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Review on Improving Geospatial Data Visibility on the Web

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***Abstract* - Geospatial information is a common resource used at personal and corporative level. Now a day, a relevant geospatial data on the web is provided by standardized geospatial web services (GWS). GWS permits users to dynamically access, exchange, deliver, and process geospatial data and products on the World Wide Web, no matter the platform. They are compliant with Open Geospatial Consortium (OGC) standards to advance interoperability. This paper briefly describes Geospatial Web Services through OGC standard-based web services, including Web Map service (WMS), Web Coverage Service (WCS), Web Feature Service (WFS).**

***Index Terms* - WFS, WCS, WMS, Geospatial data, OGC WEB SERVICE**

I.INTRODUCTION

Every day, More People use the World Wide Web to get Geospatial Information. Geospatial data is a public sector information resource commonly used at Personal level, most of the people use it for everyday task like finding road route, knowing the weather, finding the closest restaurant, hospital, fuel station etc. And at corporative level Government and organization use it for environment management, weather forecasting etc.

So, for finding and accessing the Geospatial data or Information of interest over internet the Geospatial Web Service (GWS) is used.

However, these types of data have some Geospatial information extraction issue from web. And it is a challenging job due to the complexity, diversity, and ambiguity of location related information [2].

Geospatial data also have a data searching and visualization problem. Because of currently lots of tools and search engines are aimed to enhance the accessibility and availability of geospatial information over internet.

As well as Geospatial data have some unsolved visibility issues. Basically, we require the manual description of conation. So, Geo-service creators have to voluntarily register them. But the problem is that most of them are unregistered [1]. This makes difficult to generate the quality and freshness of data. And when they are registered, the limited knowledge of publishers about how to properly describe their system on web has generated an ambiguous data collection.

II. RELATED WORK

A. GEOSPATAL WEB SERVICES (GWS)

Geospatial Web Services are mainly designed to use Web Service technology to deal with spatial information over the network and another purpose for designing GWS is to collect data once and update or edit it in real time.

GWS provide a promising approach for interoperability in distributed heterogeneous geospatial data and application [7]. For achieving the interoperability between geospatial data and application, GWS compliant with the Standards which is developed by Open Geospatial Consortium (OGC).

B. OGC SERVICES STANDARDS

OGC is an international consortium of companies, government organization, research organization and universities. Participating in a consensus process to develop publicly available interface specifications. The objective of OGC standards is to promote geospatial information interoperability. OGC services standards provide a framework for developers to create applications that enable users to access and process geographical data from a variety of sources across a generic computing interface within an open information technology environment. OGC services standards are arranged into four tiers:

a. Clients Services

b. Application services

c. Processing services

d. Information management services tier.

The Information management services tier is the most important layer which contains services designed to store and provides access to geospatial data as well as geospatial visualization and delivery, it includes OGC standards like Web Feature Service (WFS), Web Map Service (WMS), Web Coverage Service (WCS) for performing such an operation [7].

a. Web Feature Service (WFS)

WFS is an interface which is allowing requests for geospatial feature across the internet using platform independent calls in from of URLS. WFS specification defines interface for describing data manipulation operation of geographical features. Data manipulation operation includes the ability to:

- Get features based on spatial and non-spatial constrains.
- Create a new feature instance
- Delete a feature instance
- Update a feature instance

WFS define operations to manipulate information about geographic feature like Points, lines, and polygons. The Web Feature service defined some operations:

1. GetCapabilities:Return information indicating which feature types are served and their supported operation[8].
2. DescribedFeatureType: Describes the structure of the feature types it can service [8].
3. GetFeature: Return Feature instances including the ability of specify which feature properties are serviced [8].

Figure 1: WFS Example

b. Web Map Service (WMS)

WMS is a standard to provide visualization of geospatial data over internet. WMS allow you to consume information on a map over the internet or to publish map layers from your GIS or image processing system onto the web. The Web Map Service defines some operations:

1. GetCapabilities: It provide answers of basic queries about the content of map and returns information about the WMS including image format and available layers [9].
2. GetMap: It produce a map and specifies map request parameters which include coordinate reference system, extents, and URI, and returns a map for visualization. This produce map is not a actual data but it is an image of data [9].

