

DYNAMIC FOAF MANAGEMENT METHOD FOR SOCIAL NETWORKS IN THE SOCIAL WEB ENVIRONMENT

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Abstract

- Various researches
 - Utilization of Friend-Of-A-Friend (FOAF)
 - Automatic update and dynamic management of FOAF
- Applying FOAF and RSS to OLAP system
 - Generates OLAP cube by using the collected FOAF and RSS
 - Processes the generated OLAP cubes
- Implemented result
 - foaf:interest of users
 - Average of 19 percent increase in four weeks
 - Increased foaf:interest change
 - Number of foaf:knows of users has grown to an average of 9 percent
- By using the suggested method
 - Can provide better services
 - Rapid change of user interests with the automatic application of FOAF

Introduction

- Social network services
 - Demonstrate the relations between users
 - Interact with the creation and evaluation of content
- Volume of content generated on social network services and the number of relations between users increase
 - Number of problems have emerged
 - Only simple relations between the users are represented.
 - Meaningful relations between users cannot be represented
 - Social network requires a considerable amount of computation
 - In order to reflect changes in its connecting relations
 - Heterogeneous distributed computing environments are not adequate
 - For effective integration and processing of large volumes of metadata

Introduction

- Our aim
 - Combine FOAF with RSS files in the OLAP system
 - Dynamically manage user relationships and then to reflect it to FOAF
 - For this purpose
 - Insert each entity from FOAF and RSS into a database designed with a star schema
 - Convert it into OLAP data cubes and analyze the social network
- Proposed dynamic update technique
 - FOAF
 - Data interoperability
 - RSS
 - Reflect changes in issues based on time flow
 - OLAP cubes
 - Multidimensional analysis and processing
 - Massive amounts of data

Related Work

- FOAF
 - OWL/RDF-based user profile description technique
 - To represent information about users and their social connections
 - User profile description method
 - Essential for integrating users and the established relations among them
 - Potential solutions that facilitate the sharing of social network data
- RSS
 - Format for representing content
 - Mainly used on news and blog sites
 - Automatic collection of RSS-related programs and services
 - Users were able to get the latest information posted to a site without actually having to visit the site

Related work

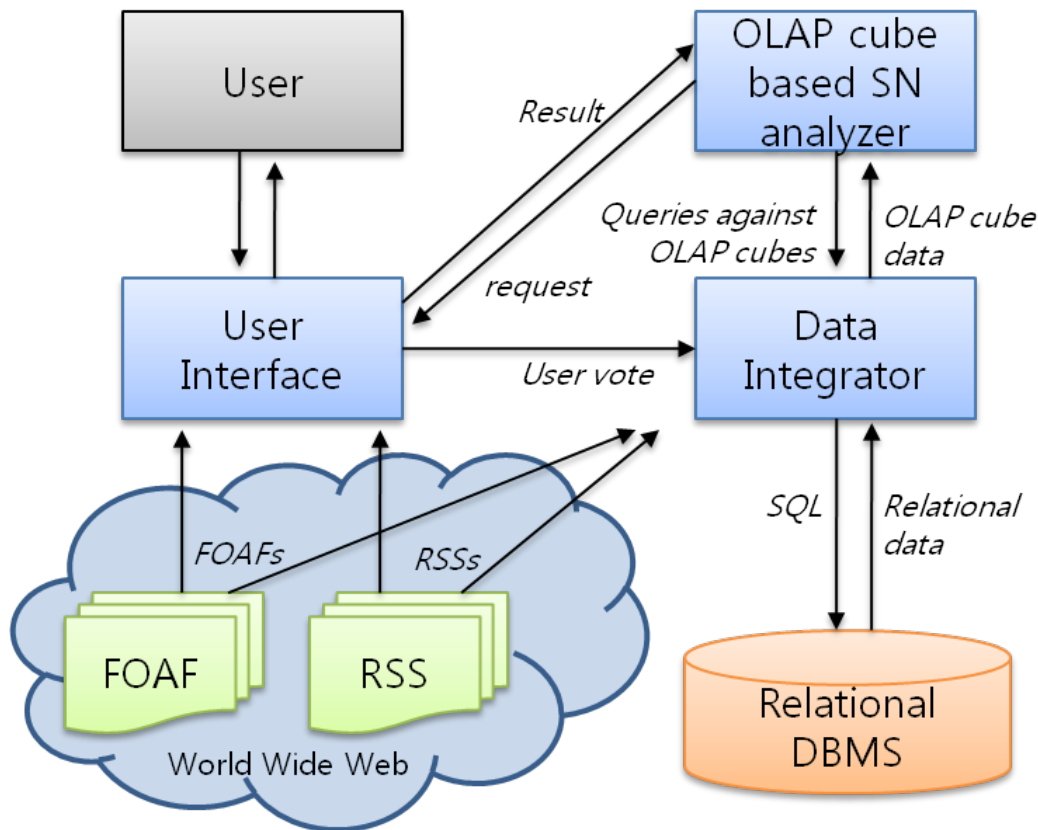
- OLAP system
 - Data warehouse
 - Storage area for massive amounts of data
 - Effectively used to offer information that is required by decision makers
 - Volume of data in data warehouses
 - Massive computational resources
 - OLAP supports multidimensional analysis
 - To run data items in diverse time frames
 - Process complicated queries

