

Introducing Groups to an Annotation System

Amjad Hawash

hawash@di.uniroma1.it

Supervised by:

Prof. Paolo Bottoni

bottoni@di.uniroma1.it

DIPARTIMENTO
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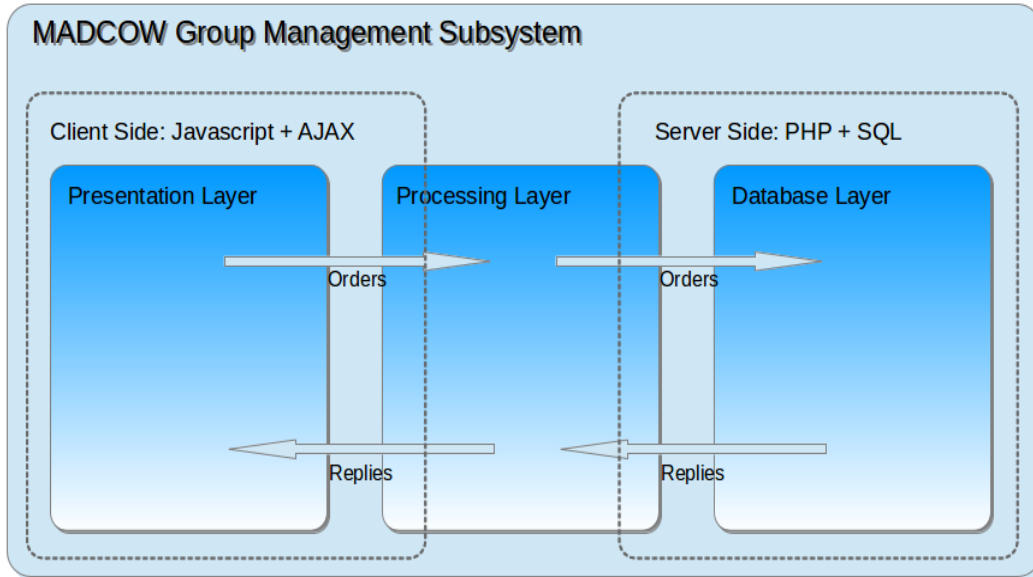
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Web Annotation: What is it?

- Associating informative data (annotations) with web resources.
- Annotations could be: text or links to multimedia documents (attachments).
- Web resources could be: text, image or video.

MADCOW Project: Architecture and services



- Multimedia Annotation of Digital Content Over the Web.

(<http://www.web-annotations.com>)

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Annotations

comment
Interesting Subject.