Figure 2: WMS Example

c. Web Coverage Service (WCS)

WCS supports electronic retrieval of geospatial data as “coverage” that is, digital geospatial information representing space-varying phenomena. It offers multi-dimensional (2-D,3-D,4-D) coverage data for access over internet. Coverage represents space/time varying sensor, image, simulation, and statics data. The WCS provide three operations over HTTP request:

1. GetCapabilites: It returns an XML document describing the service and brief description of the coverage available to client [10].
2. DescribeCoverage: Provide the client with a full description of one or a number of coverage’s served by the WCS server [10].
3. GetCoverage: Server returns a coverage (vale or Properties of a set of geographic locations) [10].

Figure 3: WCS Example

C. COMPRESSION OF WEB SERVICES [8,9,10]

WFS	WMS	WCS
WFS allow features to be queried, updated, created, or deleted by the client.	WMS is the best know of among all three due to it is wildly used by map servers to deliver map image.	WCS is used to transfer "Coverages", like an object which is covering a geographical area.
Geographical features can be thought of as a "Source code" behind a map.	WMS interface return only an image, which cannot be edited or spatially analyzed.	WCS provide available data with its original semantics instead of image.
WFS provide access to geospatial data itself.	WMS produces styled maps of georeferenced data, including both coverage and feature data.	WCS provide access to geospatial data itself.
WFS's Feature data is typically passed using the XML-based GML format.	WMS image is most probably in from of raster tiles like PNG, JPEG, GIF but they can also be in a vector format such as SVB and WebCGM.	Coverages can be a set of data points; a regular grid of points or pixels; a set of segment curves (Ex: road path); a set of polygons.

TABLE 1: Compression

III.CONCLUSION

This work has described a process of finding and accessing geospatial data or information using Geospatial Web service standards like WFS, WMS and WCS developed by OGC.

Generally, Web Feature Service is worked as a "Source Code" behind any Map which is developed by using Web Map Services. Web Map service return only static images of map, which cannot be edit or spatially analyze by end user. Therefore, Web Coverage Service are becoming most popular because it is deal with original semantics rather than image, and geographic raster data, e.g., 2-D satellite image, 3-D or 4-D object.

IV.FUTURE WORK

We can solve the visibility issue of geospatial data by improving the description of geospatial information on web, this work proposes a process to construct a linked data model of geospatial resource that allows semantic searching and browsing [1]. A general diagram of the process is show in figure4.

The First step is Data Development of metadata desecration provide by OGC Web services. It is done by crawler, which is locates suitable service and obtains metadata they provide. Metadata structure is depending on the type of service, so in pre-processing step the content has been extracts and match. Then it separates the description of service from the provided resource description. These cleaned descriptions are the input for a Classification step. Classification annotates resources using concepts from a selected set of thematic, place, organization, and temporal knowledge organized models. Then it generates RDF semantic metadata. In Classification, it gives the option to improve the relation between a service and its resource context to improve their respect description.

At the end of the process, the improve descriptions are published as linked data to facilitate the location and access to the associated services.

