semantic and social (intra)webs

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Web-Instrumented Man-Machine Interactions, Communities, and Semantics

a joint research team between INRIA Sophia Antipolis – Méditerranée and I3S (CNRS and University Nice Sophia Antipolis).
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research problem

socio-semantic networks: combining formal semantics and social semantics on the web
web landscape and graphs
(meta)data of the relations and the resources of the web

web...ITES + social + of data + of services + semantics

= typed graphs + web (graphs) + networks (graphs) + linked data (graphs) + workflows (graphs) + schemas (graphs) + ...

web landscape and graphs
(meta)data of the relations and the resources of the web
challenges

analyzing, modeling, formalizing and implementing graph-based social semantic web applications for communities

1. multidisciplinary approach for analyzing and modeling
   - the many aspects of intertwined information systems
   - communities of users and their interactions

2. formalizing and reasoning on these models
   - new analysis tools and indicators
   - new functionalities and better management
diffusion

Master IFI: from KIS to Web
– gradual changes to the courses
– then replace the master by a new one

Standardization participation
– Working groups: RDF 1.1, SPARQL 1.1
– INRIA Advisory Committee Representative

Open-source and CeCILL-C free software
reset...
RDFS/Rules : 0.00 s
Load Triples : 488
Load Relations : 423
Load Concepts : 135
done.
projects

isicil.inria.fr (ANR)
- enterprise social networking
- business intelligence, watching, monitoring
- communities of interest, of practice, of experts

datalift.org (ANR)
- from raw public data to interlinked data and schemas
- a platform and documentation to assist the process
- validation on real datasets

kolflow.univ-nantes.fr (ANR)
- reduce the overhead of communities building knowledge
- federated semantic: distributed blackboard for man-machine coop.

dbpedia.fr (Ministry of Culture)
- extract and publish data and facts from French version of wikipedia

ocktopus (ANR)
- dynamic typed network of user-generated web sites (e.g. forums)
ISICIL

semantic and social intraweb for corporate intelligence and watch

ANR project CONTINT 2009-2011
<background_knowledge>
internet

classical web

wiki, (μ)blog, forum, etc.

read-write web

Ward Cunningham, 94
social web networks
social networks
networking is not that new e.g. commerce

social network analysis
beginning of the 20th century
SOCIAL TAGGING

collaboratively create and manage tags to annotate and categorize content
Encore une cuillère d’OGM dans ta purée ?

Classé dans : Politique, Science, Société

Comment, dans quel but, leur dire ?

Tags:
- cutout
- purpure
- viola
- vlUUUUola
- limone
- lime
- ogm
- organismi geneticamente modificati
- b/n+color
- macro
- centro
- semino
- fingers
- dita
- pollice
- alluce
- mano
- photo+song
- Ysplix
- SuperShot
- DiamondClassPhotographer
- SpecialEffects

related tags:
- politique
- france
- environnement
- loi
- 200805
- une
- manifestation
- parlement
- vert
- rejet

Tags:
- ogm
- lobbys
- scandale
- santé
- argent
- exploitation
- mensonge
- monsanto
- chimique
a crowd of users creating massive categorizations
semantic web
mentioned by Tim BL
in 1994 at WWW

A WEB OF LINKED DATA

User Interface & Applications

Trust

Proof

Unifying Logic

Ontology: OWL

RDF-S

Rule: RIF

Crypto

SPARQL

RDF

XML

URI/IRI

W3C®
RDF stands for Resource: pages, images, videos, ... everything that can have a URI Description: attributes, features, and relations of the resources Framework: model, languages and syntaxes for these descriptions
RDF is a triple model i.e. every piece of knowledge is broken down into 
( subject, predicate, object )
doc.html has for author Fabien and has for theme Music
doc.html has for author Fabien

doc.html has for theme Music
( doc.html , author , Fabien )
( doc.html , theme , Music )

(subject , predicate , object )
RDF triples can be seen as arcs of a graph (vertex, edge, vertex)
a URI on everything
"Music"
principles

- use RDF as data format
- use URIs as names for things
- use HTTP URIs so that people can look up those names
- when someone looks up a URI, provide useful information (RDF, HTML, etc.) using content negotiation
- include links to other URIs so that related things can be discovered
query with SPARQL SPARQL Protocol and RDF Query Language
e.g. DBpedia
Ontology -> ontologies
RDFS to declare classes of resources, properties, and organize their hierarchy

Diagram:
- Document
  - Report
- creator
- author
- Person
- Document

Document Person
OWL in one...