Tags : cloud, Database

Groups : Database Material, Database Homeworks

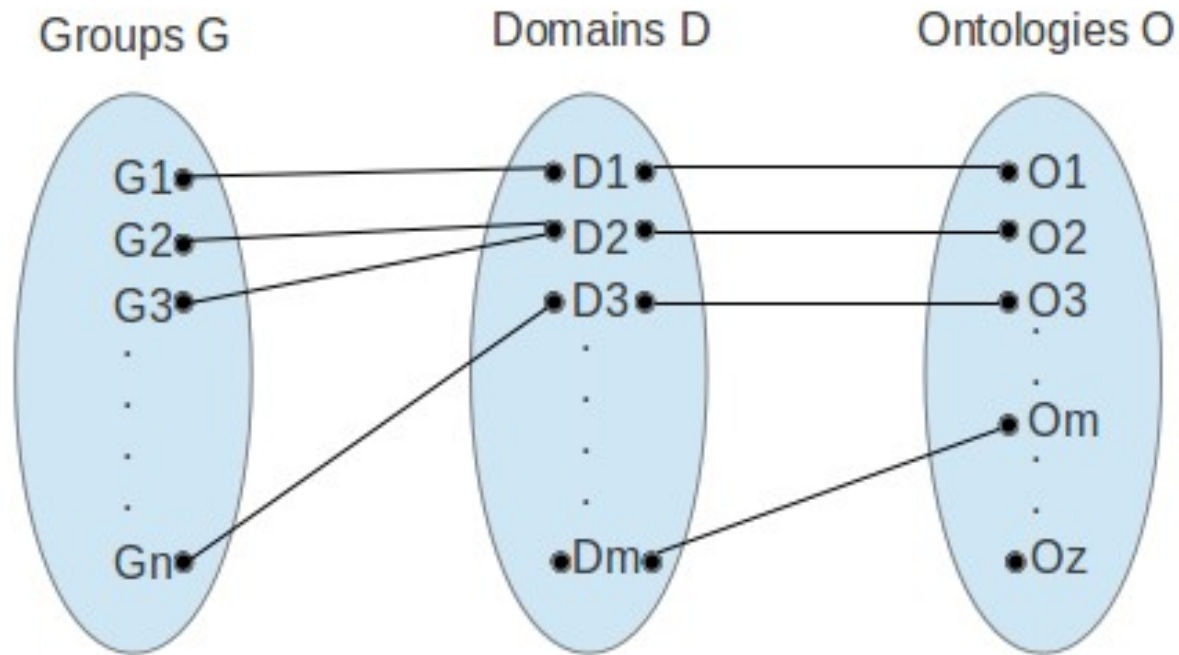
Groups Join: Problem & Solution

- **Problem: Manual Groups Join** (Time, Effort, Irrelevance).
- **Solution: Groups-Users Matching**
 - **Ontology-based:**
 - **Class Match Measure:** amount of ontology coverage for a term.
 - **Degree Centrality (Social Networks Analysis):** quantifies the importance of a concept in an ontology with respect to its number of connections.
 - **URL-Matching.**

Ontology-Based Matching:

Groups-Domain-Ontology Association

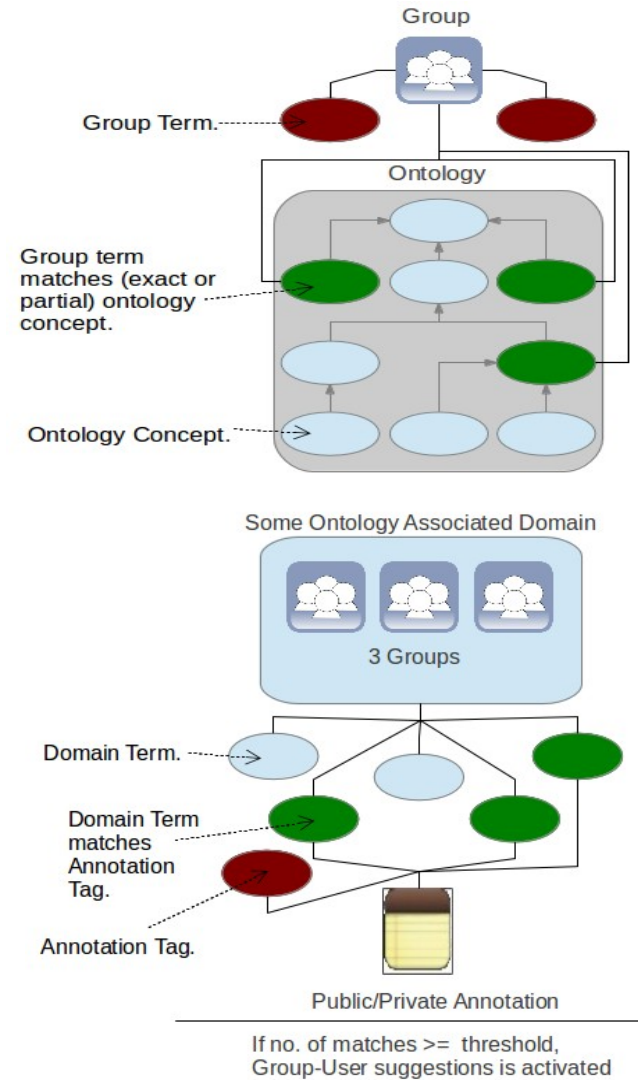
- Domain-Ontology.
- Domain-Group.



Ontology-Based Matching: Class Match & Degree Centrality Measures

- Group-Domains Suggestions.
- Group-Users Suggestions.
- User-Groups Suggestions.