Related work

- Generation and analysis of social networks
 - Online social networks
 - To generate, integrate, and visualize
 - In the semantic web community [10, 18]
 - Culotta et al [12]
 - End-To-End user social network system
 - Aikebaier et al [23]
 - Trustworthy in distributed system
- Semantic social networks
 - Jung and Euzenat [26]
 - Three steps for using ontologies to represent user profiles, relations
 - Szomszor et al [30]
 - Models of user interests *<foaf:interest>*

System Overview

- System overview



- Step 1) Design of star schema
- Step 2) Data collection and insertion
- Step 3) Generation of OLAP cubes
- Step 4) OLAP processing operation and updating of user relationships

Design of the Star Schema

- We construct a star schema
 - 6 Dimension Tables
 - 1 Fact Table
1. id dimension table: stores user profile
 2. published_time dimension table: stores time information
 3. knows dimension table: stores foaf:knows
 4. site_link dimension table: stores website information
 5. entry_link dimension table: stores contents
 6. category dimension table: stores category and tags

Data Collection

- Collect FOAF profile
 - Many SNS provides FOAF
 - We collected FOAF from livejournal.com
- Collect RSS data
 - 1) Extract the addresses of blogs or web sites of the users' FOAF
 - 2) Collect and store RSS

```
<?xml version="1.0" encoding="UTF-8" ?>
- <rss version="0.92">
- <channel>
  <title>Law, Technology & Arts Blog</title>
  <link>http://wjta.wordpress.com</link>
  <description>Bi-weekly comments from the Washington
    Journal of Law, Technology & Arts</description>
  <lastBuildDate>Sun, 30 Jan 2011 08:18:01
    +0000</lastBuildDate>
  <docs>http://backend.userland.com/rss092</docs>
  <language>en</language>
  <!-- generator="WordPress.com" -->
- <item>
  <title>The Future of Textbooks in a Digitized
    World</title>
  - <description>
    <![CDATA[ James Proctor In January 2011,
      California start-up company Kno, Inc. announced
    </description>
  <link>http://wjta.wordpress.com/2011/01/27/the-
    future-of-textbooks-in-a-digitized-world/</link>
  </item>
```

Generation of OLAP Cubes

RSS

```
<?xml version="1.0" encoding="UTF-8" ?>
<rss version="2.0">
  <channel>
    <title>Finding Neverland with Photos</title>
    <link>http://scratchback.net/mis026/</link>
    <description>Escaping the Earth via the Neverland</description>
    <pubDate>Wed, 24 Jun 2009 00:55:38 +0900</pubDate>
  </channel>
  <item>
    <title>꽃돌깨개 희망을</title>
    <link>http://scratchback.net/mis026/entry/%EA%B9%83%EB%99%A4%EC%97%9D%EA%B2%8C-%ED%9D%AC%EA%B7%9D%EC%9D%98</link>
    <description><div class="imageblock center" style="text-align:center; clear:both;"></div> <DIV style="TEXT-ALIGN:center">존수, <STRONG>꽃돌깨개 희망을</STRONG>, 음남 연, 2009.06.22 (Pentax K10D + m50.4)<BR><BR>겨울이 지나면 꽃돌깨개 희망을 줄 수 있도록</DIV>
    </description>
    <category>Photos</category>
    <category>2MBOUT</category>
    <category>개간웃</category>
    <category>꽃</category>
    <category>꽃돌깨개 희망을</category>
  </item>
  </rss>
```

