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Model of Information Classification in the Agricultural Information Push Service

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Abstract: Agricultural information push service as an active and communicative method of information acquisition is the effective way to improve the quality of agricultural information service. Information classification is the base for information push, the degree of reasonable classification affect directly the level of information service quality. Based on the time attribute, relationship attribute and type attribute of information, combining with knowledge evolution and industry chain, the method of information classification based on data, information, knowledge, the method of information classification based on production, market, science and technology and the method of information classification based on three-dimensional space are proposed to construct an reasonable and accurate synthesized classification model about agricultural information, the model fits the real demand of agricultural information service, attributes to the rapid update and personalized push for information.

Key words: Agriculture, information services, push technology, information classification

INTRODUCTION

Information classification is the base of information push, whether the information classification is rational or not will directly affect the information service quality. Reasonable and precise information classification can improve the matching efficiency and accuracy, supporting agricultural information personalized push. Currently, the contradictions between the increasing information resource and the quality of information service is the main issue, namely, the increasing information resource has not improved the user experience. The basic reasons resulting for this phenomenon is that agricultural information service is lack of user classification and information classification. User classification can be achieved by extending user's attribute but to achieve the rational, practical and efficient information classification needs to be supported by a set systematized and scientific classification system. Presently, the usually methods of agricultural information division are: based on vector space model (Li and Wang, 2000; Yuan and Pu, 2008; He *et al*., 2010), based on neural network, based on ontology and so on (Li and Wang, 2006; Wang and Liu, 2006; Li, *et al*., 2010; Li *et al*., 2007; Wang *et al*., 2005; Zheng *et al*., 2010). In these classification methods, information classification method which is merely based on vector space has a poor adaptability, the classification results have deviation; the information classification method based on neural network has a relative narrow scope of application and the rule expressing is not easy to understand; the information classification method based on ontology is difficult to construct ontology, to lead user interest without update in time.

INFORMATION CLASSIFICATION BASED ON AGRICULTURAL INFORMATION KNOWLEDGE EVOLUTION

From knowledge evolution, it can be seen that knowledge comes from information, is the abstraction of information. Positive evolution is to extract data from noise, then translate into information, upgrade to knowledge, finally sublime wisdom. The evolution process is information's management and classification, which make information order from disorder, make the best of things. Whereas, when the information reaches to a certain amount for the abundance of information production means, noise will inevitably appear. The process of information production is a process of decline, from wisdom to knowledge, from knowledge to information, from information to recorded data, from decline data to noise, which is reverse decline process, also is the information overload issue that is must to be faced.

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Table 1: Demand for information of the rice industry chain

Industry	Industry chain links	Demand information (for example)
Rice	Production	Information of improved variety, information of soil testing and fertilizer recommendation, information of fertilizer, information of pesticide, information of meteorology, information of diseases and pests control
	Market	Information of supply and demand, information of price
	Science and technology support	Information of science and technology, information of policy, information of laws and regulations

Useful information resource involved in agricultural information service includes data, information and knowledge. In the process of information resource management, data mining and knowledge refine is the positive process mentioned above; but along with the information increase, information will produce noise, which make users more difficult to find interest information, then users drown in information resource. For common farmers, information and knowledge are useful; for agricultural scientific researchers, data, information and knowledge are important. Therefore, according to knowledge's evolution rule, information resource is purposefully divided into data, information and knowledge, to effectively manage the information resource.

INFORMATION CLASSIFICATION BASED ON AGRICULTURAL INDUSTRIAL CHAIN

Users in different industry chain links have different information demands, information classification according to industry chain links contributes to push information accurately, to improve the information service's quality. At present, there is no uniform standard for agricultural industry chain's division, "pre-production, in-production and post-production" is the most common version but it is too macro to explain, which is hard to meet the demands of agricultural information service. From the studies of history, several scholars have proposed unique views and in-depth analysis about the division of agricultural chain. For example, scholar Zhang and Zhang (2010) considered agricultural industrial chain including four aspects: First is the link in industrial chain, namely, production, process and sale; second is the link of industrial factor, namely, funds, labor and land; third is intellectual support, including science and technology, creativity and planning, the last one is the links between the industry and surrounding. Some other scholar thought that there are five aspects for agricultural industry chain consisting of production link, agricultural resource supply link, process link, circulation link and service link. Besides, COFCO proposed 7C entire industry chain which has been accepted widely by society, namely, agricultural industry chain consisting of seed selection, planting or breeding, harvest, storage and transportation, process, package and service.

