# UNDERSTANDING HOW FOAF (FRIEND OF A FRIEND) IMPORTING VOCABULARIES FROM EXTERNAL ONTOLOGIES USING SEMANTIC WEB

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*Abstract: FOAF descriptions are themselves published as linked documents in the Web. It is actually a project devoted to linking people and information using the web. It is an RDF based schema to describe persons and their social network in a semantic way. Using the features of Semantic web vocabularies from external ontologies, a number of FOAF properties have been imported.*

*Many traditional web-based social networks share their member's information in FOAF format, while this is by far the largest source of FOAF online. By using RDF/XML vocabulary provided by FOAF, itdescribe personal information [7], including name, mailbox, homepage URL, friends, and so on. FOAF documents then induces the "web of acquaintances"[8] and thus an implicit trust network to support such applications as knowledge outsourcing[9] and online communities[10]. Using the FOAF feature with Semantic Web Reasoning we show that a big number of profiles can be merged from multiple networks. We present results on how this affects network structure and what it says about relationships and individual behaviour. There is no information about whether the social network overlap to create a larger unified social network, or whether they are simply isolated components. In this paper, we present a study of the intersection of FOAF data found in many online social networks. We present that how FOAF importing vocabularies from external ontologies using semantic web.*

*Keywords: FOAF(Friend of a friend), Semantic Web, Online Social Network, Digital Content, Future Internet.*

## INTRODUCTION

During recent years it can be observed that our everyday live is strongly influenced by all kinds of Online Social Networks. A few years ago, only information about known people (politicians, actors, musicians) was available on the web. Now such a data is available for most of people, who have profile on one of the Online Social Networks (OSN). Social networking is a large movement on the web, and social networking data using the Friend of a

Friend (FOAF) vocabulary makes up a significant portion of all data on the Semantic Web. Now a days many traditional web based social networks share their members' information using FOAF format. While this is by far the largest source of FOAF online, there is no clear information about whether the social network models from each network and the larger unified social network models overlapped each other, or whether they are simply isolated components.

This paper describes the results of research in the area of integration of Social Network profiles data to create knowledgebase which can be used by other computer systems. The idea was to prepare ontology which can be used to model variety of data existing in social network user's profiles.

The Friend of a Friend (FOAF) project is one of the largest projects on the Semantic Web. Now a days FOAF is widely accepted for representing social networks, and a big number of social networking websites like Facebook, Twitter are using it produce Semantic Web profiles for their users. There are millions of FOAF profiles online, hosted at a wide range of websites. Because of its user-friendly features in terms of use, FOAF is plays an important role in the success of the Semantic Web. The way it is used satisfies the goal of using an ontology to represent considerable amounts of distributed data in a standard form. However, one can say that FOAF truly serve as an example of the Semantic Web's full potential, perceptive over the data must lead to the discovery of connections between what are represented as distinct data sets. That means merging profiles of the same person from multiple social networking websites and creating a large, unified social network from subnetworks that evolved independently. In addition to FOAF is considered as an instantiation of Semantic Web vision, it's profile merging feature is helpful to social network users. It is common for people to have accounts on several networks. If Semantic Web applications are built that use social networks, automated accumulation of a user's distributed social connections will give a broad picture of their profile and improve the functioning of the applications. In this paper, the researcher present the first analysis of cross network linkages in FOAF. Using all of the accessible web-based social networks that generate FOAF profiles, we show the frequency of multiple profiles that a reasoner could merge and describe the properties of those users. We found that a large percentage of social network users had accounts on multiple networks, FOAF is serving as hubs that connected the social networks we studied. We conclude with a discussion of the implication of these results.

**THE SEMANTIC WEB AND FRIEND OF A FRIEND (FOAF)**

The 115,000,000 members of the social networks discovered in this survey do not represent 115,000,000 unique people. Indeed, one hundred accounts in that total belong to the author. Many people maintain accounts at multiple social networking websites. It is often desirable to keep separate information for business networking, connecting with friends and family, and dating. A person's boss or colleague certainly does not need to know that he enjoys long walks on the beach…or any of the information one would provide while seeking a "discrete adult encounter".

