GroupMe! – Where Information Meets

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ABSTRACT

This paper presents the GroupMe! system, a resource sharing system with advanced tagging functionality. GroupMe! provides a novel user interface, which enables users to organize and arrange arbitrary Web resources into groups. The content of such groups can be overlooked and inspected immediately as resources are visualized in a multimedia-based fashion. In this paper, we furthermore introduce new folksonomy-based ranking strategies that exploit the group structure shipped with GroupMe! folksonomies. Experiments show that those strategies significantly improve the performance of such ranking algorithms.

Categories and Subject Descriptors

H.4.m [**Information Systems**]: Miscellaneous; H.5.3 [**Information Systems**]: Information interfaces and presentation (e.g., HCI)Group and Organization Interfaces; D.2.8 [**Software Engineering**]: Metrics—*complexity measures, performance measures*

General Terms

Social Search

Keywords

Social Media, Search, Ranking, Folksonomies, GroupMe!

1. INTRODUCTION

Popular Web 2.0 systems like Flickr, del.icio.us, Blogger or others, which allow users to share photos, broadcast links, or blog about topics they are interested in, illustrate a paradigm shift in today's Web systems. Instead of putting users in the role of pure *content consumers*, these systems enable people to create and share content easily, and encourage their creativity.

The *tagging* activity – assigning freely chosen keywords to resources of interest – is one of the important characteristics of these systems. The result of a single tagging activity is a binding between a user, a resource, and the respective keywords that this user assumes relevant for the resource. The evolving set of such *user-tag-resource* bindings is called a folksonomy[1].

[1]http://vanderwal.net/folksonomy.html

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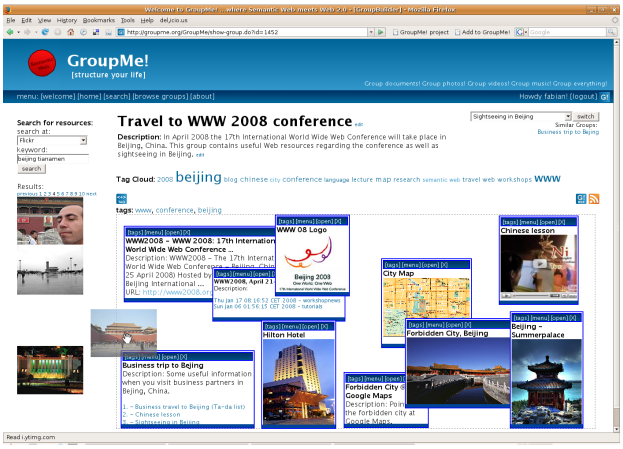

Figure 1: Screenshot of the GroupMe! system: Creating a group of multimedia Web resources via drag & drop.

The so-far developed folksonomy systems have in common that the set of user-tag-resource bindings is hardly structured any further. Del.icio.us allows to structure tags by grouping them into so-called *bundles*, and CiteULike[2] allows to structure users by the formation of user groups. Nobody so far has investigated on the effect of structuring the resource dimension in folksonomies. Bao et al. have revealed that pure folksonomy-based ranking strategies have potential to improve Web search [2].

In this paper, we present GroupMe!, a novel Web 2.0 application, which enables users via an intuitive user interface to create groups of arbitrary Web resources. We propose strategies to exploit the evolving group structures for ranking algorithms, and show that they improve performance of existing approaches significantly.

2. GROUPME! TAGGING SYSTEM

GroupMe![3] is a new kind of resource sharing system, which provides an enjoyable easy-to-use interface to create groups of multimedia Web resources. Content of such groups can be grasped immediately because resources are visualized according to their media type, e.g. pictures are displayed as thumbnails, videos can be played directly within the group, and RSS feeds are previewed by displaying recent headlines. GroupMe! users can either create groups while browsing the web (via bookmarklet), or they use integrated search engines

[2]http://citeulike.org
[3]http://groupme.org

	Strategy	OSim	KSim
(i)	C + Full Tag Propagation	0.610	0.369
(ii)	B + Group Tag Propagation	0.585	0.368
(iii)	B	0.580	0.375
(iv)	C + Group Tag Propagation	0.540	0.351
(v)	B + Full Tag Propagation	0.465	0.273
(vi)	A	0.405	0.255
(vii)	C	0.390	0.257
(viii)	A + Group Tag Propagation	0.360	0.237
(ix)	A + Full Tag Propagation	0.345	0.247

Table 1: Overview of OSim and KSim for different ranking strategies ordered by OSim, where the dampen factor for propagating tags is 0.2.

like Flickr or Google to search for content that they like to add to a group. Figure 1 shows the latter approach, where the user adds a Flickr image via drag & drop into his group about the "Travel to WWW 2008 conference". The group bundles valuable resources for the travel, like the website and blog of the conference, a video tutorial about Chinese language, photos of the hotel, or another related GroupMe! group.

