

A study on constructing GIS component repository on web using registration/retrieval agents

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Abstract: To improve the reusability and interoperability of GIS components, we propose the registration/retrieval agents, which can search the locating of users' frequently used components in not only the GIS domain but also other spatial information technologies such as GPS, ITS, RS and FM.

The registration/retrieval agents increase the reusability through the GIS component based development under distributed GIS components environment and enables the rapid setting of application on the web. Moreover, users can understand easily the information of GIS component and have the effective investment, timeliness and reliability while they have less maintenance effort by agent.

In order to design and implement this system on web, HTML and ASP (Active Serve Page), and JAVA were used. In addition, the performance of this system was verified through comparing others, which are similar to.

Keywords: GIS (Geographic Information System), Component, Registration/retrieval agents, Repository system, Web, Reusability, Interoperability

1. Introduction

Recently many software engineers have focused on component research to increase its reusability and interoperability. Especially, the research of common repository system for architecture technology, management and development has been regarded as a hot issue because it can save time and manpower by accessing to exactly what system developers are looking for. (Han, 2002)

However, as you may know, it is very difficult to identify certain components in a repository because of the lack of quality of software components and the inability of developers to efficiently find them. Here, in order to solve this problem, establishing fully repository architecture on the web for component sharing and circulation should be encouraged in a proper way.

In addition, to implement GIS more efficiently in the view of cost and time, GIS developers started to consider the concept of GIS component repository on

Web. It is mainly focused on reusability and interoperability because most GIS projects have its certain application such as MIS (Marketing Information System), ITS (Intelligent Information System), LIS (Land Information System), DCS (Disaster Control System) and FMS (Facility Management System) and each application needs its common functionalities such as mapping and query or its certain functionality such as 3D viewer and GPS data processing. Therefore, if there exists a universal repository storing GIS components and system designers or developers know where desired component are located in real time, they can easily select their desired component then modify or composite to their system by using them. (Han, E. J. 2002)

In this study, in order to develop and manage effective web based GIS component repository system, registration and retrieval agents system was proposed to resist and retrieval GIS components on repository system and compose or modify them to develop new GIS application system. For this, HTML and ASP (Active Serve Page), and JAVA were used to design and implement. In addition, the performance of this system was verified through comparing four others, which are similar to this web based components repository.

2. Registration/retrieval agents

As shown in Fig. 1, there are three parts, which consider users (system developers), agents (interface, registration, retrieval), and GIS component repository where stores user authentication information, GIS component classification spec., GIS components.

1) User interface agent

Users can acquire the results of registration and retrieval through the user based interface so that can manage GIS components more conveniently and

efficiently in visually.

2) Registration agent

GIS component developers could identify the desired components through the registration agent by composing the GIS component specification. This recorded component specification was stored in web based GIS component repository as GIS component classification specification as well as user authority information and GIS components.

Component registration could be consisted into 2 phases; 1) GIS contents dependent specification, 2) GIS contents independent specification. These data could be used as the clue of retrieval and metadata.

3) Retrieval agent

When the requirement toward user's retrieval occurs, retrieval agent detected them and received the result for users. The retrieval agent has two categories; 1) keyword, 2) GIS Component application domain.

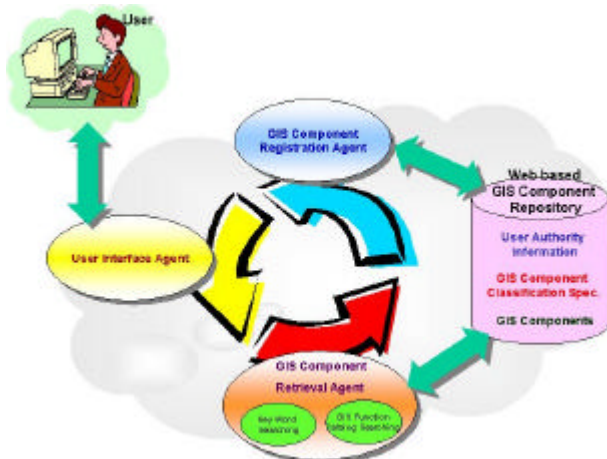


Fig. 1 Registration/retrieval agents system for the implementation of GIS application system

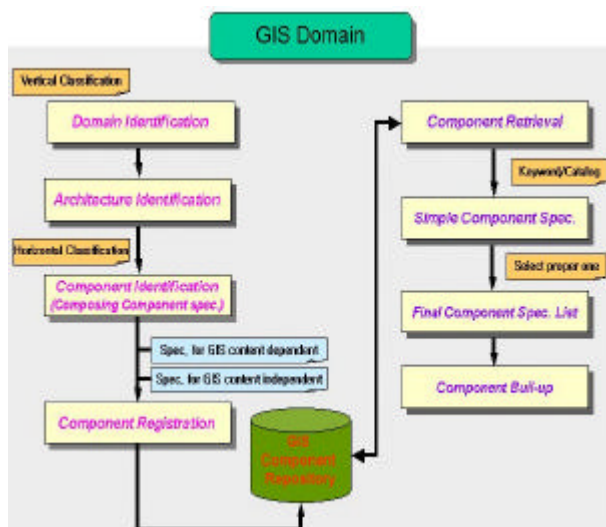


Fig. 2 Development phase through agents

Fig. 2 shows each step of the agent function for the generation of GIS component specification.

