A FLEXIBLE ABSTRACT GRAPHICAL GRID WORKFLOW DATA STRUCTURE FOR REMOTE SENSING QUANTITATIVE RETRIEVAL

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ABSTRACT

The modern remote sensing quantitative retrieval requires high-throughput and high-performance computing. The heterogeneous nature of remote sensing application makes the Grid environment require workflow technologies to join remote sensing application to Grid system. Grid workflow model includes abstract Grid workflow and concrete Grid workflow. Abstract Grid workflow is more suitable for users to define remote sensing Grid workflow applications than concrete workflow.

Most representative scientific workflows have their own languages to describe and construct domain-specific workflows, but generally do not follow domain standards [1]. There are many reasons for this, but some example are: 1) it is troublesome to expand and develop the workflow process definition tools based on graphic-based workflows to adapt to the remote sensing domain; 2) language-based workflow for Grid computing require user to grasp the workflow language and mechanism of Grid. It is difficult for laymen to compose a complex Grid workflow; 3) many remote sensing algorithms depend on special runtime environments; 4) remote sensing data are characterized by largeness and instantaneousness.

Therefore, it is significant to design an abstract graphical remote-sensing-oriented Grid workflow process definition tools for laymen without the technical expertise to compose the existing Grid service resources, runtime environments and remote sensing resources under the uniform environment.

The design of abstract Grid workflow is a complex project involving in remote sensing data and algorithms, algorithms runtime environments, Grid and geosciences standards, and so on. It needs a flexible data structure to

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describe and store their various dynamic relations.

This paper firstly gives the relative research status about science workflow applied to geosciences' domain. In the design of Grid workflow data structure, the authors illustrate the abstract Grid workflow's data structure for remote sensing quantitative retrieval (see Figure 1). And then the authors give the key operation algorithms of the abstract Grid workflow data structure. In the implementation part, the authors have accomplished the abstract graphical Grid workflow composition system for remote sensing quantitative retrieval service (see Figure 2). Using it, users can construct a workflow based on remote sensing application just by dragging and clicking the components of interest provided by the system.

Index Terms—Workflow, Grid, Remote Sensing, Data structure, Abstract

REFERENCES

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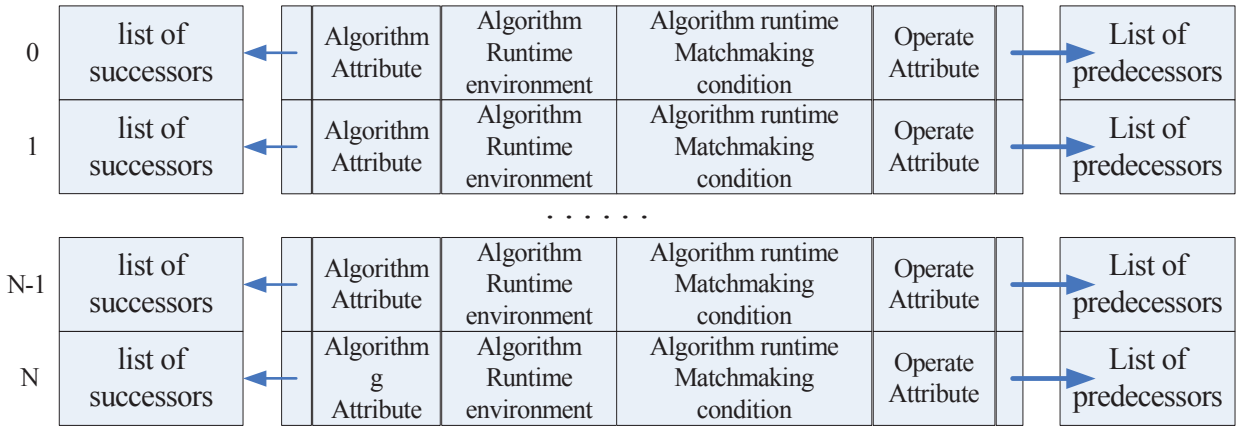

Fig. 1 the node list of DAG data structure

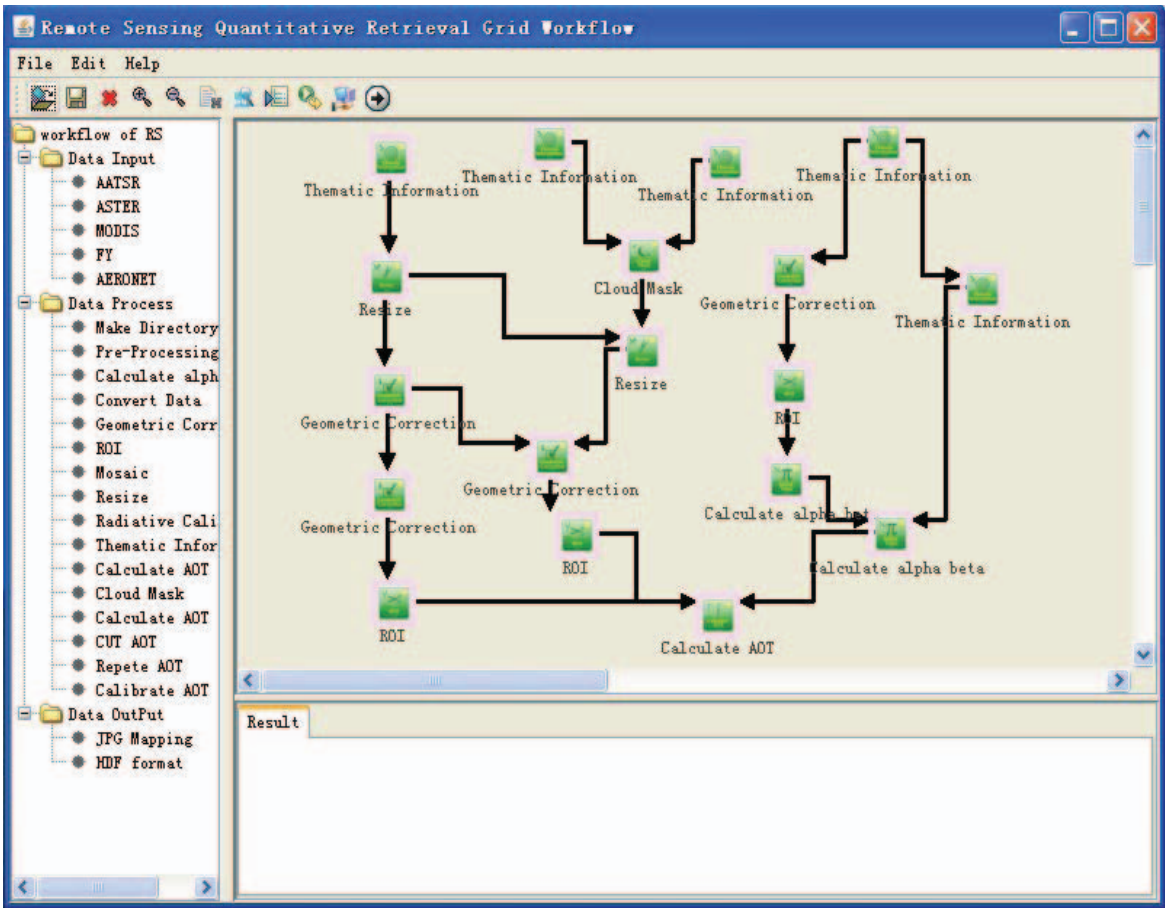

Fig. 2 Abstract Grid workflow composition system