Implementation of Annotation and Thesaurus for Remote Sensing

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Abstract: Many users want to add some their own information to data which was on the web and computer without actually needing to touch data. In remote sensing, the result data for image classification consist of image and text file in general. To overcome these inconvenience problems, we suggest the annotation method using XML language. We give the efficient annotation method which can be applied to web and viewing of image classification. We can apply the annotation for web and image classification with image and text file.
The need for thesaurus construction is the lack of information for remote sensing and GIS on search engine like Empas, Naver and Google. In search engine, we can't search the information for word which has many different names simultaneously. We select the remote sensing data from different sources and make the relation between many terms. For this process, we analyze the meaning for different terms which has similar meaning.

Keywords: Annotation, Thesaurus, Database.

1. Introduction

To store current large amounts of data such as satellite images, we need the huge storage device. To retrieve the storage device efficiently, we need the database and search component. If we provide one satellite images to some one with some information and another person independently, we need some papers or post-it to notify this information independently. But this is cumbersome in some cases. So, many users want to add some their own information to data which was on the web and computer without actually needing to touch data.

In remote sensing, the result data for image classification consist of image and text file in general. To overcome these inconvenience problems, we suggest the annotation method using XML language. We give the efficient annotation method which can be applied to web and viewing of image classification. We can apply the annotation for web and image classification with image and text file.

In general, we retrieve the terms of remote sensing search engine. We only type the terms such as "GCP" and enter. But we have many results which doesn't related to the GCP in remote sensing. To overcome this disadvantage in search engine, we must make the relation between many terms. For this process, we analyze the meaning for different terms which has similar meaning.

Fig. 1. Example image and annotation

2. Annotation

People of remote sensing often need to summarize the essential content of an image, point out features of interest, or express similarities or differences between images. Likewise, GIS specialists often need to highlight spatial patterns, label certain features, or otherwise "mark up" a map. For this need, OpenGIS defines an XML vocabulary to encode annotations on imagery, maps, and other geospatial data. This document is XIMA (XML for Image and Map Annotations) [1]. This document suggests the following seven requirements.

1. Annotations are independent features
2. Annotations must annotate something
3. Annotations often point to a spatial subset of a map or image
4. Annotations may link to multiple images or maps
5. Annotations have different shapes on different images or maps
6. Annotations may have rich content
7. Annotations may have properties

To implement these requirements in our web annotation, we consider the following items.

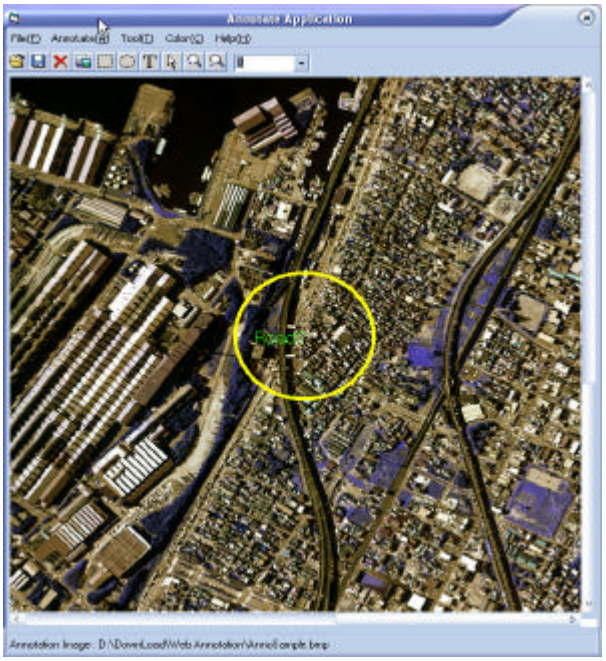

Fig. 2. Web annotation application examples

Fig. 3. Web annotation in web service

(1) Access Convenience

Web service doesn't satisfy its user if it requires extra software or hardware to connect web annotation service.

(2) Reuse of web annotation service

Since it is necessary to use web annotation service in another application program without revising it, we implement web annotation using component.

(3) Interface and features

Since user prefer intuitive interface to colorful interface, we made our web annotation with intuitive interface. For efficient annotation, we implement the following figures; circle, ellipse and square. We also implement the revision mode with transition and scaling option.

