Using Semantic Web to Model Social Computing

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***Abstract*—The Web connects people not just machines or documents. Interactions of people on the Web are just as complex as their interactions in the real life, which leads to a complex eco-system on the Web. Therfore, understanding and accounting for the social side on the Web is a vital aspect when it comes to encouraging the growth of the Web. Semantic Web provides a platform to connect people using ontologies like FOAF (Friend Of A Friend), model their interactions on web forums through ontologies such as SIOC (Semantically Interlinked Online Communities). These ontologies, together with many others, lay the groundwork to observe the social interactions of people to make useful observations and linkages. Although putting out the data out there may seem like a threat to an individual's privacy, the social good that can come out of this is immense. In this paper we provide several use cases expressed in a Semantic Web rule language called Notation 3 (N3) and a software agent which can make useful deductions based on these rules and an input graph.**

I. Introduction

We introduce the idea of formally descibing a social computing service or an agent using rules grounded in Semantic Web technologies. These rules provide the basis for finding a resource, making an assertion, or even predict events that may happen in the future. It is needless to say about the benefits of having such outcomes based off of publicly available social data.

On the Semantic Web, data happens to be a first class citizen. Such data on the Semantic Web comes from different sources and are thus bound to be distributed. Therefore, services and agents based on the Semantic Web are guaranteed to be data-oriented and distributed.

In Section II we describe some useful properties of the Semantic Web, in particular the Resource Description Framework (RDF)[1], and show why it is a good way of representing knowledge. In Section III we give a social computing mechanism using a formal Semantic Web language, namely Notation 3 (N3)[2]. In Section IV, we describe an implementation of an agent which can make deductions based on the rules defined according to the some social interactions or situations. In Section V, we compare our work with the related work in this area, and finally conclude the paper in a discussion of our results and our future work in section VI.

II. Semantic Web

Imagine you are on Facebook. You can make friends with people whom you may (or may not) know in the real work, you can wish a friend on her birthday, send a gift, post links to mulimedia content that you think would interest your friends, and do a myriad of activities which closely model things that you do in the real world. However, all that data are trapped within Facebook because it is not semantically annoatated nor it is not linking out.

A. Properties of Semantic Web

1) Extensibility and Universality: New concepts can be introduced. Universality???

2) Independance from human languages: RDF is a formal language.

B. Advantages of Semantic Web

Raw Data and formal rules Detecting duplicate services

III. Modelling Social Computing with N3 Rules

A. Wish-lists and Barter Systems

```
{?personA :wants ?thingA.
 ?personB :wants ?thingB.
 ?personA :can_provide ?thingB.
 ?personB :can_provide ?thingA.} =>

{[ a :NegotiationEvent;
   :participant ?personA, ?personB;
   :goods ?thingA, ?thingB].}.
```

B. Rental Systems

```
{?personA :wants_to_borrow ?thing.
 ?personB :can_lend ?thing.} =>

{[ a :BorrowingEvent;
   :first_participant ?personA;
   :second_participant ?personB].}
```

C. Confirming "Relationship Status" on Facebook

```
{?personA :in_love_with ?personB.
 ?personB :in_love_with ?personA.} =>

{[ a :ConfessionEvent;
   :participant ?personA, ?personB].}.
```

D. Making Friends

```
{?personA :interest ?thing.
 ?personB :interest ?thing.} =>

{[ a :MakingFriendsEvent;
   :participant ?personA, ?personB].}.
```

E. Preparing a Tax Return

Assume someone is preparing her tax return. If all the data in her receipts are available as RDF data, she can just run a rule against the graph of data and obtain the necessary information to prepare her tax return. The following is such a simple rule which will filter out the receipt based on the time period of the year that she is preparing her tax return for. We can envisage the benefits of having such a system implemented because it provides transparency for where the data (and thus the money!) is flowing if the IRS (Internal Revenue Service) wants to audit the tax return further. Of course the actual preparation of the tax return has many complex rules and many complex pieces of information come in to play rather than the one we have illustrated here.

```
{?receipt :belongs_to ?person;
          :has_date ?date.
 ?date :less_than ?last_day_of_the_tax_year;
       :greater_than ?first_day_of_the_tax_year.} =>

{[ a :UseReceiptInTaxReturnEvent;
   :participant ?person;].}.
```

F. Predicting Ecosystem Collapse

Scientists are already combining the text and numbers available on the Web in the hopes of extracting otherwise unavailable or expensive information, essentially using human beings as sensors by mining their communications [3]. Such methods of ”crowd mining” has led to interesting results, such as the Google Flu Trends [4], which uses a cloud of keywords to determine . As a very extreme example, May be incorporate things from here:

IV. Decentralized Social Computing Service

We have prototyped an ’agent’ which use the existing linked social data on the web to make useful inferences. Based on these inferences, the agent can make suggestions to the concerned parties.

V. Related Work

DBpedia from Wikipedia [5]
Social Computing stuff [6]

VI. Conclusion

The ideas presented in the paper is at a very conceptual level. Although we provide an implementation, it is still very far from being complete. Our contributions
Future Work

VII. Conclusion

The conclusion goes here.

Acknowledgment

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