Whichever division modes proposed before, they have the same purpose to improve the high quality information service. Farmers is the main subjects in agricultural information service, hence, the content expression should be more clear and nature, too professional expression to understand for farmers. In Japan, market information service is the core of agricultural information service, expanded from the systems of production information service, market information service, science and technology support service, is a clear classification given a good application effect by users. In this study, the information service thought surrounding the three links of "production, market and support" have been referenced, according to the three information service links, information demands in different industries are subdivided, which is favorable to the rational information classification. Users demands division in every link of rice industry chain are represented in Table 1 as follows:

INFORMATION CLASSIFICATION BASED ON INFORMATION ATTRIBUTE

Attribute analysis of agricultural information: Currently, there are two kinds of methods based on space information classification: line classification method and plane classification method, two classification methods have different advantages and disadvantages. In this study, the advantages of two classification methods have been integrated to propose the information three-dimensional space classification model (Xue, 2012). The three-dimensional specific visualization of information is the common name of three-dimensional specification and visualization. Information three-dimensional specification means to adopt clear and specific way to describe the information content, which make the recognition process specification, science knowledge popularization. Information visualization means to use the vivid and effective description method to describe the abstract information, which makes it present with a visible approach. Users in society with a large amount of information are easy lead to resource lost and visual fatigue, can't effectively find the information they need but three-dimensional specific visualization of information more consider the relation between every key attributes and users, make users to feel objective things through common perspective, finding the vivid things from

Table 2: Users viewing angle on the information

Industry chain links	Users	Attribute: Attention degree of time	Attribute: Mian content concerned	Attribute: Presentation model of content
Production: Feed processing	Users in small private business	2	Price of raw material, price of pork	Video, audio, picture
	Users in processing plant	3	Price of raw material, price of pork	Character, hyperlink
Production: Swine production	farmers	2	Price of feed, disease control, price of pork	Video, audio, picture
	technician	3	Price of feed, disease control, price of pork	Character, picture, hyperlink
Production: Slaughter and processing	slaughter	3	Price of swine, price of pork	Video, audio, picture
	Worker of slaughterhouse	3	Price of swine, price of pork	All types
Market: Pork sale	Stall-keeper	3	Price of swine, price of pork	Video, audio, picture
	Workers in monopoly store	2	price of pork, market analysis	All types
Support: Science and technology service	Individual investor	0	Practical technology, Q and A	Video, audio, picture
	Large scale growers	1	Practical technology, Q and A	All types
	Small and medium-sized grower	1	Practical technology, Q and A	Character, hyperlink

abstract status, to find the incredible and useful information which uses are interested to. According to three-dimensional specific visualization of information of agricultural service, the abstract information before has the exact summary and vivid visualization, can more exactly support personalized push of agricultural information, can effectively resolve the issuse in users classification and users interest migration.

In the process of agricultural information push service, information's time attribute, relationship attribute and content attribute is the key attributes which are concerned by users and easy to exactly summarize, are specifically regarded as information's updating time, the relationship between information and users' business, the content of information. Types of users have different attention degree and angles, the specific differences are presented in Table 2.

From table 2, it can be seen that the links of swine production and pig slaughtering pay more attention in time attribute, both the industries are lead by market, the feed price, swine price and the changes of swine price directly influence the profit status. But the subjects in the two links have low knowledge level, prefer to video, audio and picture to acquire information; technician and workers in slaughterhouse have relative high knowledge level, usually choose character and hyperlink to acquire information. The link of science and technology pay little attention to time attribute except the period of disease and pests, because a kind of technology may have a good practicability during 3 or 5 years, it means that the recent information is not always useful compared with the old information, the users relatively concern technology's guidance and practicability. As a whole, different links and education levels decide the information content and acquirement approaches users are prefer to.

