

DEVELOPMENT OF GEOLGOCIAL SYMBOL MAPPING TOOL

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ABSTRACT Geological symbols are used for describing geological information. But it's not ease to represent them in commercial GIS s/w, because of their complexity and diversity. This study aims at developing the geological symbol mapping tool for representing geological symbol on user's geological information. Geological symbol mapping too is a web application which can handle SHP format and map geological symbols based on user's requests. It manages geological symbols and mapping codes and symbols are mapped within the geological boundary according to the corresponding non-spatial field that is a mapping code. The system has functions to upload a user's GIS file, and download the converted image file which is mapped geological patterns. The system displays converted images to be check mapping results. Because the symbols are simple bitmap files, user(system manager) can design and apply them rapidly without considering specific commercial S/W. Thus, it is expected that this system plays an important role to disseminate geological standards such as geological symbols. And the results of this study can be used for developing global geological symbols and applying them easily

KEY WORDS: Information Standard, Geological Information, web mapping

1. INFRODUCTION

The geological map is defined as the visual language of geologists(RUDWICK, 1976). But the geological map is not enough to be understandable, because there have been no geological information standards until recently. Geological information consists of geological age, rock type, stratigraphy, and geological phenomenon such as faults, fold. Geological information is represented by the mixture of pattern and color. Because of the complexity and diversity of geological symbols, Commercial GIS system did not support geological symbols. Thus it was difficult to represent seamless geological maps which are merged with neighbourhood maps.

KIGAM (Korea Institute of Geoscience & Mineral Resources) has harmonized 1:50K geological maps and has developed geological symbol standard using harmonised geological symbol(Chi et al, 2004)

Standard enable that information communicates correctly between information a provider and a user. It provides criteria to keep the same quality information. It insures information compatibility among different computing environments. The use of standard offers such merits to the information providers and users on condition that the standards should be easy to use. Sometimes newly developed standards can't support commercial S/W such as fill patterns in geological map.

This study aims at widely using newly developed geological symbol without commercial S/W. This system more focuses on rapidly applying standards to geological information.

2. GEOLOGICAL SYMBOL MAPPING SYSTEM

The geological symbol mapping tool has designed to map new geological symbols to the user's geological information which may be a user drawn geological map or geological map produced by geological organization.

User can get symbol mapped image from user uploaded SHP files which are used widely as a map file but they dose not have patterns. The mapped results can be either JPG, GMLor SVG(Andersson, 2003; W3C). Figure. 1 describes such a procedure.

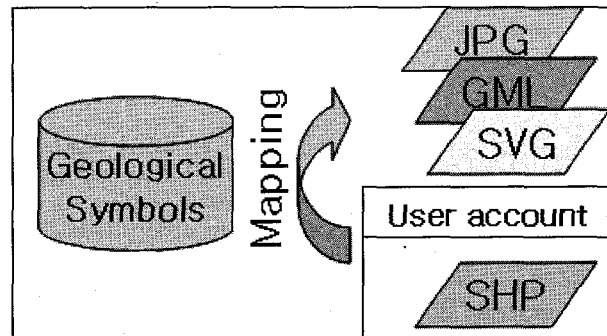


Figure 1. Data formats of Geological Mapping tool

The geological symbol mapping tool offers a search function such as by the code#, geological acronym and map name. Figure. 2 shows the list of Geological symbol

표지번호	지질기호	도상명	설명 및 설명	표지기호
L0112	sh	대단	심해퇴적암	010 P03 P03
L0221	Jshp	대단	그린노끼아미	010 P01 P15
L0323	sh	대단	편마상회암	010 P01 P10
L2328	shp	대단	그린노끼아미	011 P01 P10

Figure. 2 geological symbols and a search function

Because a layer can only represents one geometry type and one geographic theme. A geological map of SHP file consists of more than one file. User can select the layers what user's want and make the result. Figure 3 is the result of user selected layers and a GML output

