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THE USE OF INTERNET SERVICES AND RESOURCES IN GEOSPATIAL CONTEXT

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INTRODUCTION

Internet search services can be classified, regarding the scope of processed resources, as: general search services (broad scope, text based search, text based or sometimes enriched output) and domain specific search services (narrower scope, filter based search, customized output). Users can access both types of services in a generic way (using services' APIs from within application), or using web browser (that serves as a GUI provider for web applications)(Figure 1).

Geospatial search services are usually domain specific search services. They support spatial filtering in querying, and textual and/or spatial representation of outputs. Most known geospatial services are catalog services. With existing and emerging mapping services a visualization of resources has become another way for their management. Geospatial information can be also presented with the use of multimedia technologies (within applications or on web pages). Such approach is often used for Internet telephone/street directories, tourist guides and animated street maps etc.

The development of information technology has brought the use of spatial information into a new dimension. This information has become an inseparable attribute of resources on the Internet, similar to the keywords or thematic categories. And this information is often provided in social networks by the users on voluntary bases. Examples of services that already provide this functionality are: Twitter, Flickr. Thanks to the use of spatial annotation it is possible to find resources using spatial filters. This enriched the traditional full-text search and search for themes and keyword.

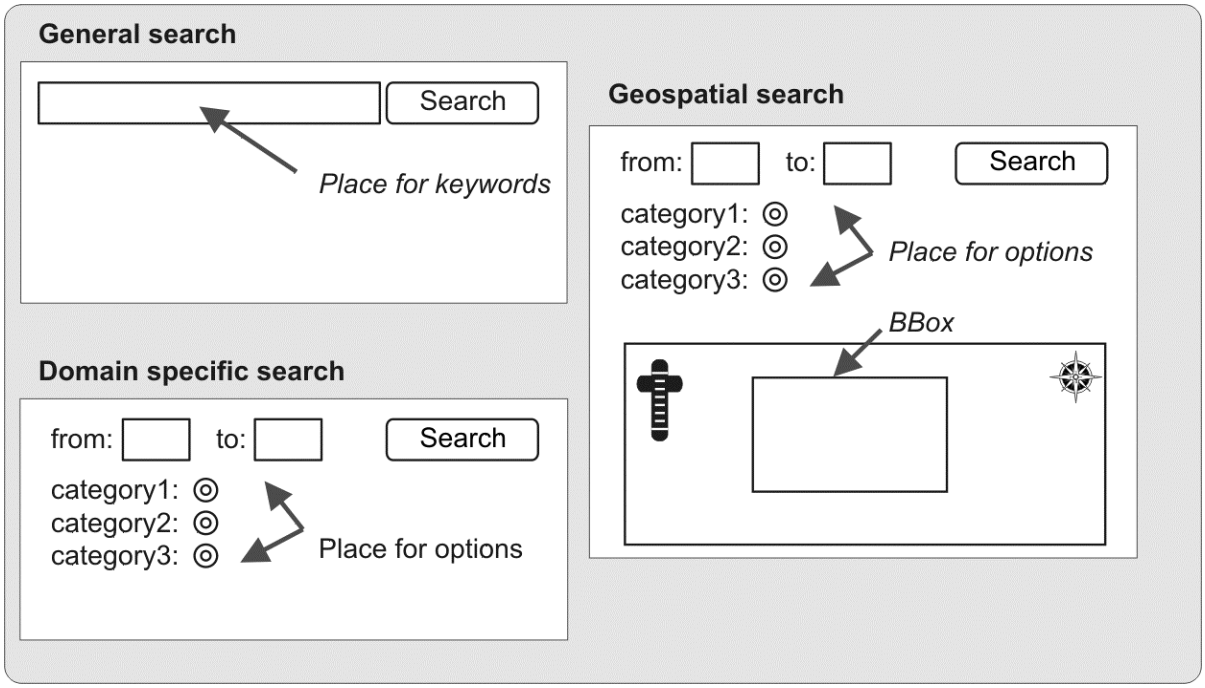

Figure 1: Internet search services interfaces

TECHNOLOGY

The use of annotations is one way of creating structured data. Structured data is the foundation of the Semantic Web, allowing computers to "understand" the data. Geospatial annotations are a special case of annotations – they describe association of objects with locations in a space. Combining the semantic and geospatial annotations one can build intelligent spatial systems, which not only allow to search for resources, but also have the ability to interpret them. To build such annotation one can use SPIME ontology (Figure 2).

