A User Profile Modelling Using Social Annotations: a Survey

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Social elements could avoid this disorientation like the social annotations (tags) which become more and more popular and contribute to guide the social user.
Outline

- Social user profile modelling
  - Characteristics of social user
  - Representation of social user
  - Tag-based user profile update
- Tag’s treatment
- Social Recommender systems
- Conclusion and perspectives
Characteristics of social user (1/3)
Characteristics of social user (2/3)

- The creation of social networks provides additional user’s behaviors
- The user is no longer representing the audience, but has become an active contributor for creating the social information

**Actif**
- exchange information
- participate in groups and blogs
- etc.

**Curious**
- compare for a better information
- search for advice
- etc.
Characteristics of social user (3/3)

Social annotations:
- User generated keywords

Popular
Social
Flexible
Outline

- Social user profile modelling
  - Characteristics of social user
  - Representation of social user
    - Vector
    - FOAF Ontology
    - Tag ontology
  - Tag-based user profile update
- Tag’s treatment
- Social Recommender systems
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Representation of social user (1/3)

• **Vector:**
  - Weighted vector for a recommendation purpose or in cross-system context:

\[ u = \langle w(t_1), w(t_2), ..., w(t_k) \rangle \]

*where* \( w(t_k) \) *denotes the weight of tag* \( tk \) *with user* \( u \)
• **FOAF Ontology**
  - Represents the user in social networks
  - Describes relations between users through the element “Knows” through five dimensions:
  - Is used in:
    • Recommender systems
    • Management of the user profile in cross-system context
## Representation of social user (3/3)

### Tag ontology

<table>
<thead>
<tr>
<th>Types</th>
<th>Tag ontology</th>
<th>Meaning of a tag</th>
<th>Social Semantic Cloud of Tags</th>
<th>Common Tag</th>
<th>Nice tag</th>
<th>The Modular Unified Tagging Ontology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namespace</td>
<td>tags:</td>
<td>moat:</td>
<td>scot:</td>
<td>ctag:</td>
<td>nt:</td>
<td>muto:</td>
</tr>
<tr>
<td>Purpose</td>
<td>First formal tagging ontology</td>
<td>:tags extension for semantic tagging</td>
<td>:tags extension for tag clouds</td>
<td>Optimized for RDFa</td>
<td>Tagging as speech acts</td>
<td>Unification, modularization</td>
</tr>
<tr>
<td>Tag</td>
<td>tag</td>
<td>tag</td>
<td>tag</td>
<td>tag</td>
<td>tagAction</td>
<td>hasTag</td>
</tr>
<tr>
<td>Resource</td>
<td>taggedRessource</td>
<td>tagspace</td>
<td>tagged</td>
<td>taggedResource</td>
<td>hasResource</td>
<td></td>
</tr>
<tr>
<td>User</td>
<td>foaf:Agent</td>
<td>foaf:Agent</td>
<td>sioc:user</td>
<td>foaf:maker</td>
<td>sioc:creator</td>
<td>hasUser</td>
</tr>
<tr>
<td>Authors</td>
<td>Newmann et al.</td>
<td>Passant et al.</td>
<td>Kim el al.</td>
<td>Tori el al.</td>
<td>Limpens et al.</td>
<td>Lohmann et al.</td>
</tr>
<tr>
<td>Related vocabulary</td>
<td>FOAF, SKOS, DC</td>
<td>FOAF, SIOC</td>
<td>SIOC, FOAF</td>
<td>FOAF, SIOC</td>
<td>FOAF, SIOC</td>
<td>FOAF, SIOC, SKOS, DCTERMS, MOAT…</td>
</tr>
</tbody>
</table>
Outline

- Social user profile modelling
  - Characteristics of social user
  - Representation of social user
  - Tag-based user profile update
    - In recommendation context
    - In cross system context
- Tag’s treatment
- Social Recommenders systems
- Conclusion and perspectives
Tag-based user profile update (1/3)

- The social user is very active and may be interested in many different subjects for a short time
- The update is considered as an enrichment of the user profile, in which additional information deduced from the user’s behaviour is integrated in his profile
## Tag-based user profile update (2/3)

- **In recommendation context**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>De Meo et al., 2010</strong></td>
<td>- Enrich user profiles by “authoritative” tags, which are tags considered as important</td>
<td>☺ Useful compared to other methods&lt;br&gt;☺ Tags are automatically filtered and ranked at the same time&lt;br&gt;☺ The filtering technique is simple to use and fast</td>
</tr>
<tr>
<td><strong>Kim et al., 2011</strong></td>
<td>- Enrich a user model with collaboration from other similar users&lt;br&gt;- The collaborative user modelling is made through detecting a user’s neighbour and then enriching the user profile through the neighbour’s topics</td>
<td>☺ The method is promising</td>
</tr>
<tr>
<td><strong>Beldjoudi et al., 2011</strong></td>
<td>- Enrich user profiles with relevant resources based on association rules extracted from the social relations&lt;br&gt;- In order to improve the quality of the recommendation, tag ambiguity is detected by finding similar users and resources</td>
<td>☺ This approach deals with a tag’s ambiguity</td>
</tr>
</tbody>
</table>
## Tag-based user profile update (3/3)