- algebraic properties
- disjoint properties
- qualified cardinality
- individual prop. neg
- chained prop.
- union
- disjuction
- intersection
- complement
- restriction
- cardinality
- equivalence
- enumeration
- value restrict.
- disjoint union
- keys
SKOS knowledge

thesauri, classifications, subjects, taxonomies, folksonomies...

... controlled vocabulary
natural language expressions to refer to concepts

inria:CorporateSemanticWeb
  skos:prefLabel "corporate semantic web"@en;
  skos:prefLabel "web sémantique d'entreprise"@fr;
  skos:altLabel "corporate SW"@en;
  skos:altLabel "CSW"@en;
  skos:hiddenLabel "web semantique d'entreprise"@fr.
inria:CorporateSemanticWeb
  skos:broader w3c:SemanticWeb;
  skos:narrower inria:CorporateSemanticWiki;
  skos:related inria:KnowledgeManagement.
Social web
Semantic web
Linked data
Social semantic web
ISICIL: semantic social intraweb
isicil.inria.fr

• enterprise social networking
• business intelligence, watching, monitoring
• communities of interest, of practice, of experts

isicil.inria.fr
proposed overview...

1. integrating requirement analysis methods

2. examples of challenges and derived functionalities

3. overview of this open-source platform

⇒ http://isicil.inria.fr
extracts of the requirement analysis and specifications

MERGING METHODOLOGIES
• analyze and model key business processes

• Analyze interactions between members of the group ADEME « roadmap for urban mobility »

• campaigns of questionnaires at Orange Labs

• trend analysis of intelligence market and watch

• comparison of the APIs, widgets and other applications
ex. study of transformations: existing ➔ target
## Convergence Matrix

**Detections of Needs or Redundancies in Key Scenarios**

<table>
<thead>
<tr>
<th>Etapes des scénarios</th>
<th>Fonctionnalités identifiées</th>
<th>Fonctions SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Présenter problématique au SVIC</td>
<td>Mailing, Q&amp;A</td>
<td>Envoyer</td>
</tr>
<tr>
<td>Demander ce qui est incontournable et ce que font les autres ingénieurs</td>
<td>Consultation d’experts</td>
<td>Extraire, filtrer</td>
</tr>
<tr>
<td>Prendre en compte demande</td>
<td>Workflow, Outils de collaboration</td>
<td>communiquer</td>
</tr>
<tr>
<td>Préparer requêtes</td>
<td>Moteur de recherche, équation de recherche</td>
<td>rechercher</td>
</tr>
<tr>
<td>Recueillir résultats</td>
<td>Abonnement, push...</td>
<td>Extraire, annoter</td>
</tr>
<tr>
<td>Vérifier pertinence des résultats</td>
<td>Analyses, outils de filtrage</td>
<td>filtrer</td>
</tr>
<tr>
<td>Informer l’ingénieur</td>
<td>Me, Mail, Chats, Vidéo, SVIC</td>
<td></td>
</tr>
<tr>
<td>S’approprier les résultats et les requêtes</td>
<td>Equations, outils de filtrage</td>
<td></td>
</tr>
<tr>
<td>Devenir le destinataire des alertes</td>
<td>Diffusion par profil</td>
<td></td>
</tr>
</tbody>
</table>
Segment 1: Business Intelligence

