of the algorithm is to construct a user's rating matrix for items. The matrix is an m*n matrix, where m is the number of users, n is the number of items, and the corresponding value is the rating of the i user on the j product. As shown in Figure 1.
3.1.2. Find similar user sets. The search for similar user sets requires the calculation of user similarity. At present, researchers have proposed a variety of calculation methods for similarity. This system mainly uses the cosine similarity method. The main idea is to treat user ratings as vectors on an n-dimensional item space, and the similarity between users is measured by the cosine angle between the vectors. The similarity calculation between user i and user j is shown in formula (1). Calculate the similarity between the target user and each user, and put the users whose similarity is greater than the threshold into the similar user set.

$$\text{sim}(i, j) = \cos \left( \overrightarrow{i}, \overrightarrow{j} \right) = \frac{i \cdot j}{\|i\| \cdot \|j\|}$$  

(1)

3.1.3. Generate recommended items. The average weighted recommendation strategy comprehensively considers consumers' ratings of all items, and this recommendation strategy is currently the most widely used. According to the similarity between users, the calculation method of the target user u's prediction score for the unrated item i is shown in formula (2).

$$P_{u,i} = R_i = \frac{\sum \text{sim}(u, n) \times (R_{u,n} - \overline{R}_n)}{\sum \text{sim}(u, n)}$$  

(2)

Among them, sim(u, n) is the similarity between user u and user n, and R_{u,n} is the rating of user n on item i in the nearest neighbour set. This method is reasonable when there are many items evaluated by users, and the experiment proves that it has a better recommendation effect. This system uses this average weighted recommendation strategy.

3.2. System design

The realization of personalized recommendation of agricultural products includes the collection of user historical browsing, purchase, rating, and other data. The acquired data is analysed through the recommendation algorithm to obtain product candidates, and the product candidates are repeatedly filtered and cold question substitutes are used to obtain the final product recommendation list. Feedback the product list to the target user [5]. The specific process is shown in Figure 2.
3.2.1. **User data collection.** The hybrid collaborative filtering method adopted by the system is mainly to analyse the historical behaviour data of users. Before data analysis, the user's historical records need to be digitized. The browsing history is described by a collection of specific data such as the browsed website, the ID of the user who browsed the website, and the browsing time. The purchase record is described by a collection of specific data such as the URL of the purchased product, the user ID of the purchased product, and the time of purchase [6]. A collection of specific data such as product ID, user ID, rating level, and evaluation is used to describe user rating behaviour. The user submits the form through the web page, and the system converts the score and evaluation entered by the user into a string and stores it in the database, and the information can be obtained from the database.

3.2.2. **Product candidate recommendation and product filtering.** The quality of product candidate recommendation is related to the accuracy and effectiveness of personalized product recommendation, which is the core part of the product recommendation module. First obtain the user's historical behaviour data, and generate Top-(N+M) candidate items through two strategies of Top-N and Top-M, and the set of candidate items is used as the preliminary result of recommendation. Then traverse the set of candidates to remove products with higher unsuitability. When the user's historical behaviour data is too little, the product that generates the user's recommended click-through rate is added to the candidate as a substitute.

3.3. **System test**
We use recall, accuracy, and average absolute error to measure the recommendation algorithm. The recall rate indicates whether the recommendation algorithm is comprehensive; the accuracy rate indicates whether the recommendation is correct. We compare the improved algorithm with the traditional item-based collaborative filtering algorithm. Compared with the traditional algorithm, the MAE value of the improved algorithm proposed in the article is reduced, which means that the recommendation accuracy is higher. As shown in Table 1. Table 1 shows that the improved algorithm of the article has higher recall and accuracy rates than traditional algorithms.
Table 1. Algorithm effect comparison.

| Proportion of training set | Item-based collaborative filtering algorithm | Improve algorithm |
|---------------------------|---------------------------------------------|-------------------|
| 0.2                       | 0.8370                                      | 0.7876            |
| 0.3                       | 0.8185                                      | 0.7755            |
| 0.4                       | 0.7969                                      | 0.7642            |
| 0.5                       | 0.7830                                      | 0.7561            |
| 0.6                       | 0.7635                                      | 0.7430            |
| 0.7                       | 0.7523                                      | 0.7362            |
| 0.8                       | 0.7398                                      | 0.7247            |
| 0.9                       | 0.7335                                      | 0.7182            |

4. Strategic Suggestions for Geographical Indication Agricultural Products

4.1. Promote the construction of the protection project of geographical indication agricultural products
The first is to use the Internet and big data technology to improve the geographical indication agricultural product information database, compile the technical use specifications of geographical indication agricultural products, regulate the use of geographical indication technology in the production and marketing of agricultural products, and provide reliable technical support for the extensive use of geographical indication technology in the terminal market of agricultural products. The second is to rely on the "village revitalization" strategy to promote the protection of agricultural products with distinctive geographical indications. Local governments should combine the characteristics of local agricultural products to formulate GI agricultural products protection projects, highlight the characteristic resources of GI agricultural products, encourage the industrial operation of characteristic agriculture, enhance the goodwill and brand value of characteristic agriculture, and ensure that the "comparative advantages" of GI agricultural products are effective Transform into a competitive advantage in the market.

4.2. Build a whole industry chain platform for geographical indication agricultural products
The whole industry chain strategy refers to the improvement of the quality and safety of agricultural products through collaborative management by various node organizations from the field production of agricultural products to the table consumption. There is an endogenous relationship between this and the technology of geographical indication agricultural products. First, the difficulty in the implementation of the entire industry chain strategy lies on the supply side with farmers as the main body. Smallholder-style decentralized operations are one of the root causes that induce the fluctuation rate of the quality of agricultural products and hinder the popularization and application of standardized technologies for geographical indication agricultural products. In order to promote the full development of the market for geographical indication agricultural products, integrate the resources of scattered farmers and work together to optimize the supply side of geographical indication agricultural products [7]. Local governments can mobilize leading enterprises to optimize and reorganize scattered farmer households' production resources, implement standardized technologies in agricultural product selection, planting technology, picking, storage and transportation, etc., to improve the quality of GI agricultural products. Second, the focus of the implementation of the entire industry chain strategy is in the field of circulation. Fresh agricultural products generally have the shortcomings of being perishable and difficult to store, which determines that the circulation of geographical indication agricultural products needs to implement a specialized high-level division of labour, to improve circulation efficiency and reduce circulation loss rate. Third-party agricultural logistics companies can build a vertically integrated circulation strategy, and integrate agricultural material supply, agricultural product purchase, circulation processing, storage and transportation and other resources with the circulation company as the leading factor to ensure that the entity of
geographical indication agricultural products and related information are within the entire industry chain the real flow.

5. Conclusion
Horizontal marketing is a new thinking and a new way to expand and strengthen the brand of geographical indication agricultural products. In the process of implementing horizontal marketing, we should pay attention to establishing marketing concepts and ecological brand concepts, insight into consumers' inner needs, and establishing protective mechanisms. The experiment mainly compares the subjective scoring method and the mixed filtering algorithm of explicit and implicit combination through the trial operation of the agricultural product recommendation system designed and developed by the research group.

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