3. System implementation and performance evaluation

In order to design and implement this system on web, HTML and ASP (Active Serve Page), and JAVA were used as shown in Fig. 3. In addition, the performance of this system was verified through comparing others, which are similar to.

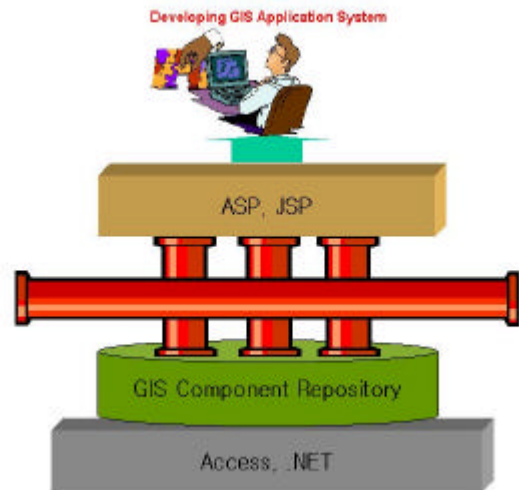


Fig. 3 Development Environment for the GIS component repository on web

Fig. 4 and 5 show the Registration agent and Retrieval agent interface through User interface agent, respectively. The GIS component registration indicates the information based on GIS content dependent specification and GIS content independent specification.

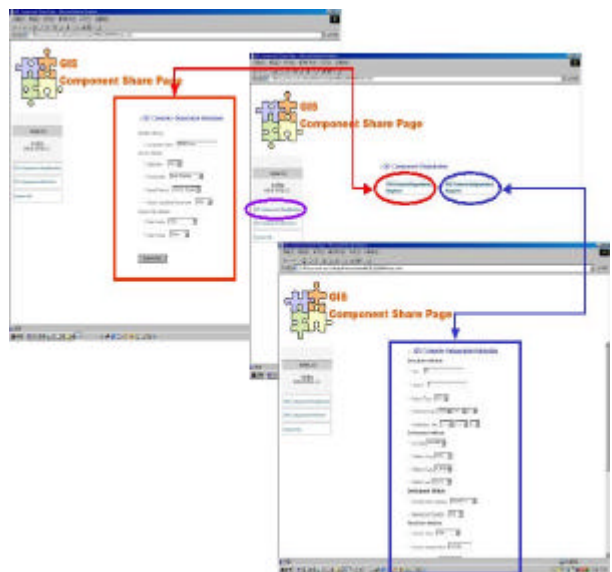


Fig. 4 Registration agent interface

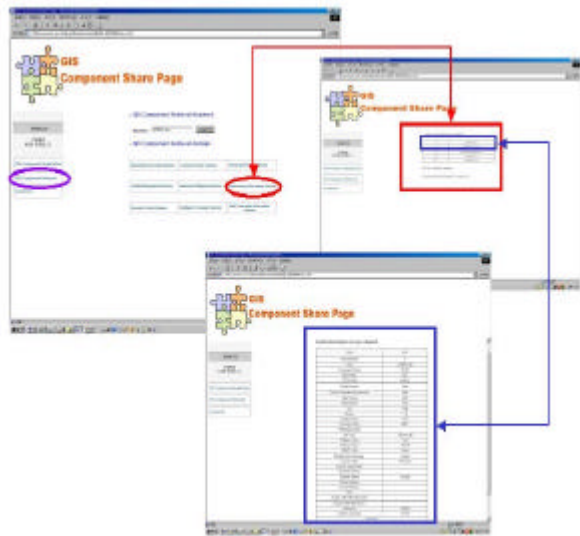


Fig. 5 Retrieval agent interface

Table 1. shows the result of performance evaluation with four other systems, which provide components on web.

Table 1. Performance evaluation with others

Item System	MainTask	Development Process (yesorno)	Spec.for Classification (yesorno)	Method for Retrieval	Agent (yesorno)
Blaze Advisor	Rule based DB Provider	Yes	No	Rule based Searching	Yes
IBMEAI	SCM, ERP, CRM	Yes	No	No	No
RationalRcom	UML based Spec.	Yes	Yes	No	No
Component Bank	Component Register & Selling	Yes	Yes	Key Word Searching	No
GIS Component SharePage	Agent based GIS Component Register & Retrieval	Yes	Yes	Key Word Searching & GIS Function Catalog Searching	Yes

4. Conclusion

Recent paradigm of software engineering tends to focus on developing component, which considers reusability and interoperability. In addition, it considers storing them in a repository, managing, and deploying in various business domains such as financial system and manufacture system.

In this paper, in order to develop and manage effective web GIS component repository system, the registration and retrieval agents system was proposed to resist and retrieval GIS components on repository system and compose or modify them to develop new GIS application system.

Through these, the biggest merit is to save expense

and time to be expected to spend for the development of software. Finally, the most significant thing will analyze and design web based component repository for public use of GIS component so that the overlapping of investment can be prevented while maintaining the quality guaranteed of component.

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