- **In cross system context**

<table>
<thead>
<tr>
<th></th>
<th>Technique</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Abel *et al.*, 2011 | - Use semantic user modelling based on Twitter posts to create semantically rich user profiles.  
- This method is graph based. | ☺️ The method deals with the user’s interests through people of interest, topics, event, etc. | ☺️ Do not consider the evolution of a user profile through time |
| Abel *et al.*, 2011 | - Enrich tag-based profiles based on association rules deduced from observation across two systems | ☺️ This approach is a good issue to model a user through his different social profiles, and to enrich this profile with semantic enrichment to decrease a tag’s ambiguity | ☺️ Do not consider the evolution of a user profile through time |
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TAG’S TREATMENT (1/3)

- Tags are elements reflecting user’s opinion:
  - Used by users for many purposes like: contributing and sharing, making an opinion, marking a place for a future search, making attention, etc. (Gupta et al., 2010)

- Tag’s problems:
  - Don’t follow any rules
  - Spam
  - Semantic ambiguity: many words have the same meaning
  - The folksonomy:
    - is very diverse: blog, blogs, blogging
    - have a lack of classification and do not handle synonyms and homonyms
Detecting Spam:

- Georgia Koutrika et al. 2007, define tag spam as:
  - “misleading tags that are generated in order to increase the visibility of some resources or simply to confuse users”
  - Evaluate the impact of tag spam with a unit called SpamFactor

- Wetzker et al., 2008 try to detect spam by:
  - Propose a concept named “diffusion of attention”, which can reduce the influence of spam in tag distribution and without a filtering process
  - Technique which gives a maximum number of tags for each resource and so limits the influence of the user
Tag’s ambiguity:

- By using a tool which can detect: a natural language, synonyms/homonyms, etc. (like WordNet dictionary)
- By classifying tags according to a specific ontology (like Carmagnola et al., 2008):
  - Proposed/free tags
  - Generic/specific tags
  - Synonym tags
  - Contextual tags
  - Subjective tags
  - Organizational tags
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Social Recommender Systems

✓ A recommendation is an adaptation technique:
  ✓ Provide to the user information he needs
  ✓ Avoid disorientation of the user

Reference: Eda Ercan 2010
SOCIAL RECOMMENDER SYSTEMS

<table>
<thead>
<tr>
<th>Tag</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of tag</td>
<td>Representation</td>
</tr>
<tr>
<td>Semantic aspect of tag</td>
<td>Vector</td>
</tr>
<tr>
<td>Filtering tag</td>
<td>Graph</td>
</tr>
<tr>
<td>Other</td>
<td>Static</td>
</tr>
<tr>
<td>Static</td>
<td>Dynamic</td>
</tr>
<tr>
<td>Dynamic</td>
<td>User interest update</td>
</tr>
</tbody>
</table>

- De Meo et al., 2010
- Kim et al., 2011
- Nauerz et al., 2008
- Xu et al., 2011
- Pan et al., 2011
- Carmagnola et al., 2008
- Carmagnola et al., 2011
- Huang et al., 2010

Reflects how much a tag is important, helps detect tag's ambiguity, eliminates inappropriate tags.

Knowing the user's interest as they change over time includes the tagging behaviour.
CONCLUSION AND PERSPECTIVES

• Social user:
  ▫ Characteristics
  ▫ Representation of tag-based profile
    • Techniques and ontology
  ▫ Techniques for update in:
    • Recommendation context
    • Cross-system context

• Social annotations:
  ▫ Limits & Solutions

• The study of a tag-based profile in a social recommendation systems
• Construct a tag-based profile which takes into consideration:
  ▫ The weight of tags
  ▫ The semantic aspect of tags
  ▫ The filtering of tags
  ▫ The static and dynamic aspect of user profile representation

• Gather information from the FOAF user’s profile and the tags assigned by the user:
  ▫ Semantic analysis and distance

• Update of the user’s interest should take into considerations:
  ▫ The social behavior of the user including his tagging behavior
  ▫ Social elements like “similar” users

• Resolve the tag’s ambiguity problem through a semantic way, by:
  ▫ Extracting meaningful tags
  ▫ Filtering the insignificant ones
Thanks for your attention

...Questions?

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Bibliography

- EDA ERCAN, PROBABILISTIC MATRIX FACTORIZATION BASED COLLABORATIVE FILTERING WITH IMPLICIT TRUST DERIVED FROM REVIEW RATINGS INFORMATION. Doctoral Thesis of MIDDLE EAST TECHNICAL UNIVERSITY. SEPTEMBER 2010