FOAF

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:admin="http://www.dodds.com/foaf/admin/rd/about#"
  >
  <foaf:Person rdf:type="foaf:Person"
  <foaf:PrimaryTopic rdf:resource="#me" />
  <foaf:GeneratorAgent rdf:resource="http://www.dodds.com/foaf/admin/rd/about#" />
  <admin:generatorReportsTo rdf:resource="mailto:leigh@dodds.com" />
  <foaf:PersonProfileDocument>
  <foaf:Person rdf:type="foaf:Person"
  <foaf:name>Sohn Jongsoo</foaf:name>
  <foaf:title>Dr</foaf:title>
  <foaf:givenname>Sohn</foaf:givenname>
  <foaf:familyname>Jongsoo</foaf:familyname>
  <foaf:nick>mis026</foaf:nick>
  <foaf:mbox_sha1sum>63724ba57bc8a046ea4273940667f8f5268eb</foaf:mbox_sha1sum>
  <foaf:homepage rdf:resource="http://scratchback.net/mis026/" />
  <foaf:phone rdf:resource="tel:860-1342" />
  <foaf:workinfo_telepage rdf:resource="http://korea.ac.kr" />
  <foaf:workinfo_homepage rdf:resource="http://www.korea.ac.kr" />
  <foaf:schoolHomepage rdf:resource="http://www.korea.ac.kr" />
  <foaf:knows>
  <foaf:Person>
  <foaf:name>