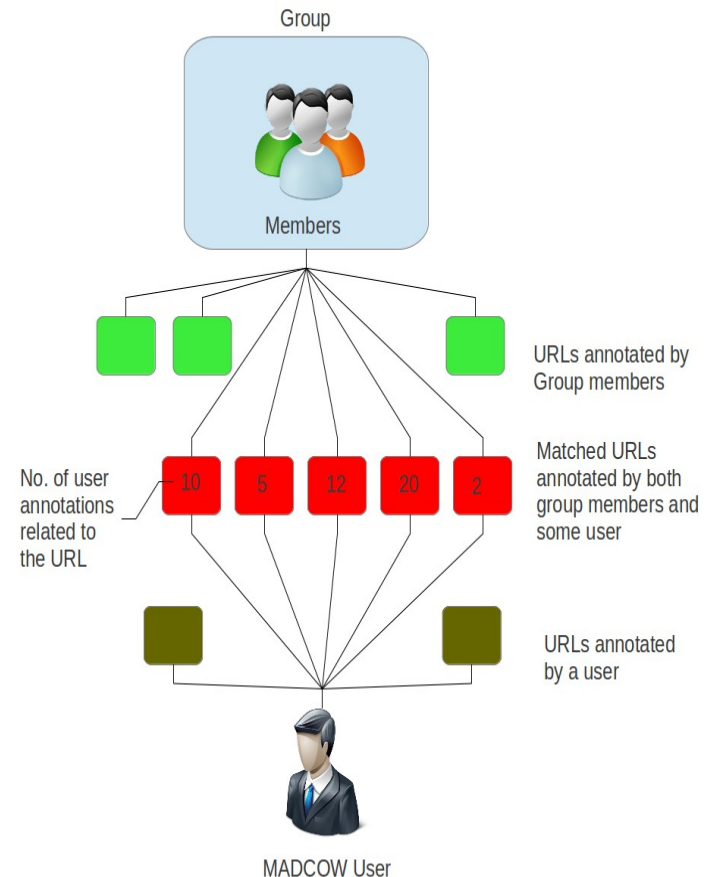
- Avola, D.; Bottoni, P.; Hawash, A., "Using ontologies for users-groups matching in an annotation system," Computer Science and Information Technology (CSIT), 2013 5th International Conference on , vol., no., pp.38,44, 27-28 March 2013 doi: 10.1109/CSIT.2013.6588755



URL-Based Matching

- Matching the URLs annotated by both group members and non-group users.

Set of URLs annotated by the user



Experimental Tests: Introducing Groups (Collaboration, Groups' Services & Operations)

- Increased Collaboration (public 3.2, Group 5.3).
- Emerge of Invitation Time & Effort Problems.

| | Create | Update | Invite | Join |
|----------------|--------|--------|--------|------|
| # of times | 72 | 51 | 719 | 125 |
| Average (sec.) | 37.3 | 15.9 | 99.25 | 5.6 |

- Avola, D.; Bottoni, P.; Hawash, A., "Group Management in an Annotation System", "Journal of Visual Languages and Computing", 2013. (2nd round of review).

Experimental Tests: Time Reduction

- **Ontology Repository: 6 different Ontologies**
(Animals, Plants, viruses, AI, Finance, Vehicles).
- **Average invitation duration is decreased from 99.25 to 10.6 seconds.**

- Hawash, A. 2013. "Introducing Groups to an Annotation System", CHIItaly2013, Trento/Italy, August. Trento. (Doctoral Consortium).
- Avola, D., Bottoni, P. and Hawash, A. 2013. "Groups-Users Matching in an Annotation System Using Ontologies (Class Match Measure)", CHIItaly2013, Trento/Italy, August. Trento. (Poster).
- Avola, D.; Bottoni, P.; Hawash, A., "Users-Groups Matching in an Annotation System: Ontological and URL Relevance Measures," Computer Science and Information Technology (CSIT), 2014 6th International Conference. Jordan/Amman.

Experimental Tests: Enhanced Matching Results

- Creating dedicated ontologies (graphs) from BabelNet (<http://www.babelnet.org>).
- DC is preferred to CMM.