The content of each GroupMe! group as well as RDF data, which is extracted from the data origin whenever a new Web resource is added to a group, is made available via RDF and RSS feeds, and RESTful client API. GroupMe! is a *free-for-all tagging system*[5], which allows users to annotate both, resources and groups. Tagging resources is always done in context of a certain group. This group context gains new relations between entities of the GroupMe! folksonomy, which consists of *user-tag-resource-group* bindings, e.g. the group's tags are likely to be relevant for the members of the group, and vice versa. Such new relations enable advanced folksonomy-based ranking strategies.

3. ADVANCED RANKING STRATEGIES

Our main motivation is to analyze the effect of group structures on the quality of ranking algorithms. Therefore, we base our ranking strategies on the FolkRank algorithm [4]. FolkRank transforms the hypergraph spanned by the user-tag-resource bindings into a weighted tripartite graph $\mathbb{G}_{\mathbb{F}}$, where an edge connects two entities (user, tag, or resource) if both entities occur together at a tag assignment within the folksonomy, and the weight of an edge corresponds to the amount of their cooccurences. $\mathbb{G}_{\mathbb{F}}$ serves as input for an adapted PageRank algorithm, in which the random surfer component is biased via a preference vector (e.g. preference in a certain tag). The adapted PageRank is applied twice, without ($\vec{w}_0$) and with ($\vec{w}_1$) influence of the preferences. $\vec{w} = \vec{w}_1 - \vec{w}_0$ is the final weight vector and $\vec{w}[x]$ denotes the *FolkRank* of $x \in V$.

By finding ways to exploit the group structure for ranking algorithms we confine ourself on adapting the process of constructing the graph $\mathbb{G}_{\mathbb{F}}$ from the 4-uniform hypergraph spanned by the GroupMe! tag assignments (user-tag-resource-group bindings). We propose three main strategies. Those strategies transform a GroupMe! tag assignment (u, t, r, g) into...

A. Normal FolkRank: traditional tag assignments (u, t, r).

B. Groups as Tags: two traditional tag assignments (u, t, r) and (u, t_g, r), where t_g is an artificial tag introduced for each group.

C. Group Context-based Tags: one tag assignment (u, t_{tg}, r), where t_{tg} is an artificial tag that is composed of the actual tag t and the group context g.

Furthermore, we introduce two additional approaches that can be applied to the strategies above: (i) *Group Tag Propagation* effects that tags, which are assigned to a group g, are propagated to the resources contained in g, and (ii) *Full Tag Propagation* causes that also the resources propagate their tags to other resources within the group and to the group itself. For both extensions the influence of the propagated tags can be adjusted via a dampen factor $d \in [0..1]$, where $d = 1$ means that there is made no distinction between user-given and propagated tag assignments.

For the evaluations of the proposed group-aware ranking strategies we concentrated on ranking of resources and groups, and use the *OSim* and *KSim* metrics as proposed in [3] in order to measure the quality of the ranking strategies with respect to hand-selected rankings, which base on experts votes. OSim measures the overlap between two ranking, whereas KSim determines the degree of pairwise distinct resources that have the same relative order in both rankings. As input for the algorithms we used a snapshot of the GroupMe! data set, which consists of 235 users, 978 tags, 1351 resources, 273 groups, and 1758 tag assignments.

Table 1 overviews the measurement results. Regarding OSim *and* KSim, strategies (i)-(v) perform better than strategies (vi-xi), where (vi) represents the normal FolkRank algorithm, which does not take the group context into account. Detailed analysis of the results (see [1]) prove that, e.g. the strategy "B. Groups as Tags" improves OSim and KSim significantly – tested with a one-tailed t-Test and a significance level of $\alpha = 0.05$.

4. CONCLUSIONS

With our evaluation, we have proven that the grouping of resources significantly improves the quality of search in folksonomies. The grouping activity itself brings many advantages for users: they can organize resources of interest, they can overlook and inspect a group's content, or they can share groups with fellow users. Furthermore, the drag & drop metaphor realized in the GroupMe! system makes the grouping activity intuitive for users. Thus, while grouping is an easy and well-received feature for folksonomies, this activity provides, on the technical side, valuable information to detect relevant resources, and to improve the quality of search.

5. REFERENCES

[1] F. Abel, N. Henze, and D. Krause. On the effect of Group Structures on Ranking Strategies in Folksonomies. Technical report, L3S, January 2008.

[2] S. Bao, G. Xue, X. Wu, Y. Yu, B. Fei, and Z. Su. Optimizing web search using social annotations. In *Proc. WWW '07*, pages 501–510, New York, NY, USA, 2007. ACM Press.

[3] T. H. Haveliwala. Topic-sensitive pagerank: A context-sensitive ranking algorithm for web search. *IEEE Transactions on Knowledge and Data Engineering*, 15(4):784–796, 2003.

[4] A. Hotho, R. Jäschke, C. Schmitz, and G. Stumme. FolkRank: A ranking algorithm for folksonomies. In *Proc. FGIR 2006*, 2006.

[5] C. Marlow, M. Naaman, D. Boyd, and M. Davis. HT06, tagging paper, taxonomy, flickr, academic article, to read. In *Proc. HYPERTEXT '06*, pages 31–40, New York, NY, USA, 2006. ACM Press.