Segment 2: business intelligence market

Segment 3: entreprise 2.0

Segment 4: startups of semantic web
proposing functionalities & prototypes

Frequent functionalities and dependencies

Prioritization of functionalities

<table>
<thead>
<tr>
<th>Exigences / problèmes récurrents</th>
<th>Sous-tâches envisagées (relées aux travaux Inria/Kewi)</th>
<th>Fonctionnalités candidates rattachées</th>
<th>Fréquence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction collaborative de documents (Workflow rédactionnel partagé)</td>
<td>- Espace partagé de construction de documents (synthèses, rapports, feuilles de route, bulletins de veille...)</td>
<td>- Espace partagé</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>- Mécanisme de valorisation / reconnaissance du travail accompli</td>
<td>- Outils de collaboration</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>- Workflow editorial</td>
<td>- Workflow editorial</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>- Outils de mise en forme</td>
<td>- Outils de mise en forme</td>
<td>12</td>
</tr>
<tr>
<td>Repérer et représenter les expertises (interne &amp; externe car lien avec les industriels fort !)</td>
<td>- Profil qui fait quoi auto-tagué</td>
<td>- Mise en forme : visualisations avancées, graphiques et cartographie</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Stockage et qualification des contacts</td>
<td>- Localisation de personnes / d'experts</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Suivre l'évolution dans le temps des expertises</td>
<td>- Filtrage</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Se représenter le réseau d'experts de contacts (proximité thématique)</td>
<td>- Gestion profils utilisateurs</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Métriques sur la capacité à partager/créer du lien social (personnes frontières)</td>
<td>- Questions/réponses</td>
<td>1</td>
</tr>
<tr>
<td>Créer ses propres services et indicateurs (pour le « métier d'ingénieur de services »)</td>
<td>- Créer ses propres services</td>
<td>- Création de tableaux de bord</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Créer ses propres indicateurs (traçage et suivi des infos &amp; des événements)</td>
<td>- Web services / Mashups</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Relier les documents à leurs auteurs</td>
<td>- Tags/bookmarks</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>- Alertes sur les activités des autres</td>
<td>- Alertes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Optimiser la transversalité (liens tout azimut)</td>
<td>- Abonnements/RSS</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Analyse et visualisation des réseaux sociaux</td>
<td>2</td>
</tr>
</tbody>
</table>
EXAMPLES OF FONCTIONNALITIES

elements of challenges and implementations (web 3.0 & enterprise 3.0)
flat folksonomies
assisted structuring of folksonomies

[Limpens et al.]

web 2.0

flat folksonomies

thesaurus

pollutant

energy

related

related

pollution

has narrower

soil pollution

SKOS
global giant graph
link users, actions, knowledge, resources, groups, etc.
Soil pollution

pollution

pollution

pollutant

Soil pollutions

distance
evaluating distances
c.f. [Limpens et al.]
Comparison of the mean value of the JaroWinkler metric for each type of semantic relation

Mean value of the difference \(s(t_1, t_2) - s(t_2, t_1)\) with \(s\) being the Monge-Elkan QGram metric for each set of tag pairs.

determine thesaurus relations
examples of results

Node size ↔ InDegree
- tags (delicious + thesenet)
- svic keywords
contextual distance: co-occurrence vector

cosine distance to detect related tags

\[
\cos(\vec{tag}_1, \vec{tag}_2) = \frac{\vec{tag}_1 \cdot \vec{tag}_2}{\|\vec{tag}_1\| \cdot \|\vec{tag}_2\|}
\]

[Cattuto et al. 2008]
example of results

CADIC, ADEME
interest community inclusion

detecting narrower tags  [Mika et al.]

\[ \{user_{tag_1}\} \subset \{user_{tag_2}\} \Rightarrow (tag_2, hasnarrower, tag_1) \]
examples of results
del.icio.us

Arrows mean "has broader" thickness ≈ weight
combining metrics

edition distances
Monge-Elkan Soundex, JaroWinkler, asymmetry Monge-Elkan Qgram

+ contextual metric
cosinus vector co-occurring tags

+ social metrics
inclusion of communities of interest
structuring as a side effect
handling conflicts

arbitration rules

\[
\begin{align*}
&\text{IF} \quad \frac{\text{num}(\text{narrower})}{\text{num}(\text{broader})} \geq c \\
&\text{THEN} \quad \text{narrower/broader} \\
&\text{ELSE} \quad \text{related}
\end{align*}
\]
folksonomy enrichment lifecycle

Flat folksonomy

Automatic processing

User-centric structuring

Detect conflicts

Global structuring

Structured folksonomy

[1] Limpens et al.
sociograms 3.0
Graphs, graphs, graphs

social network analysis

\[ d_{in}^{\circ}(p) = \| \{x; rel(x, p)\} \| \]