Experimental Tests: Enhanced Matching Results

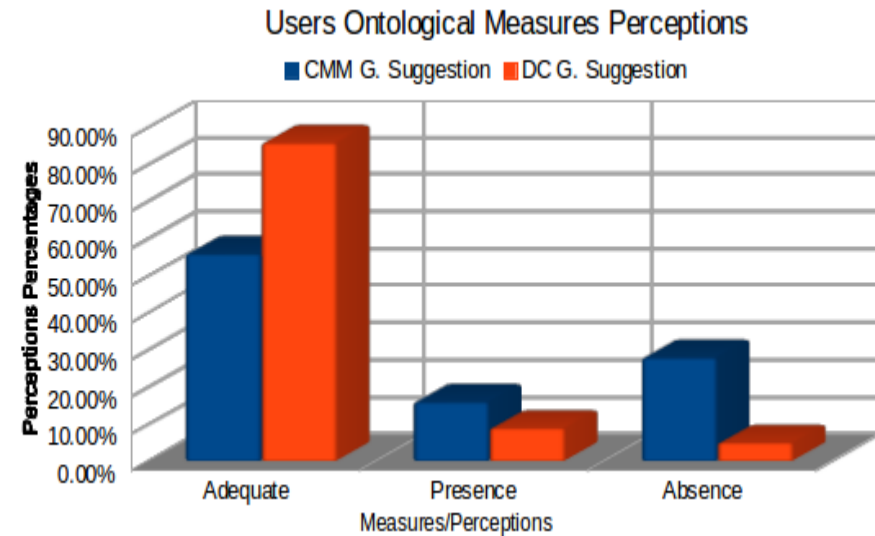
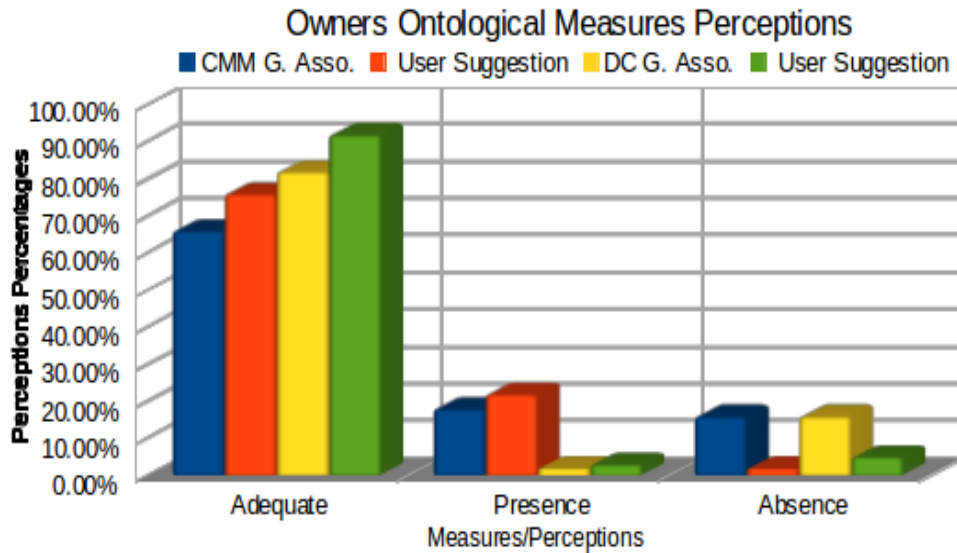
| | | <i>Adequate</i> | <i>Presence</i> | <i>Absence</i> |
|------------|------------------------------|-----------------|-----------------|----------------|
| CMM | <i>G. Asso.</i> | 66% | 18% | 16% |
| | <i>M. Suggestion</i> | 76% | 22% | 2% |
| DC | <i>G. Asso.</i> | 82% | 2% | 16% |
| | <i>M. Suggestion</i> | 92% | 3% | 5% |
| URL | <i>Needed (M. Sugg.)</i> | 80% | | |
| | <i>Not needed (M. Sugg.)</i> | 20% | | |

Table 1. Owners' assessment of measures.

| | <i>Adequate</i> | <i>Presence</i> | <i>Absence</i> |
|--------------------------|-------------------|-----------------|----------------|
| CMM G. Suggestion | 56% | 16% | 28% |
| DC G. Suggestion | 86% | 9% | 5% |
| URL G. Suggestion | <i>Needed</i> | 72% | |
| | <i>Not needed</i> | 28% | |

Table 2. Members' assessment of measures.

