Use of Semantic Web - Tools and Technologies for Social Networking

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Abstract— **Finding relevant information in a social networking site has been a long time problem. The purpose of this research is to use Semantic Web Tools & Technologies to find a way to represent and process web information such that user queries can be better answered. We often want to search about a person or a group but land up with either a lot of information or no information at all. As a result of this we have to manually process the result to find the best or the most relevant answer.**

Keywords— *Agents, FOAF, Ontology, Resource Description Framework, Resource Description Framework Schema, Semantic Web, Semantic Web architecture, Social Web, Web Ontology Language, XML*

INTRODUCTION

The recent popularity of the Web and online social media has completely revolutionized human interaction. The Web has an unprecedented scale of user interactions, as the Internet has become an integral part of human life.

The Semantic Web initiative is an approach attempting to provide the web with a meaning machines can process. Computers could handle the tedious interpretation of the web content, presenting human users with summaries of the interpretation results.

A lot of research has been done and still going on, on the concept of Semantic Web, focusing on making machine understandable to the user queries. This research is based on searching personal information and human relationships. Social Networks started as a means for people to have a social connection with other people with similar interests. A social networking site creates network communication among the user community. Though social networking site serves for communication purposes among special interest groups, but they do not have a searching option where we can search people or group with certain features.

OBJECTIVE

The objective of this research is to make searching meaningful by using semantic web tools and technologies for creating more effective modern social networking websites. This will help the developers to create, reuse, and link profiles and contents on social media sites so that the users can get the best result of their complex queries.

Semantics can help social websites by using agreed upon semantic formats to describe people, content objects and the connections that bind them all together. Developers are already using semantic technologies to develop the ways in which they create, reuse, and link profiles and content on social media sites. Social networks can serve as rich data sources for semantic applications. The Social Web provides a vast store of continually updated information, as well as emergent data about an individual's interest, professional activities and friends.

Over the years, a lot of research has been done on the concept of Semantic Web, which is focused on making data machine understandable while neglecting personal information and human relationships[1]. This research is to search people based on personal information and human relationship. The Semantic vision of the Web is an effort by the World Wide Web Consortium (W3C)[2] to make the Web friendly to machines as much as it is friendly to human. This research is concerned with Semantic Web Technology to use the web information on social networking sites and to bring more effective modern social networking websites with the help of semantic web tools and technologies.

This will help the developers to create, reuse, and link profiles and contents on social media sites so that the users can get the best result of their complex queries. Present social networking sites do not give result for queries such as "Find list of Assistant Professors in CSE departments of different Engineering Colleges of North India in the age group of 30 years to 40 years." Many such queries are often used by users but the present Social Networking sites do not provide the users with relevant results.

The Semantic Web tools and technologies can be used to find meaningful results for such queries.

SEMANTIC WEB - TOOLS & TECHNOLOGIES

In this section we have introduced some of the tools and technologies that are used in Semantic Web. It focuses on the theories on which this paper is based upon.

A. Semantic Web

Current World Wide Web (WWW) is a huge library of interlinked documents that are transferred by computers and presented to people. It has grown from hypertext systems, but the difference is that anyone can contribute to it. This also means that the quality of information or even the persistence of documents cannot be generally guaranteed. Current WWW contains a lot of information and knowledge, but machines usually serve only to deliver and present the content of documents describing the knowledge. People have to connect all the sources of relevant information and interpret them themselves.

Semantic web[3] is an effort to enhance current web so that computers can process the information presented on WWW, interpret and connect it, to help humans to find required knowledge. In the same way as WWW is a huge distributed hypertext system, semantic web is intended to form a huge distributed knowledge based system. The focus of semantic web is to share data instead of documents.

B. Ontology

Ontology[4] is the branch of philosophy that seeks to answer the question "what is there?". In computer science, an ontology is a formal conceptualization of a domain. Typically, it specifies the classes of objects that exist, the relationships amongst those classes, the possible relationships amongst instances of the classes, and constraints over those instances. An ontology also defines terms denoting these classes and relationships as well as individual objects. Current web ontology languages, designed to encode information on and for the web, use the eXtensible Markup Language (XML) both for specifying ontologies, and also for making assertions about the world using terms defined in ontologies. A semantic web page begins by listing (as URLs) the locations of the ontologies to be used, then goes on to use those ontologies to make assertions about datasets, human beings, items for sale, etc. An agent[5], on coming to such a page, can import the specified ontologies and use that information to understand the semantics of the ensuing assertions.

C. Resource Description Framework

Resource Description Framework (RDF)[6] is a core data representation format for semantic web. RDF is a framework for representing information about resources in a graph form. It was primarily intended for representing metadata about WWW resources, such as the title, author, and modification date of a Web page, but it can be used for storing any other data. It is based on triples subject-predicate-object that form graph of data. All data in the semantic web use RDF as the primary representation language. RDF itself serves as a description of a graph formed by triples. Anyone can define vocabulary of terms used for more detailed description. To allow standardized description of taxonomies and other ontological constructs, a RDF Schema (RDFS)[7] was created together with its formal semantics within RDF. RDFS can be used to describe taxonomies of classes and properties and use them to create lightweight ontologies.