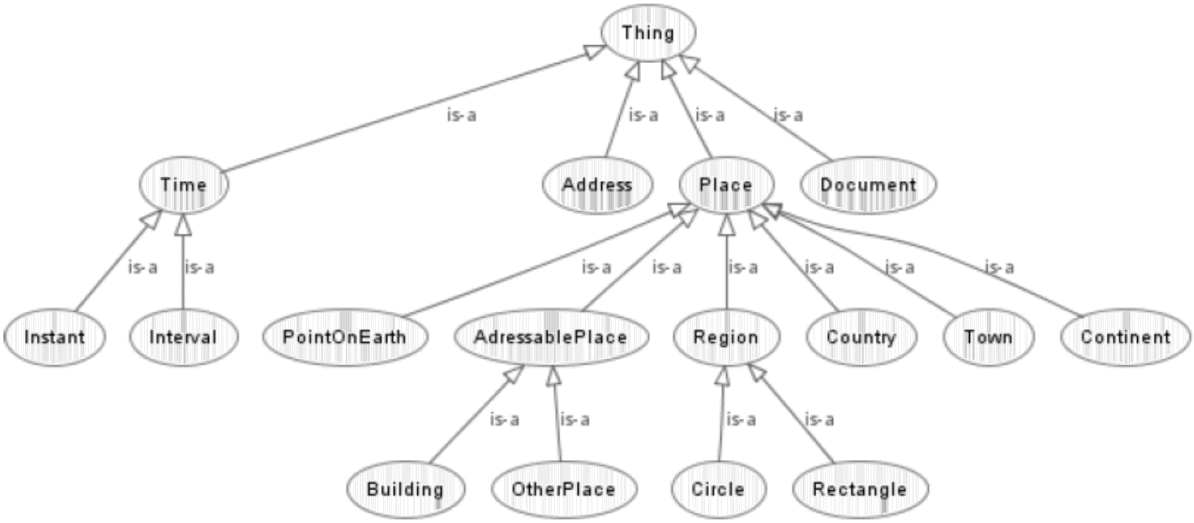

Figure 2: Space and Time ontology (SPIME)

Modeling of spatial annotation can be: based on UML, based on XML and XML Schema, based on RDF and RDF Schema. The mechanisms that can be employed include: specific metadata in files (EXIF), file metadata, indexing and resources linking.

The annotation may appear in different contexts: in Internet accessible documents (RDFa, micro formats, …), in catalog services (UDDI, SAWSDL, CSW), feeds (RSS, ATOM, GeoRSS), and in dedicated API (REST, SOAP, …).

Specific annotations use cases can be outlined as follows:

(1) An automatic search for geospatial-related information. The user builds his/her own repository of geospatial-annotated resources (which can be, for example, photos), assigning to each resource a URI. The system sends query for additional information to the external service (as DBPedia) on event triggered by insert (or view) operation. The additional information is displayed along with geospatial annotations and other values of attributes of a resource being viewed. (Figure 3).

(2) An automatic search for various geospatial-related information using community service.

To find a place for the given geographic coordinates user can issue query:

http://apiwiki.twitter.com/Twitter-REST-API-Method%3A-GET-geo-reverse_geocode

"http://api.twitter.com/1/geo/reverse_geocode.json?lat=51.110&long=17.030"

or find a place for the given object ID:

http://apiwiki.twitter.com/Twitter-REST-API-Method%3A-GET-geo-ID

"http://api.twitter.com//1/geo/id/b0bc75c6768d1c64.json"

or find twitts related to the given geographic coordinates:

http://apiwiki.twitter.com/Twitter-Search-API-Method%3A-search

"http://search.twitter.com/search.atom?geocode=51.110%2C17.030%2C25km”

and show the results on a map (on a background from WMS).

(3) Searching for the documents in a given repository which are indexed with SPIME ontology. The user builds repository of resources with spatio-temporal indices. These indices can be used then for searching.