  <foaf:mbox_sha1sum>63114d702d4c4dd8b52706c6a3d3c2715919c</foaf:mbox_sha1sum>
  <foaf:seeAlso rdf:resource="http://jp.com" />
  </foaf:Person>
  <foaf:knows>
  <foaf:Person>
  <foaf:knows>
  <foaf:Person>
  <foaf:name>ab</foaf:name>
  </foaf:Person>
  </foaf:Person>
  </foaf:knows>
  </foaf:Person>
  </rdf:RDF>
```

socialnetwork.id
key : int(40)
id : varchar(100)
name : varchar(100)
title : varchar(50)
givenName : varchar(50)
familyName : varchar(50)
nick : varchar(100)
mbox : varchar(200)
homepage : varchar(100)
phone : varchar(100)
workhome : varchar(100)
schoohome : varchar(100)
resource : varchar(300)

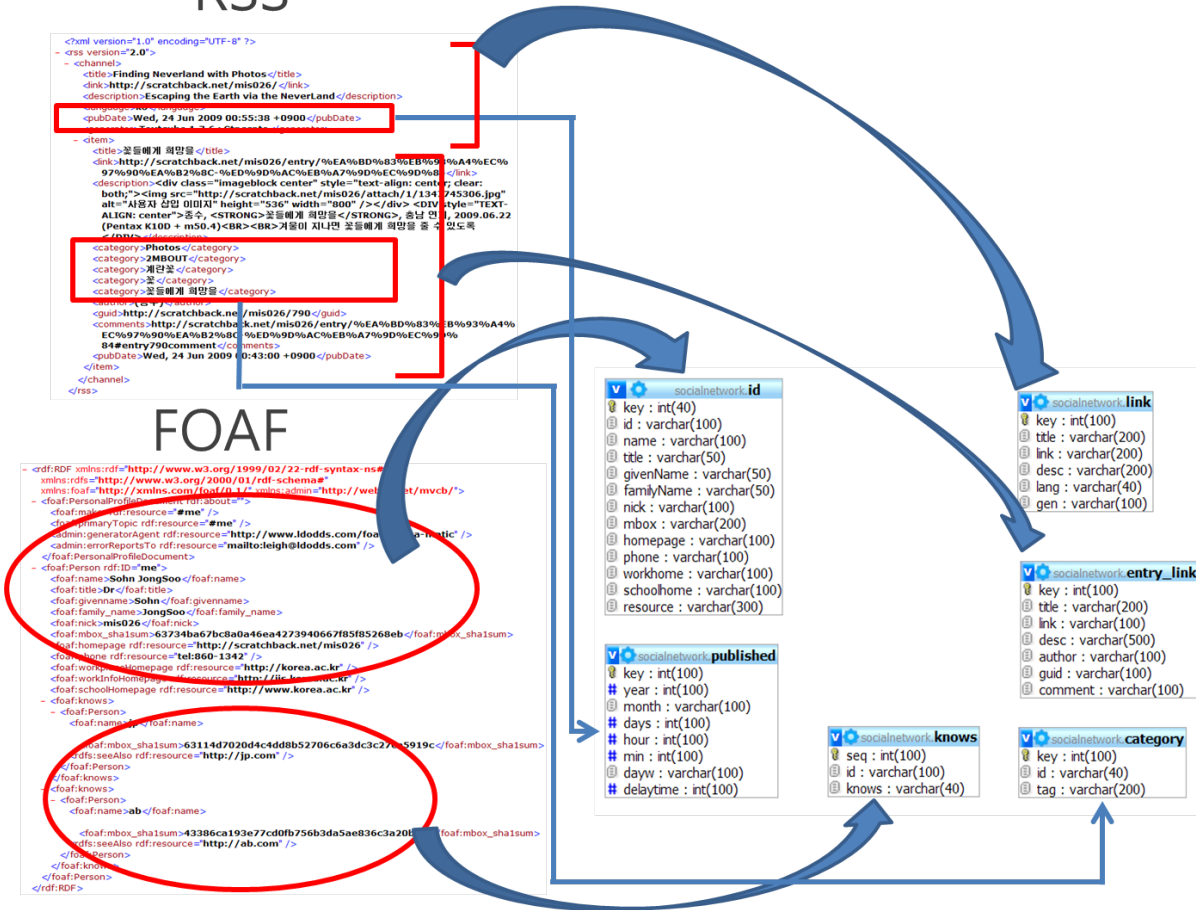
socialnetwork.link
key : int(100)
ttle : varchar(200)
link : varchar(200)
desc : varchar(200)
lang : varchar(40)
gen : varchar(100)

socialnetwork.entry_link
key : int(100)
ttle : varchar(200)
link : varchar(100)
desc : varchar(500)
author : varchar(100)
guid : varchar(100)
comment : varchar(100)

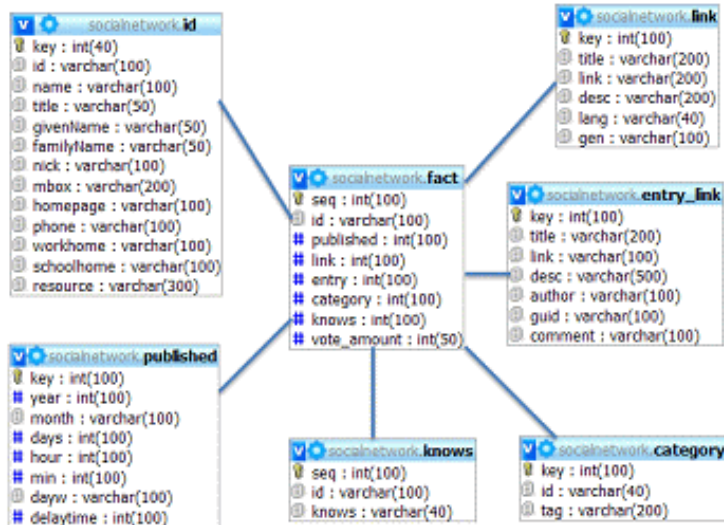
socialnetwork.published
key : int(100)