Semantic web is not antisocial

Fabien

Michel

Marco

Guillaume

Rémi

Nicolas

\[ d_{in}^{\circ}(\text{Guillaume}) = 4 \]


\[ d(\text{guillaume}) = 5 \]

\[ \text{knows} \]

\[ \text{colleague} \]

\[ \text{father} \]

\[ \text{colleague} \]

\[ \text{sister} \]

\[ \text{mother} \]

\[ \text{brother} \]

\[ \text{child} \]

\[ \text{parent} \]

\[ \text{family} \]

\[ \text{c.f. [Erétéo et al.]} \]
eg. typed proximity centrality

$$C^c_{\text{<knows*/worksWith>}}(k) = \left[ \sum_{x \in E_G} \text{length}(g_{\text{<knows*/worksWith>}}(k, x)) \right]^{-1}$$

select distinct ?y ?to
    pathLength($path) as ?length
    (1/sum(?length)) as ?centrality
where{
    ?y s (foaf:knows*/rel:worksWith)::$path ?to
}group by ?y
ipernity.com dataset in RDF
61 937 actors & 494 510 relationships
–18 771 family links between 8 047 actors
–136 311 friend links implicating 17 441 actors
–339 428 favorite links for 61 425 actors
etc.
c.f. [Erétéo et al.]
some interpretations
validated with managers of ipernity.com

- `friendOf`, `favorite`, `message`, `comment`
  small diameter, high density

- `family` as expected: large diameter, low density

- `favorite`: highly centralized around Ipernity animator.

- `friendOf`, `family`, `message`, `comment`: power law of
some interpretations

existence of a largest *component* in all sub networks

"the effectiveness of the social network at doing its job" [Newman 2003]
e.g. of results: different key actors for different kinds of links

c.f. [Erétéo et al.]
## PERFORMANCES & LIMITS

<table>
<thead>
<tr>
<th>( \text{Comp}_{&lt;\text{rel}&gt;}(G) )</th>
<th>( \text{time} )</th>
<th>( \text{projections} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knows</td>
<td>0.71 s</td>
<td>494 510</td>
</tr>
<tr>
<td>Favorite</td>
<td>0.64 s</td>
<td>339 428</td>
</tr>
<tr>
<td>Friend</td>
<td>0.31 s</td>
<td>136 311</td>
</tr>
<tr>
<td>Family</td>
<td>0.03 s</td>
<td>18 771</td>
</tr>
<tr>
<td>Message</td>
<td>1.98 s</td>
<td>795 949</td>
</tr>
<tr>
<td>Comment</td>
<td>9.67 s</td>
<td>2 874 170</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \text{D}_{&lt;\text{rel},1&gt;}(y) )</th>
<th>( \text{time} )</th>
<th>( \text{projections} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knows</td>
<td>20.59 s</td>
<td>989 020</td>
</tr>
<tr>
<td>Favorite</td>
<td>18.73 s</td>
<td>678 856</td>
</tr>
<tr>
<td>Friend</td>
<td>1.31 s</td>
<td>272 622</td>
</tr>
<tr>
<td>Family</td>
<td>0.42 s</td>
<td>37 542</td>
</tr>
<tr>
<td>Message</td>
<td>16.03 s</td>
<td>1 591 898</td>
</tr>
<tr>
<td>Comment</td>
<td>28.98 s</td>
<td>5 748 340</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shortest paths used to calculate</th>
<th>( \text{time} )</th>
<th>( \text{projections} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knows</td>
<td>Path length &lt;= 2: 14m 50.69s</td>
<td>100 000</td>
</tr>
<tr>
<td>Path length &lt;= 2: 2h 56m 34.13s</td>
<td>1 000 000</td>
<td></td>
</tr>
<tr>
<td>Path length &lt;= 2: 7h 19m 15.18s</td>
<td>2 000 000</td>
<td></td>
</tr>
<tr>
<td>Favorite</td>
<td>Path length &lt;= 2: 5h 33m 18.43s</td>
<td>2 000 000</td>
</tr>
<tr>
<td>Friend</td>
<td>Path length &lt;= 2: 1m 12.18 s</td>
<td>1 000 000</td>
</tr>
<tr>
<td>Path length &lt;= 2: 2m 7.98 s</td>
<td>2 000 000</td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>Path length &lt;= 2 : 27.23 s</td>
<td>1 000 000</td>
</tr>
<tr>
<td>Path length &lt;= 2 : 2m 9.73 s</td>
<td>3 681 626</td>
<td></td>
</tr>
<tr>
<td>Path length &lt;= 3 : 1m 10.71 s</td>
<td>1 000 000</td>
<td></td>
</tr>
<tr>
<td>Path length &lt;= 4 : 1m 9.06 s</td>
<td>1 000 000</td>
<td></td>
</tr>
</tbody>
</table>
annotating the networks with analysis results