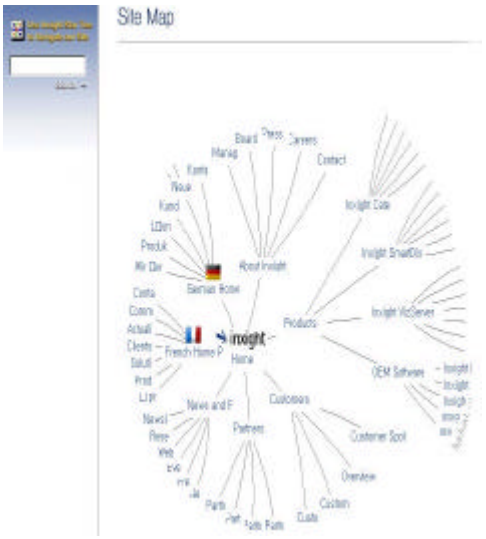

Fig.4. Schema of thesaurus

(4) Input

User must input necessary information into spatial region with text and image etc. our annotation web service supports general image format such as JPEG, BMP, GIF, and TIFF.

We extended the annotation through function of URL (Uniform Resource Locator) connection.

For considering these items, we implement the web annotation using XML. We can apply this annotation method to classification algorithm. Current classification algorithm generates the result images and statistic facts in independent files. Though this situations similar to the annotation, we can't see the relation between them visually. Using annotation through XML, users see the images with the statistic facts. Fig. 2. is example of web annotation application. This web application supports the image import, square, circle, text input and zoom in, zoom out, etc.

Our web service which has name "Korea Satellite Imagery Information Management Center" (http://simc.etri.re.kr) gives satellite image to public domain freely. For user's convenience, we will give web annotation service. People enter the metadata for satellite image which they want and server displays the result. For the resulted image which has 512 x 512 size, users will annotate the information which describe the browse image and save the result. Fig. 3. is our demo for web annotation.

3. Thesaurus

The efficient management, searching, and retrieval of geospatial information are supported by indexing thematic contents as well as geographic location and extent of data. Use of thesaurus (See Fig. 4.) assists data producers and managers to achieve consistency in selecting and assigning indexing terms to related data sets.

Fig. 5. Thesaurus and search engine

The consistency of thesaurus-assisted indexing provides structure and direction for data searching and retrieval, which is enhanced by the transparency of a thesaurus.

The thesaurus is meant to help in the selection of keywords for abstracting and indexing. The WWW will be encouraged to use the thesaurus as an aid to understanding the scope of what is available and to select terms to describe what they want. Subject searching is most successful when the query language matches the indexing.

Our thesaurus of theme is intended to be used to provide terms of remote sensing and satellite images through semantic relationship systematically and implement the enhanced function for web based retrieval.
To construct the efficient thesaurus, we take the following steps:

1) **Select the remote sensing terms needed to index.**
   Though we must index all remote sensing terms, it takes much time. So, we select the most used remote sensing terms.

2) **Find the relation between the selected remote sensing terms.**
   For examples, "기하보정" relates to the following terms: "Geometric correction", "Resampling", "GCP", "위성자료처리", "Nearest Neighbor", "Bilinear", "Bicubic", "위성탐사" etc. For this purpose, we reference the "NASA thesaurus Products and Resources" [2]. From this reference and many remote sensing books, we extract the important terms in remote sensing and find relations between them.

3) **Construct the web page which has function of search using thesaurus with search engine.**

Using this methods, users can retrieve the remote sensing terms using search engine through the following scenarios.

1. Users connect to the thesaurus web service.
2. Users enter the keyword which they want to find.
3. Thesaurus DB suggest the related terms.
4. Users reference the relation diagram which they can find the suitable terms.
5. Users check the related terms which they want and select the search engine such as Empas, Naver and Google.
6. Users click the search button and verify the search information.

4. Conclusions

Web annotation and thesaurus service enhanced the convenience of users for web services. We will examine the needs of users which we can't consider and reflect the implements of web annotation and thesaurus.

References

[1] Discussion Paper : XML for Image and Map Annotations(XIMA) Draft Candidate Interface Specification , ver 0.4, OpenGIS Document #01-019

[2] NASA thesaurus Products and Resources, http://www.sti.nasa.gov/thesfrm1.htm