At the same time, users put significant effort into maintaining information on social networks. Multiple social network accounts are not just for compartmentalizing parts of our lives. A person may have one group of friends who prefer Facebook, another group on Friendster, like the quiz features of Tickle, and have an account on one or two religious websites to stay connected to that community. It can be desirable and convenient to join all of those connections together into one set of data. Friends who also have multiple accounts would be represented as a single person in this merged data set, and information about the user that is distributed across several sites also would be merged. The Friendof-a-Friend (FOAF) Project is a standard and reliable way to sharing user profile data among sites, and this section introduces how that is being done.
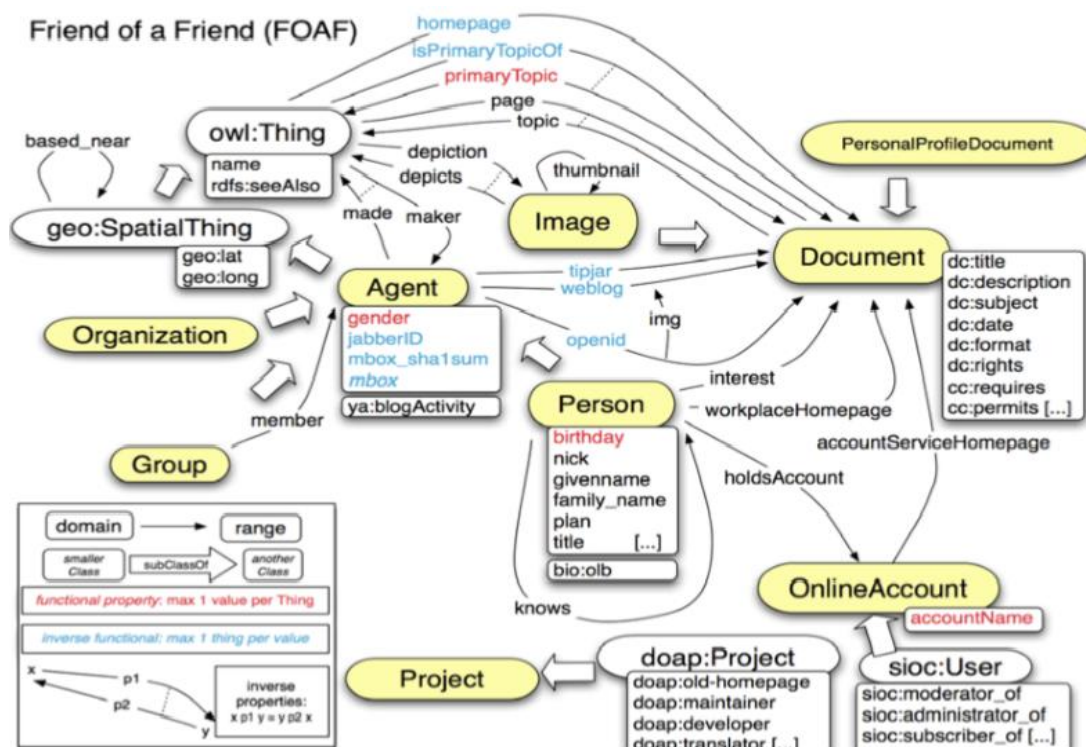
Fig. 1 FOAF Terms by Class and Property

## BACKGROUND

One can use FOAF as a feature for representing information about people and their social connections. The FOAF Vocabulary (Brickley, Miller, 2004) contains terms for describing personal information, membership in groups, and social connections. Table1lists the concepts and properties of the FOAF vocabulary. The property "knows" is used to create connection between two people (i.e. one person knows another person).

| FOAF Basics | Personal Info | Online Accounts / IM |
|---|---|---|
| Agent | weblog | OnlineAccount |
| Person | knows | OnlineChatAccount |
| name | interest | OnlineEcommerceAccount |
| nick | currentProject | OnlineGamingAccount |
| title | pastProject | holdsAccount |
| homepage | plan | accountServiceHomepage |
| mbox | based_near | accountName |
| mbox_sha1sum | workplaceHomepage | icqChatID |

Table 1. FOAF Vocabulary summary. The term "Person" and "knows" have been highlighted because they represent the basics needed to represent a social network.

The FOAF Vocabulary is represented as a Semantic Web ontology. The Semantic Web is an extension to the current web and is designed to encode information in a way that is machine readable. Like the current web of hypertext documents, Semantic Web information is maintained in documents stored on servers. Instead of using HTML, the Semantic Web uses a hierarchy of languages, including the Resource Description Framework (RDF) and Web Ontology Language (OWL). These languages are used to create ontologies, comprising classes (general categories of things) and their properties. The concepts from those ontologies are then used to describe data. There are several forms that data modelled with RDF and OWL can take. The examples presented here are shown in the N3 language. This shows the subject listed with each of its properties and their values.

In Table 5, terms with initial capital letters are classes, and terms in all lower-case are properties. A FOAF file will generally contain a Semantic Web-based description of at least one person with some personal information and who that person knows.