SEMSNA SCHEMA

high centrality
SemSNA an ontology of SNA

http://ns.inria.fr/semsna/
example of SemSNA
ADD { 
  ?y semsna:hasInDegree _:b0 
  _:b0 semsna:forProperty param[type] 
  _:b0 rdf:value ?indegree 
  _:b0 semsna:hasLength param[length] 
} 
SELECT ?y count(?x) as ?indegree 
{ 
  ?x $path ?y 
  filter(match($path, star(param[type]))) 
  filter(pathLength($path) <= param[length]) 
} group by ?y

parameterized in-degree

\[ d_{in}^{o}(y) \]
conceptual and software framework for a semantic analysis of social networks using semantic web frameworks
groups & reasons
detecting AND labeling communities
propagating tags to discover communities of interest
tags to detect and label communities

extension of algorithm RAK/LP: from random labels to structured tags

rugby, foot, hockey, salt, water
foot, movie, mustard
pepper, wine

[sport, sport, condiment]

[foot, movie]

pepper, wine

Eretéo et al., 2011
applied to Ademe Ph.D. network

- 1 853 agents
  - 1 597 academic supervisors
  - 256 ADEME engineers.
- 13 982 relationships
  - 10 246 rel:worksWith
  - 3 736 rel:colleagueOf
- 6 583 tags
- 3 570 skos:narrower
  relations between 2 785 tags
MODULARITY COMPARISONS

X axis: propagation iterations, Y axis: modularity
results

1. pollution
2. sustainable development
3. energy
4. chemistry
5. air pollution
6. metals
7. biomass
8. wastes
controlled abstraction and merge
overview of the architecture

PLATFORM AND PROTOTYPES
a web 3.0 solution

open integration and standard in the front-end
Official keynote speakers announcement

Tim Berners-Lee

A graduate of Oxford University, Tim Berners-Lee invented the World Wide Web, an internet-based hypertext system, in 1989 while at CERN, the European Particle Physics Laboratory. He is the first web client and server in 1990, HTML were refined as Web technology. He is the Director of the World Wide Web Consortium (W3C), an organization founded in 1994 which he helped to start. He is the author of several books and papers on the topic of the future direction of the World Wide Web. It began in 1994 at CERN and is organized by.

Bernard Stiegler

Bernard Stiegler is a director of IRIF at the University of Paris, a professional fellow at the Centre for Cultural Studies at Goldsmiths College in London, and an associate professor of Technology of Compiegne where he teaches digital philosophy. Before taking up the post at the Pompidou Center, the International College of Philosophy, the University of Paris, and Université National du L’Auditive, then Director of Coordination Acoustique/Musique (ICRANL), he worked for several years at the Pompidou Center as a research assistant.

photo credit: Tony Scarpetta
Read more...

photo credit: Georges Pompidou Center
L’AFP recadrée par le Parlement

Les députés ont voté un texte précisant les missions de l’Agence France Presse. Une mesure imposée par Bruxelles.
Senior Researcher in Informatics and Computer Science
Leader for the Wimmics team at the Research Center of Sophia-Antipolis
General co-chair conference WebMark

twitter: @fabien_gandon
Quote: "He who controls metadata, controls the Semantic Web: a web to link data and knowledge" (O'Reilly)

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Which kind of relation do you have with this person?
- Follows
- Knows
- Acquaintance of
- Apprentice to
- Close friend of
- Collaborates with
- Colleague of
- Employed by

Archive It!

Webmark Editor
- Infos
- Localize
- Socialize
- Synchronize

Webmark it!
Senior Researcher in Informatics and Computer Vision
Leader for the Wimms project at INRIA Sophia-Antipolis (France)
General co-chair of conferences

twitter: @fabien_gandon
Quote: "He who controls metadata controls the Semantic Web: a web to link data"
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Document

société face à ses odeurs. Journée ECRIN de l'Environnement, auditoriu...

Description:
Conférence d'André Holley du Centre Européen du Goût à Dijon, quelques exemples de traitement des odeurs, le témoignage d'un maire et la clôture de la journée par Danièle Manfredi de la DPPR/SEI du MEDD. Le second DVD présente les ateliers : Sait-on identifier, qualifier et quantifier les odeurs ?; Modélisation de la dispersion des odeurs, Aspects santé, la restitution de ces ateliers et une table ronde de synthèse et perspective avec notamment Jean-Claude Oppeneau.
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