Through analysis before, information can be reduced according to the concern degrees of information attributes and after information reduction, the information's time, content and relationship are projected

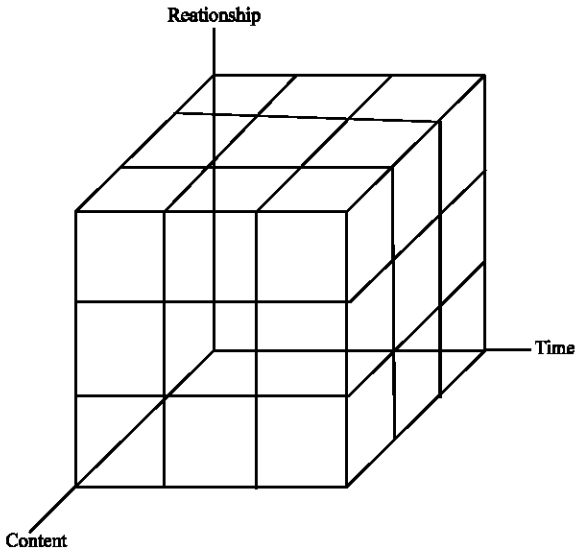

Fig. 1: Division of space

to three-dimensional coordinates (X, Y, Z), the different time, content and relationship represent a point in space, the point represent the information in three-dimensional specific visualization.

Information classification based on information attribute: Three-dimensional information space is divided into n cubes; every point in every cube represents a space coordinate in three-dimensional information space (Fig. 1). Tentatively set these cubes 100 long, agricultural information is classified for their characteristics and is given with numbers as mark according to the classification results, then independent information storage space is distributed by the numbers, to realize information's correct classification. For example, according to the production objects, agriculture is usually divided into: Planting industry, animal husbandry, forestry, fishery and sideline production, which are the primary number marked as 01, 02, 03, 04 and 05. Planting

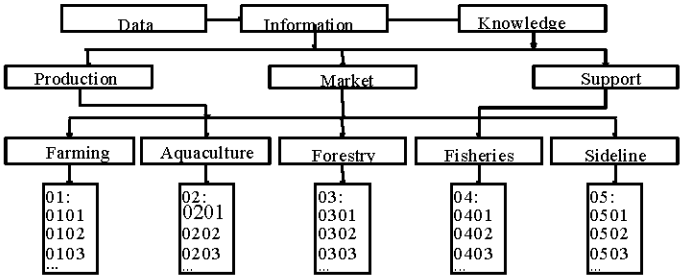

Fig. 2: Model of Information classification

industry is divided into: Rice, wheat and so on. Rice and wheat planting industry are given the secondary number, respectively marked as 0101 and 0102. According to this rule, swine husbandry and sheep husbandry can be marked as 0201 and 0202.

AGRICULTURAL INFORMATION COMPREHENSIVE CLASSIFICATION MODEL

For different starting points and different application fields, various agricultural information classifications form their classification systems. Scholar Zhong Yixin analyze the different definitions and propose that information definition system need to fully consider the complexity of information's concept, which should be made out in different levels according to different positions. The highest level is the common level, also is the constrained level, the defined information has a wide range of application but information's accuracy is not high; constrained conditions are more the definition's levels are low, the application ranges of the defined information are narrow, meanwhile information's accuracy is stronger (Zhong, 1988).

Similarly, information's classification is from the highest level to the lowest level, according to the different conditions introduced, information's classification in different levels and different application ranges can be provided, customizing information classification systems which are suitable for different fields. According to agriculture's regionality and periodity, farmers' education level and knowledge structures and so on, combining with information's essential characteristics and agricultural industry's characteristics and demands of application (Niu *et al*., 2003), information demands based on knowledge management, industry chain links are studied in this research, agricultural information comprehensive classification model is constructed combined with three-dimensional specific visualization of information, classification model structure is represented as Fig. 2.

There are three grades for information's classification: first, information resource is divided into data, information and knowledge, given relative less constrained condition in this dimensionality, mainly is convenient for information's maintain and management to ensure that information resource will not present too much noise; second, according to the links of industry chain, information resource is divided into production information, market information and support information, clear constrained conditions is set for information in this link to realize information classification according to fields; finally, information of every industry chain links is divided into planting industry, animal husbandry, forestry, fishery and sideline production, this link will set strict constrained conditions for information, information will be subdivided by three-dimensional specific visualization of information and every kind of information will be numbered to realize information's classification storage and call, accurate matching between information and users' demands.

CONCLUSION

Focusing on the issues such as poor pertinence in agricultural information push service, paying more attention to link of information classification, three kinds of classification methods from low to high for different constrained levels were proposed though analyzing knowledge evaluation rule of agricultural information, information demand of every industry chain links, characteristics and key attributes of agricultural information: namely, the method based on data, information and knowledge, the method based on production, market, science and technology support and the method based on time attribute, relationship attribute and content attribute. Combined with the three kinds of information classification methods, agricultural information comprehensive classification model is constructed. The model satisfies the reality of agricultural

information service, having certain significance, contributing to improve the service quality of agricultural information service.

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