Experimental Tests: Enhanced Matching Results



Experimental Tests: Enhanced Matching Results

| | <i>Asso.</i> | <i>Users Sugg.</i> | <i>Groups Sugg.</i> |
|------------|--------------|--------------------|---------------------|
| <i>CMM</i> | 52%, 24% | 20%, 30% | 45%, 15% |
| <i>DC</i> | 75%, 25% | 66%, 16% | 75%, 14% |
| <i>URL</i> | | 80%, 10% | 50%, 16% |

Table 3. 1st and 2nd selections.

- Avola, D.; Bottoni, P.; Hawash, A., "Relevance Measures for the Creation Groups in an Annotation System," DMS2014, Pittsburgh, USA, 27 - 29 August, 2014

Future Works

- Studying better matching threshold.
- Try other matching measurements like: Term Frequency–Inverse Document Frequency.
- Try Harmonic Distance.
- Multiple Domain Association.
- Enhancing Groups and Users Ranking by Fuzzy Logic (why?).

References

1. P. Bottoni, R. Civica, S. Levialdi, L. Orso, E. Panizzi, and R. Trinchese, "MADCOW: a multimedia digital annotation system," in Proc. AVI'04. ACM, 2004, pp. 55–62.
2. D. Avola, P. Bottoni, and R. Genzone, "Light-weight composition of personal documents from distributed information," in Proc. IS-EUD 2011, ser. LNCS. Springer, 2011, vol. 6654, pp. 221–226.
3. R. Heck, S. Luebke, and C. Obermark, "A Survey of Web Annotation Systems," 2008. [Online]. Available: [http://www.math.grin.edu/rebelsky/Blazers/Annotations/Summer1999/Papers/survey paper.html](http://www.math.grin.edu/rebelsky/Blazers/Annotations/Summer1999/Papers/survey%20paper.html)
4. D. Barger, J. Grudin, A. Gupta, E. Sanocki, F. Li, and S. Leetiernan, "Asynchronous collaboration around multimedia applied to on-demand education," J. Manage. Inf. Syst., vol. 18, no. 4, pp. 117–145, Mar. 2002.
5. A. Sakar and G. Ercetin, "Effectiveness of hypermedia annotations for foreign language reading," J. of Computer Assisted Learning, vol. 21, no. 1, pp. 28–38, 2005.
6. Y.-S. Lai, H.-H. Tsai, and P.-T. Yu, "Integrating annotations into a dual-slide powerpoint presentation for classroom learning." Educational Technology & Society, vol. 14, no. 2, pp. 43–57, 2011.
7. D. Avola, P. Bottoni, M. Laureti, S. Levialdi, and E. Panizzi, "Managing groups and group annotations in MADCOW," in Proc. DNIS 2010, ser. LNCS, vol. 5999, 2010, pp. 194–209.
8. C. Brewster, K. O'Hara, S. Fuller, Y. Wilks, E. Franconi, M. A. Musen, J. Ellman, and S. B. Shum, "Knowledge representation with ontologies: The present and future," IEEE Intelligent Systems, pp. 72–81, January 2004.
9. B. Chandrasekaran, J. R. Josephson, and V. Benjamins, "What are ontologies, and why do we need them?" IEEE Intelligent Systems, vol. 14, no. 1, pp. 20–26, Jan. 1999.
10. R. Gil, A. Borges, and L. Contreras, "Shared ontologies to increase systems interoperability in university institutions," in Proc. IMCSIT 2007, 2007, pp. 799–808.