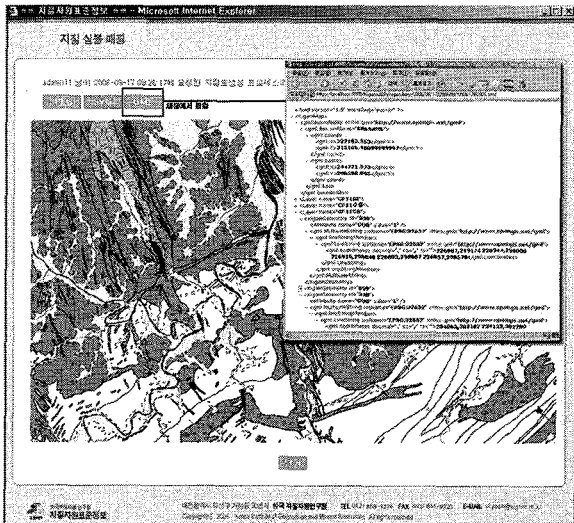


Figure. 3 the results of symbol mapped image and a GML which are from the user selected SHP files

```

<MapStyles>
  <!-- FillPatternDefinition -->
  <Pattern disc="AMSUK">
    <Width>90</Width>
    <Height>90</Height>
    <Path>pattern1</Path>
  </Pattern>
  <!-- LinePatternDefinition -->
  <LineStyles>
    <Layer name="GB">
      <Attribute>GOB</Attribute>
      <Attr code="1">
        <lineColor>#000000</lineColor>
        <stroke>
          <width>1</width>
        </stroke>
      </Attr>
      <Attr code="2">
        <lineColor>#ff0000</lineColor>
        <stroke>
          <width>5</width>
          <cap>CAP_BUTT</cap>
          <join>JOIN_ROUND</join>
          <miterlimit>5.0</miterlimit>
          <dash>5:5</dash>
          <dash_phase>0.1</dash_phase>
        </stroke>
      </Attr>
    </Layer>
  </LineStyles>
</MapStyles>

```

Figure. 4. The configuration of geological pattern.

The geological symbol can configured such as Fig 4. The figure shows that the fill pattern set a 90-width and 90-

height and line pattern can be either solid line or dotted line according to the field value. The configuration is a XML file which can be editable outside of the geological symbol mapping tool.

3. IMPLEMENTATION

The symbol mapping tool has developed using JAVA platform and the running environment is Tomcat 5.0(JAVA JSP), it consists of four core package modules

- 1) **Data provider module (org.kigam.core.data)**
 - This module which is in-memory data storage structure after parsing SHP file, to create a mapping result, keeps attribute and attribute value.
- 2) **Symbol Dictionary (org.kigam.core.symbol)**
 - To increase search and mapping speed, symbol dictionary stores symbol resources. When symbols are modified, it detects the changes and updates the symbol resources.
- 3) **Symbol mapping module (org.kigam.core.renderer)**
 - This module creates image file such as raster, vector, and XML style map
 - When making vector graphic SVG, it includes pattern resource into SVG document by encoding Base 64.
 - When making GML document, it creates a valid document by using predefined schema.

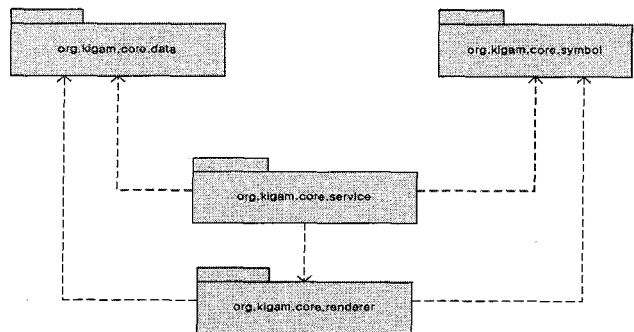


Figure. 5 Relationship among core package modules

- 4) **Business process module(org.kigam.core.service)**
 - Business process module is an interface which controls other components in order to map geological symbols.

4. CONCLUSION S

The use of standardized information becomes more important recently since information from various sources integrates into one database. Especially in geoscience area, same geological content represented differently according to the information providers until recently. In this study, we have developed the geological symbol mapping tool for the management and the use of newly developed geological symbols. This system can offer standardized symbols and the mapping results. This system can be used for ornamenting user's drawn geological information

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