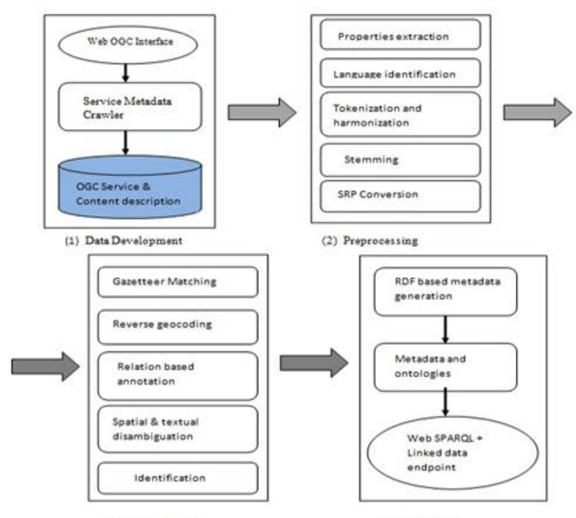

Figure 4: Linked Data Model Process

1. Data Development: The geospatial web rests on open and proprietary web service interface. OGC leads the development of open specifications and interface to access geospatial information. This organization has produced a set of specifications that define web services interface with specific functionality. These interfaces share a common operation that returns technical and functional metadata encode in a XML document. The goal is to start the crawl from web references to OGC web services.
2. Preprocessing: The crawled metadata are processed to extract content useful for classification. We focus on the fields providing the following content: the resource title, a description, thematic keywords, content data, bounding box (spatial co-ordinates), textual description of place, and the creator. The result is a collection of RDF metadata records describing each resource providing by the service, and an additional record related to the previous ones describing the service itself. This separation makes it possible to identity geospatial resources independently of the web service containing it. In addition to the extraction, the content is harmonized, and its language is identified. This allows the use of natural language processing techniques dependent on the structure and language of the text. The harmonization performs a set of tasks such as: replacement of hyphens with spaces, split of words containing uppercase characters or numbers, and translation of spatial coordinates to the same coordinate reference system. These tasks are performed using regular expressions (for text transformations) and the geo tools library (for coordinate conversions).
3. Classification: It improves pre-processed metadata record with concepts from knowledge organization model. It maintains the original fields (title, abstract, spatial) and adds relations to spatial (coverage), thematic (subject), authority (creator) and temporal (data) models using specialized NLP process. Each of three processes analyses a different set of the source properties uses concepts from different knowledge organization models to enrich the descriptions.
4. Publication: The improved collection can be published on the web using common semantic web technology. We only need to import the Dublin core RDF descriptions in a triple- store such as JENA, publish it through an SPARQL endpoint such as Fuseki, and deployed a Linked Data services top of it.

The publication as Linked Data helps to improve the visibility because it simplifies the indexing to general and specialized search engines. Additionally, the provided Linked data browsing facilitates the use of locations, thematic, organization and temporal URIs as category families to construct a faceted search system.

REFERENCES

[1] Javier Lacasta, Francisco j, Walter, Javier Nogueras-Iso, Improving the Visibility of geospatial data on the Web,2014 IEEE,978-1-4799-5569-5/14, 2014.
[2] Liping Di, Yuanzheng Shao, Lingjun Kang, Implementation of Geospatial Data Provenance in a Web Service Workflow Environment with ISO19115 and ISO 19115-2 Lineage Model, IEEE Transactions on geosciences and remote sensing, vol.51, no.11, NOVEMBER 2013
[3] George Shi, Ken Barker, Extraction of Geospatial Information on the Web for GIS Applications, 10th IEEE I.C. on Congnitive Informatics & congnitive Computing,978-2-4577-1697-3/11/$26.00,2011 IEEE
[4] Xia Wang, Jinsongdi Yu and Peter Baumann, A Web Coverage Ontology for Geospatial Web Applications, 2011 Fifth IEEE International Conference on Semantic Computing, IEEE ComputerSociety,978-0-7695-4492-2/11, DOI 10.1109/ICSC.2011.73
[5] Mutao Humg, YongTian, RIAs and OGC Web Services based Geospatial Serching and Visualization, 978-1-4244-7941-2/10/$26.00, 2011 IEEE.
[6] Jianting Zhang, Denna D. Pennington, Willian k. Michener, Performance Evaluation of Geospatial Web Services Composition and Invocation, 2007 IEEE International Conference on Web services, 0-7695-2924-0/07, 2007 IEEE
[7] Yaxing Wei, Suresh-Kumar Santhana-Vanna, Robert B. Cook, Discover, Visualize, and Deliver Geospatial Data through OGC standards-based WebGISSystem, IEEE.
[8] OGC, OGC Web Feature service
[9] OGC, OGC Web Map service
[10] OGC, OGC Web Coverage service