**Example**

Following  is the basic document describing a person:

```
<foaf:Person rdf:about="#danbri" xmlns:foaf="http://xmlns.com/foaf/0.1/">

<foaf:name>John Doe</foaf:name>

<foaf:homepage rdf:resource="http://danbri.org/" />

<foaf:openid rdf:resource="http://danbri.org/" />

<foaf:img rdf:resource="/images/me.jpg" />

</foaf:Person>
```

This brief example introduces the basics of FOAF. It basically says, "there is a foaf:Person with a foaf:name property of 'John Doe'; this person stands in foaf:homepage and foaf:openid relationship to a thing called http://danbri.org/ and a foaf:img relationship to a thing referenced by a relative URI of /images/me.jpg
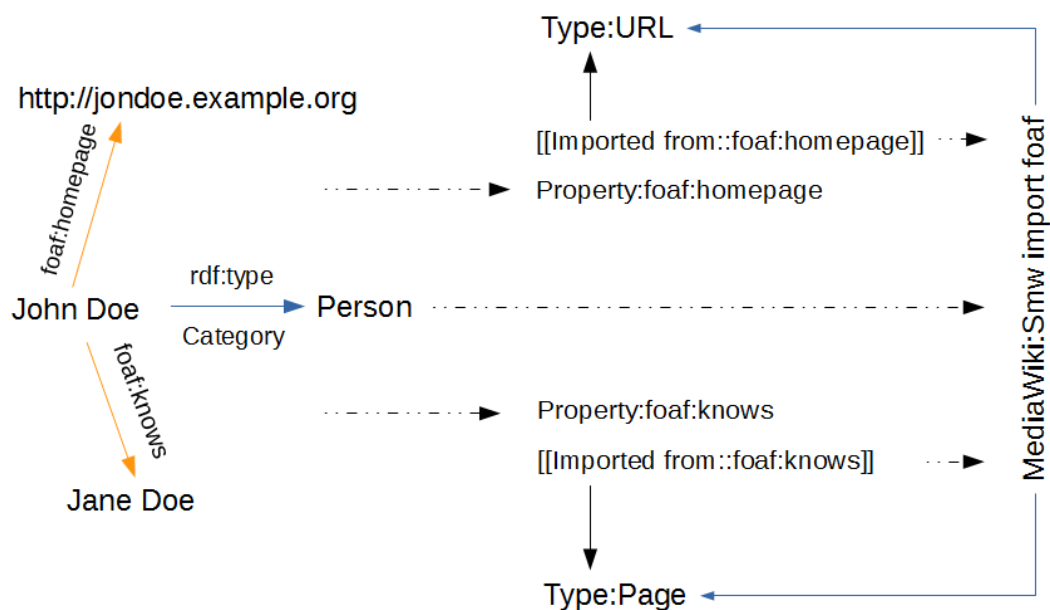


Fig.2 Example of a FOAF import and its bindings to properties declared in Semantic MediaWiki

The Semantic Web acts much like a large distributed database. There may be information about a person stored in many places. Using the basic features of RDF and OWL, it is easy to indicate that information about a person is contained in several documents on the web and

provide links to those documents. Again, any tool that understands these languages will be able to take information from these distributed sources and create a single model of that person.

## FOAF AND THE WEB BASED SOCIAL NETWORKS

If a website builds FOAF profiles of its users, it allows the users to own their data in a new way. Instead of having their information locked in a proprietary database, they are able to share it and link it. A number of Web Based Social Networking sites (WBSNs) are already using this feature. Some of the sites in this survey generate FOAF files for each user.

| Website | URL | Number of Members |
|---|---|---|
| LiveJournal | http://livejournal.com | 5,700,000 |
| eCademy | http://ecademy.com | 72,000 |
| Trust Project | http//trust.mindswap.org | 1,700 |
| Tribe | http://tribe.net | 250,000 |
| Buzznet | http://www.buzznet.com | 52,000 |
| Zopto | http://zopto.com | 10,500 |
| FilmTrust | htto://trust.mindswap.org/FilmTrust | 200 |
| Total | | 6,086,400 |

Table 2. WBSNs that provide FOAF profiles of users' social networks.

With this information, a user with accounts on all of these sites can create a small document that points to the generated files. A FOAF tool would follow those links and compile all of the information into a single profile. The code example below shows a file that would link a person to the files maintained at each of the sites listed in Table 2.

```
:Joe    a foaf:Person;

        rdfs:seeAlso

        <http://trust.mindswap.org/trustFiles/385.owl>,
        <http://www.livejournal.com/users/joeblog/data/foaf>,
        <http://www.tribe.net/FOAF/6bed4755-a467-4fa9-844d-e9bfc786e570>,
        <http://ecademy.com/module.php?mod=network&op=foafrdf&uid=71343>,
        <http://joe.buzznet.com/user/foaf.xml>
```

<http://www.zopto.com/foaf.asp?id=10088>;

<http://trust.mindswap.org/cgi-bin/FilmTrust/foaf.cgi?user=joe>;

= <http://trust.mindswap.org/trustFiles/385.owl#me>.