D. RDF Query Language SPARQL

RDF Data can be queried by "The Simple Protocol and RDF Query Language" (SPARQL)[8]. It is a SQL-like language for querying RDF data. An example of a SELECT query follows.

```
PREFIX foaf:  <http://xmlns.com/foaf/0.1/>
SELECT ?name ?emailid
WHERE { ?x foaf:name ?name .
        ?x foaf:emailid ?emalid . }
```

The first line defines namespace prefix, the last two lines use the prefix to express a RDF graph to be matched. Identifiers beginning with question mark ? identify variables. In this query, we are looking for resource ?x participating in triples with predicates foaf:name and foaf:emailid and want the subjects of these triples.

E. The Web Ontology Language OWL

The Web Ontology Language OWL[9] extends RDF and RDFS. Its primary aim is to bring the expressive and reasoning power of description logic to the semantic web. There are three species of OWL defined as follows.
OWL Lite can be used to express taxonomy and simple constraints, such as 0 and 1 cardinality. OWL DL supports maximum expressiveness while retaining computational completeness and decidability. The DL in the name shows that it is intended to support description logic capabilities. OWL Full has no expressiveness constraints, but also does not guarantee any computational properties. It is formed by the full OWL vocabulary, but does not no impose any syntactic constrains, so that the full syntactic freedom of RDF can be used.

F. FOAF

FOAF (an acronym of Friend of a friend) is a machine-readable ontology describing persons, their activities and their relations to other people and objects. Anyone can use FOAF to describe himself. FOAF allows groups of people to describe social networks without the need for a centralized database.
FOAF is a descriptive vocabulary expressed using the Resource Description Framework (RDF) and the Web Ontology Language (OWL). Computers may use these FOAF profiles to find, for example, Assistant Professors in the Computer Science Department between 30 and 40 years of age. This is accomplished by defining relationships between people. Each profile has a unique identifier (such as the person's e-mail addresses, a Jabber ID, or a URI of the homepage or weblog of the person), which is used when defining these relationships.

METHODOLOGY

In this section we have discussed the methods and the steps that will be followed in this research to find a solution for perfect result in queries by users of Social Networking sites.

The centralized social networking services have a number of drawbacks. The information is under the control of the

database owner who keeps the information bound to the site. The profiles stored in these systems cannot be exported in machine processable formats and therefore the data cannot be transferred from one system to the next. The users are not allowed to control the information they provide on their own terms in centralized systems. These problems have been addressed with the use of Semantic Web technology. The Friend-Of-A-Friend (FOAF) project is a first attempt at a formal, machine processable representation of user profiles and friendship networks. FOAF profiles should be created and controlled by the individual user and shared in a distributed fashion. Much like the way web pages are linked to each other by anchors, these profiles link to the profiles of friends by using the rdfs.

The key issue in our research is the metadata describing Web resources'. The research is an attempt to define a standard format for adding metadata, referred to as content labels. But resource labeling has two major drawbacks. First, resource labeling requires content providers to spend time to describe their resources, such an effort can be justified by bringing real marketing benefits to a content provider and provide innovative ways to accept details from users. Second, since Web resources' content may frequently change, it is necessary to update content labels accordingly, to be sure that they actually describe the resources they refer to. Web metadata will be presented to the content and service providers as a means to assure the quality of online information. Our attempt will be enabling the Social Networks sites to provide their members the ability for specifying and sharing metadata. With the currently growing interest in the Semantic Web, metadata is becoming to play an important role in the Web. Friend of a Friend, FOAF is one of forthcoming metadata standards for the Semantic Web. FOAF defines an RDF vocabulary for expressing metadata about people and the relation between people. In this research we propose a method to extract FOAF metadata from the Web.

A lot of research is already going on the above concepts of centralized system as well resource labeling. Looking at their limitations we are of the opinion to form a system where the data in the centralized system can be converted and labeled in a form which can be processed by machine. In this way the content providers will not have to spend a lot of time in describing their resources. Second, as Web resources' content frequently change the content label can be automatically updated. The data in the centralized system can be presented in the FOAF metadata standard.

Our method extracts relevant keywords depending on the context of a person. Friend of a Friend will be used to define an RDF vocabulary for expressing metadata about people, the links between them, and the things they create and do. As FOAF provides a way to create machine-readable documents in the Web, and make them easily processed, merged and aggregated it will be much useful in our research. In the relation to the Semantic Web, FOAF facilitates the creation of the Semantic Web equivalent of the archetypal personal homepage. With respect to "Social Networking", FOAF is

considered as Social Networking metadata standard which can be extracted in our proposed system from centralized system. In this way already existing Social Networking sites can be updated with very little effort and time and user can get meaningful results for their queries.

CONCLUSIONS

In the web there are a lot of person information that have potential to be used as FOAF metadata and lot of information needs to be added which will help in giving meaningful results for user queries. In this research we propose a method to extract the person information from the Web by using available metadata and adding more metadata. Our study shows the great possibility of using the extracted keywords as FOAF metadata. The method can significantly capture the person information in the different context. This enables us to get various person-related metadata. Since the Web is such a large information resource, the information is diversified from useful one to trivial one, this system can get down to the useful information.

REFERENCES

[1] Analyzing the Role of Semantic Web in Social Networking
    Sites by RAVI
[2] www.w3.org
[3] www.w3.org/2001/sw
[4] www.semanticweb.org/ , www.ontology.com
[5] Semantic Web Agents www.springer.com
[6] http://www.obitko.com/tutrials/ontologies-semantic-
    web/resource-description-
    framework.html
[7] http://www.obitko.com/tutorials/ontologies-semantic-
    web/rdf-schema-rdfs.html
[8] http://www.w3.org/tr/rdf-sparql-query/
[9] http://www.w3.org/tr/owl-features