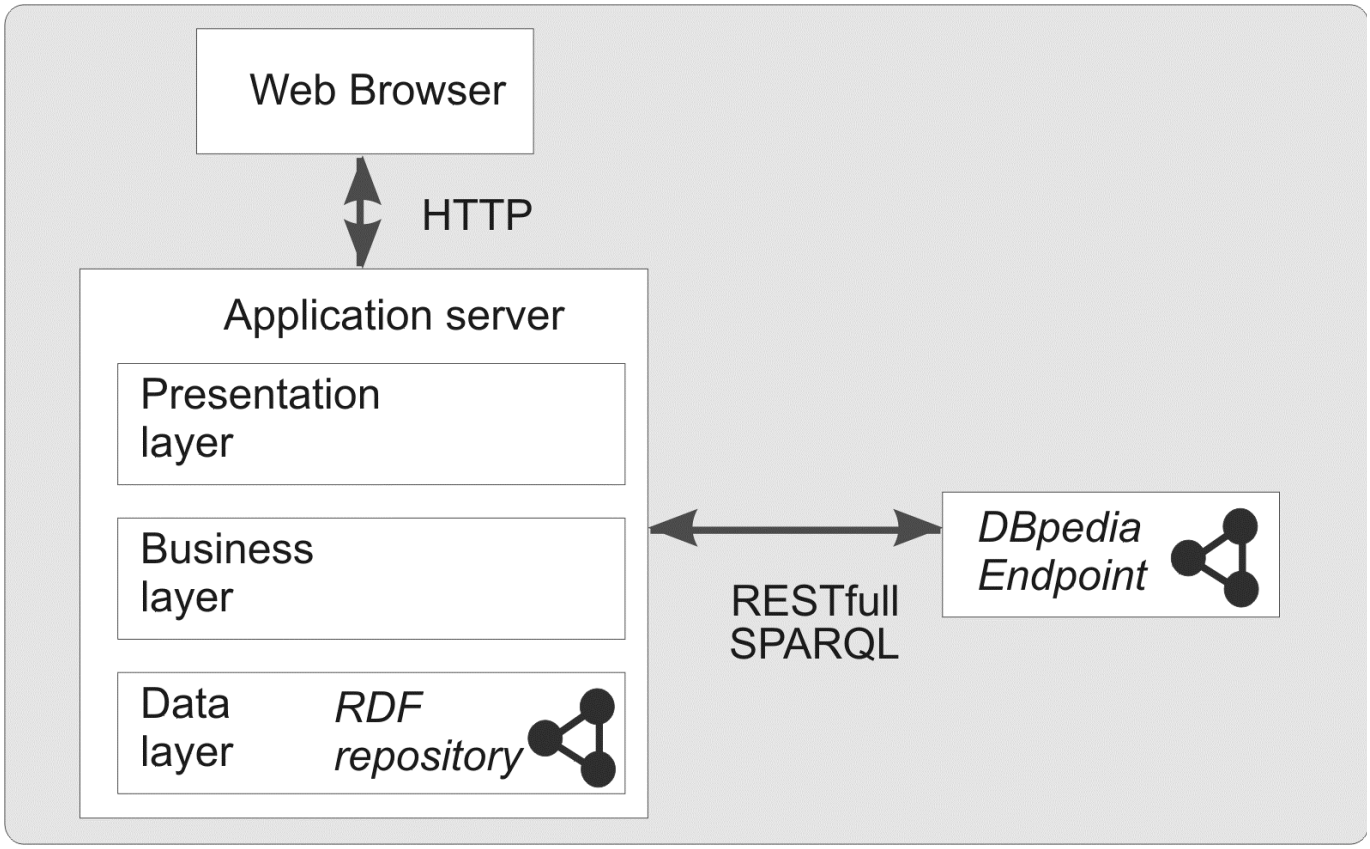

Figure 3: Architecture of a linked repository

CONCLUSIONS

The aim of the presented work was to evaluate the current state and possibility of using Internet services and resources in a geospatial context. The scope, nature and use of spatial information appearing on social networking sites were analyzed. Particular attention was paid to the use of methods of geospatial search and geospatial annotation. The system combining search engine, text analyzer and ontological database was build and tested in practice (outline (1)). The system which makes use of results of search in Twitter resources was build and tested as well (outline (2)). The prototype of a system which involved the use of SPIME ontology was implemented. All solutions build proved that the high potential of current technologies, especially those that makes geospatial annotations.