SOA-based precision irrigation decision support system

Xu Liyuan [a,b,1], Chen Liping [b,*], Chen Tianen [b], Gao Yunbing [b]

[a] *Capital Normal University, Information Technology Institute, Beijing West 3rd Ring North Road 56, 100048, China*

[b] *National Engineering Research Center for Information Technology in Agriculture, Beijing Shuguang Garden Road, 11th Beijing Agricultural Building A519, 100097, China*

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ABSTRACT

At present, irrigation decision-making systems applied to the field of agriculture were mostly aimed at a given area and specific crops. It was difficult to be applied in different areas and different crops. In this paper, a precision irrigation decision-making system has done something to solve this problem. The paper, on the one hand, has synthesized multi-areas and multi-crops in one decision; on the other hand, the key was that it used an advanced design idea, which quickly builds a system by using SOA architecture and fully meets different needs of users based on the maximum reuse of services. The paper arranges services in BPM. First of all, user programmed areas, crop types and the water supply. Secondly, the system selects optimum services from the BPM based on different inputs, and then quickly builds a suitable model. Moreover, it gave precise guidance for crop irrigation processes. The precision irrigation decision support system provides an on-demand decision-making model for agricultural production. Applied results show that, through the test on Xiao Tangshan winter wheat, Da Xing vegetables and rice in central China, the system can quickly build a decision-making model to meet the needs of irrigation for different users. In addition, it shows a good reflection and wide use.

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0. Introductions

Decision support systems using databases, human–machine to combine a large number of models realizes scientific decision-making [1–3]. Decision support systems in irrigation management applications began in the early 1990s [4,5]. The developed countries do better in standardization of irrigation decision support systems and current use, and they developed a batch of software for irrigation districts. There are many advanced delegates: the CROPWAT system was an initial single-player based on the DOS environment, then the WISE system supported meteorological data's real time refresh based on an Internet environment, and the SIMIS system which can be applied to various irrigation area gave process from plan, design, water's allocation, maintenance, management and system execution.

In China, water shortage is the basic situation, agricultural water accounts for 70% of the total consumption, but its utilization is only 45% compared with 80% in developed countries. Water consumption per kg of crop is 2–3 times of developed countries [6]. So water-saving agricultural irrigation systems have great potential. The excellent irrigation system abroad is difficult to apply to domestic practical conditions: water shortage and low utilization rates. Therefore, the home also takes up the search for irrigation decision support systems. From the early handmade irrigation water plans to applying programming irrigation management software methods in most areas. Though it lasted 20 years, our country's agriculture irrigation based on the development of software is still in the primary stage [7,8].

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* Corresponding author.
  E-mail addresses: enhui860227@126.com (L. Xu), chenlp@nercita.org.cnm (L. Chen).

[1] Master of The Capital Normal University, Research in Software Engineering and Computer Application System. Tel.: +86 15910669483.