References

11. D. Vallet, M. Fernández, and P. Castells, “An ontology-based information retrieval model,” in Proc. ESWC 2005. Springer, 2005, pp. 455–470.
12. Y. Zhang, W. Vasconcelos, and D. Sleeman, “Ontosearch: An ontology search engine,” in Research and Development in Intelligent Systems XXI, M. Bramer, F. Coenen, and T. Allen, Eds. Springer London, 2005, pp. 58–69.
13. RDF Working Group, “RDF/XML Syntax Specification (Revised),” <http://www.w3.org/TR/2004/REC-rdfsyntax-grammar-20040210/>, OMG, Tech. Rep., 2004.
14. OWL Working Group, “OWL Web Ontology Language,” <http://www.w3.org/TR/2004/REC-owl-guide-20040210/>, OMG, Tech. Rep., 2004.
15. H. Alani, C. Brewster, and N. Shadbolt, “Ranking ontologies with aktiverank,” in Proc. ISWC’06. Springer, 2006, pp. 5–9.
16. J. Paralic and I. Kostial, “Ontology-based information retrieval,” in Proc. IIS 2003, 2003, pp. 23–28.
17. R. Braga, C. Werner, and M. Mattoso, “Using ontologies for domain information retrieval,” in Proc. DEXA 2000, 2000, pp. 836–840.
18. C. Patel, J. Cimino, J. Dolby, A. Fokoue, A. Kalyanpur, A. Kershenbaum, L. Ma, E. Schonberg, and K. Srinivas, “Matching patient records to clinical trials using ontologies,” in Proc. ISWC’07/ASWC’07. Springer, 2007, pp. 816–829.
19. S. Park, W. Kim, S. Lee, and S. Bang, “Product matching through ontology mapping in comparison shopping,” in Proc. iiWAS 2006, ser. books@ocg.at, vol. 214. Austrian Computer Society, 2006, pp. 39–49.
20. H. Tangmunarunkit, S. Decker, and C. Kesselman, “Ontology-based resource matching in the grid – the grid meets the semantic web,” in Proc. ISWC 2003, ser. LNCS, vol. 2870, 2003, pp. 706–721.

References

21. M. Fazel-Zarandi and M. Fox, "Reasoning about skills and competencies," in CProc. PRO-VE 2010, ser. IFIP AICT. Springer, 2010, vol. 336, pp. 372–379.
22. I. Cantador, P. Castells, D. Vallet, and E. Poltznica, "Enriching group profiles with ontologies for knowledgedriven collaborative content retrieval," in Proc. STICA 2006 at WETICE 2006, 2006, pp. 358–363.
23. V. Cordì, P. Lombardi, M. Martelli, and V. Mascardi, "An ontology-based similarity between sets of concepts," in Proc. WOA 2005. Pitagora Editrice, 2005, pp. 16–21.
24. Y. Li, D. Mclean, Z. Bandar, J. O'Shea, and K. Crockett, "Sentence similarity based on semantic nets and corpus statistics," Knowledge and Data Engineering, IEEE Transactions on, vol. 18, no. 8, pp. 1138–1150, 2006.
25. S. K. Rhee, J. Lee, and M. Park, "M.W.: Ontology-based semantic relevance measure," in Proc. 1st Int. Wks. On Semantic Web and Web 2.0 in Architectural, Product and Engineering Design, 2007.
26. I. Trestian, S. Ranjan, A. Kuzmanovic, and A. Nucci, "Measuring serendipity: connecting people, locations and interests in a mobile 3G network," in Proc. IMC'09. ACM, 2009, pp. 267–279.
27. D. Avola, P. Bottoni, and A. Hawash, "Using ontologies for users-groups matching in an annotation system," in Proc. CSIT 2013, 2013, pp. 38–44.
28. A. Hawash, "Introducing groups to an annotation system," in Proc. CHIItaly2013, vol. 1065, 2013, pp. 43–54.
29. P. Velardi, S. Faralli, and R. Navigli, "OntoLearn reloaded: A graph-based algorithm for taxonomy induction," Computational Linguistics, vol. 39(3), 2013.
30. P. Atzeni, S. Paolozzi, and P. D. Nostro, "Ontologies and databases: Going back and forth," in Proc. ODBIS 2008, 2008, pp. 9–16.