These simple lines of code make it possible to join potentially hundreds of pieces of information distributed across many sites together into one single description of the person.

Aside from the benefit to users who are able to merge their data, websites are also able to benefit from FOAF data on the web. For example, a website could suggest connections to other users in their system if FOAF data from another site shows a connection between the two people. Some user information could be pre-filled in if it is contained in a FOAF file somewhere else. By enhancing the user experience, a site becomes easier and more attractive to use.

## FOAF SYNTAX AND SEMANTICS

In the current scenario many people maintain accounts at multiple social networking websites. In many circumstances it is desirable, to keep information intended for business networking separate from personal information.At the same time, users put significant effort into maintaining information on social networks. Upholding multiple accounts are not just for labelling parts of their lives. A person may have various type of connections, for example, one group of friends who prefer MySpace, another group on Facebook, and have an account on a religious website to stay connected to that community.

From the view of managing an entire social connection that are spread across sites, it is beneficial to merge all of those connections together into one set of data. In a merged social network, all the accounts of a friend would be represented as a single profile. In this section, we present the important details of the FOAF vocabulary and discuss how they facilitate this type of merging.

## THE TERMINOLOGY

FOAF is a framework for representing information about people and their social connections. Written in OWL, FOAF contains terms for describing personal information, membership in groups, and social connections. Peoplearedescribedasinstancesofthefoaf:Personclass. There

are many properties to describe attributes of people, including name, email address, and documents they produce. Thepropertyfoaf: knowsisusedtoshoe that one person knows another person.

## CONCLUSION

This paper is an approach to identifying and discovering FOAF documents from the Web and extracting information about people from these FOAF documents. Using thisapproach,one can provide a means of exceeding the boundaries of individual FOAF documents, blending information about a person frommultiple documents. The analysis of FOAF network pattern also present itself to inimitable social network structures in the Semantic Web.

Recently FOAF is one of the most prevalent and widely discussed uses of Semantic Web technologies. Work is appearing that discusses the possibility of using a FOAF social network as a backend for applications. Large web-based social networks a real so starting to share some of their members information and social connections in FOAF format, making millions of profiles available. However, up to this point, there is not any clear picture to what extent users are making connections between those large web-based social networks.

We collected FOAF profiles from a number of social networks like Facebook, Twitter etc. with over 3 million total users. Using a customized Semantic Web reasoner, we have shown that thousands of users have accounts on multiple web-based social networks, linking their subgraphs in the unified social network. It proves that large collections of automatically generated FOAF contribute to a connected, distributed social network that can feed into a variety of applications. This shows that some of the goals of the Semantic Web are being realized in the social networking space.

Future work in this space must consider a common Semantic Web concern, particularly with social networks: privacy. The website Plink was set up to display public FOAF data but was forced to shut down because so many people were upset at seeing this data displayed. This will certainly continue to be a concern, especially when multiple social network profiles for a person can be merged to show even more data.

**REFERENCES**

[1]     "The friend of a friend(foaf) project," http://www.foaf-project.org/.

[2]     L. Ding, T. Finin, A. Joshi, R. Pan, R. S. Cost, Y. Peng, P. Reddivari, V. C. Doshi, , and J. Sachs, "Swoogle:2004, A search and metadata engine for the semantic web," in Proceedings of the Thirteenth ACM Conference on Information and Knowledge Management.

[3]     "The dublin core element set v1.1 namespace providing access to its content by means of an rdf schema," http://purl.org/dc/elements/1.1/.

[4]     Barnes, J. A., 1972. Social networks. Reading, MA: Addison-Wesley.

[5]     Brickley, D., L. Miller,2004. FOAF Vocabulary Specification, Namespace Document, September 2, 2004. http://xmlns.com/foaf/0.1/.

[6]     Cattell, V., 2001. "Poor people, poor places, and poor health: the mediating role of social networks and social capital." Social Science and Medicine 52(10):1501-1516.

[7]     E. Dumbill, June 2002, "Finding friends with xml and rdf," IBM's XML Watch, http://www-106.ibm.com/developerworks/xml/library/x-foaf.html.

[8]     J. Golbeck, B. Parsia, and J. Hendler,2003, "Trust networks on the semantic web," in Proceedings of Cooperative Intelligent Agents.

[9]     L. Ding, L. Zhou, and T. Finin,2003,"Trust based knowledge outsourcing for semantic web agents," in Proceedings of IEEE/WIC International Conference on Web Intelligence.

[10]     E. Dumbill, August 2002, "Support online communities with foaf: How the friend-of-a-friend vocabulary addresses issues of accountability and privacy," IBM's XML Watch, http://www106.ibm.com/developerworks/xml/library/x-foaf2.html.