year : int(100)
month : varchar(100)
days : int(100)
hour : int(100)
min : int(100)
dayw : varchar(100)
delaytime : int(100)

socialnetwork.knows
seq : int(100)
id : varchar(100)
knows : varchar(40)

socialnetwork.category
key : int(100)
id : varchar(40)
tag : varchar(200)

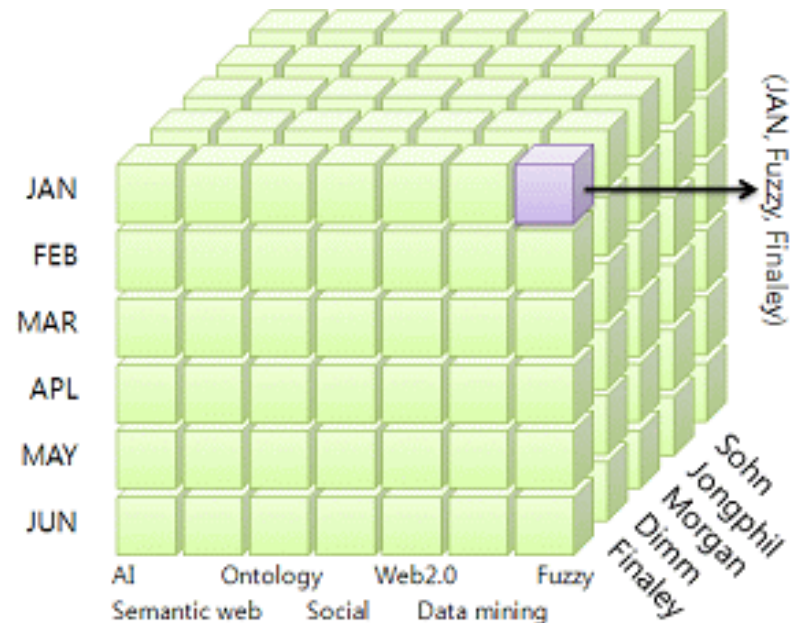


Generation of OLAP Cubes



Star schema

3D OLAP Cube

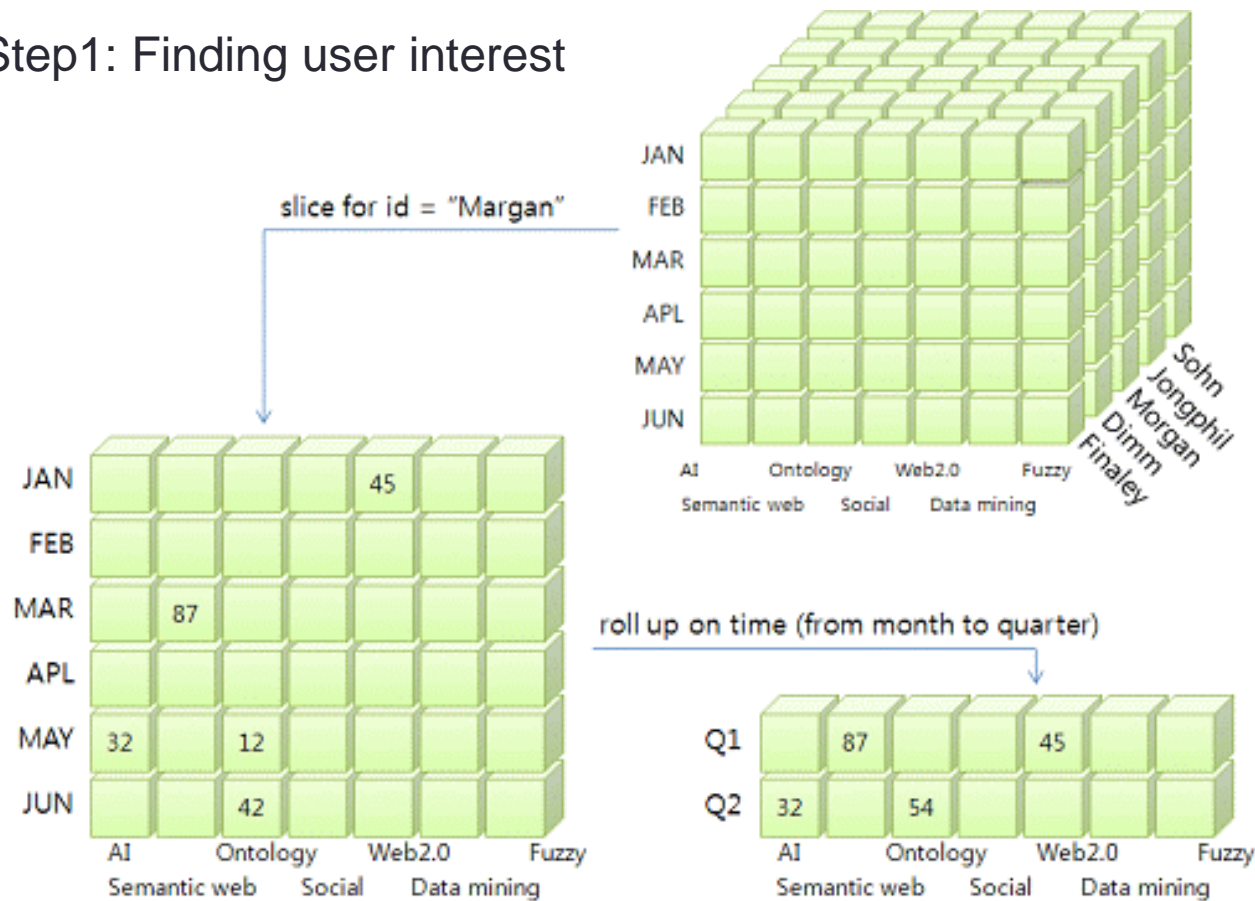


Dynamic Management of FOAF

- To make connections
 - Interests are most similar
 - Users who intend to extract relations
- First step
 - Extraction of the major interests of the corresponding users
 - Carry out several OLAP operations
- Second step
 - Extract the user
 - Most similar to the corresponding user
- By following these two steps
 - We can extract the major interests of the corresponding user

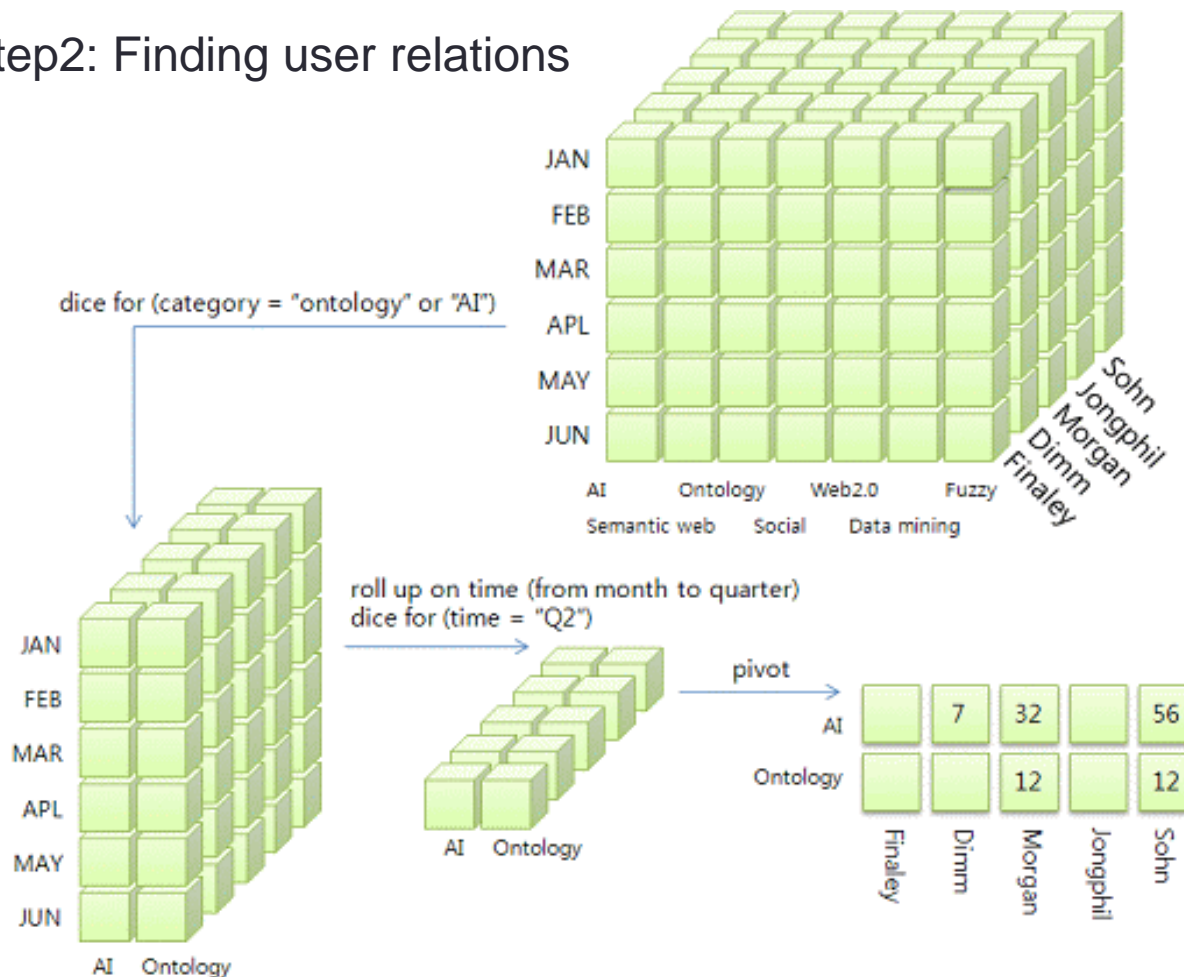
Dynamic Management of FOAF

Step1: Finding user interest



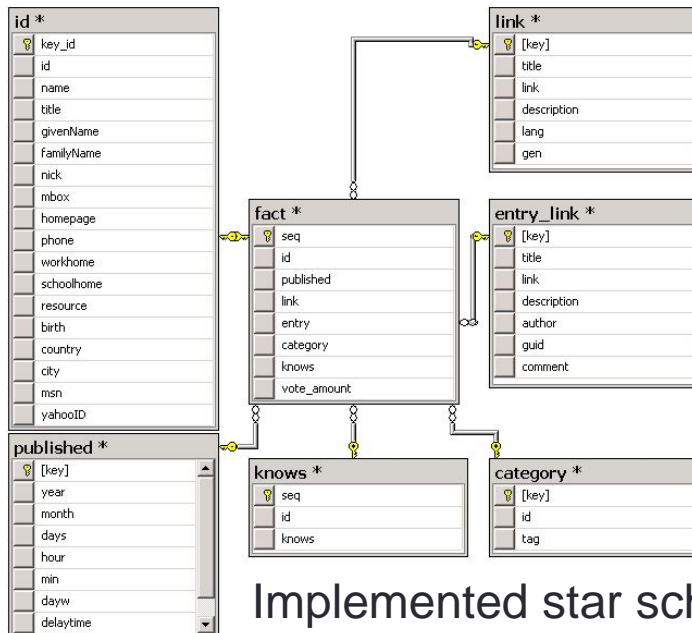
Dynamic Management of FOAF

Step2: Finding user relations



System Implementations

- Our system was constructed under the following environment:
 - Operating system: Windows XP
 - Programming language: C#
 - Database: MS SQL



Implemented star schema

id	link	entry	category	knows
yvanne	31	31	31	31
karaokeictator	32	32	32	32
hockeyvaughnfan	33	33	33	33
sotranquil	34	34	34	34
cheryl_bites	36	36	36	36
liquidhalcyon	38	38	38	38
scrittorello	40	40	40	40
razor2rozary	41	41	41	41
le_pinotnoir	42	42	42	42
angualupin	43	43	43	43
ewanism	44	44	44	44
postmodernpippo	45	45	45	45
betsyli	47	401	401	47

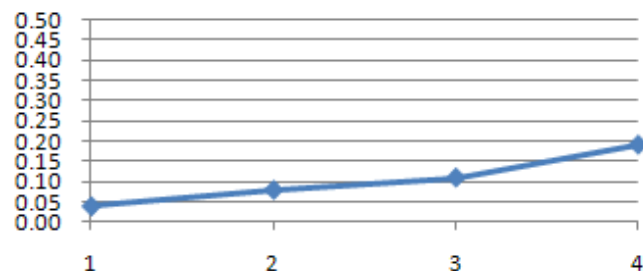
Implemented fact table

Analysis

- Number of collected data

FOAF	RSS	Number of articles
587	587	8691

- Variation in users' interest



During the fourth week
19% of variation was observed

- Change of friendship per user

ID/Week	Week 0	Week 1	Week 2	Week 3	Week 4
Criminal	29	31	38	38	39
betsyl	7	9	14	17	17
cherryboy	30	30	30	56	56
Danny_7	4	8	19	25	31
...omitted...

Analysis

- Functional analysis of FOAF applications

FOAF Applications	FOAF Generation	Filtering	Automatic update
Proposed	○	○	○
FOAF me	○	×	×
FOAF-o-matic	○	×	×
FOAF realm	○	○	×

- Adoption to social network services

- Most of the web sites that support social networks
 - Choose to recommend friends based on the items
 - When there is a change in the member's interest
 - User has to directly modify his/her personal information
 - In order to solve this problem
 - System should automatically extract
 - Members' interests and reflect these interests
 - Proposed method can improve the quality of service support in social networks

Conclusion

- We proposed a method
 - To resolve the problems
 - Social network generation and management using an OLAP system
 - Based on FOAF and RSS
 - Dynamically update and manage FOAF via the OLAP system
- With the proposed method
 - We can represent the interests of users
 - As well as other relationships
 - Apply changes in the user interests to the FOAF using RSS
- Further research
 - Utilization of a query language such as SparQL
 - RDF-based metadata without conversion

THANK YOU
