Multi-faceted Tagging in TagMe!

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ABSTRACT

In this paper we present TagMe!, a tagging and exploration front-end for Flickr images, which enables users to add categories to tag assignments and to attach tag assignments to a specific area within an image. We analyze the differences between tags and categories and show how both facets can be applied to learn semantic relations between concepts referenced by tags and categories. Further, we discuss how the multi-faceted tagging helps to improve the retrieval of folksonomy entities. The TagMe! system is currently available at http://tagme.groupme.org

Categories and Subject Descriptors

H.4.m [**Information Systems**]: Miscellaneous

Keywords

Faceted Tagging, Learning Semantics

1. INTRODUCTION

Tagging systems like Flickr or Delicious organize and search large item collections by utilizing the Web 2.0 phenomena: Users attach tags to resources and thereby create valuable metadata. However, especially for images, traditional tag assignments are not sufficient because—although assigned to the whole image—they often just describe specific parts of an image or they are ambiguous. For disambiguation, approaches like MOAT [2] exist, which support users to attach URIs describing the meaning of a tag to a particular tag assignment analogously to semantic tagging in Faviki[1]. A more sophisticated approach, which exploits Wikipedia and WordNet to detect the meaning of tags, is presented in [1].

In this paper, we present TagMe!, which maps tags to DBpedia[2] URIs and extends traditional tag assignments by new tagging facets: So-called *area tags* enable users to tag a specific part of an image and a *category* dimension is offered to categorize tag assignments. In the evaluation we show that users appreciate the new tagging features and illustrate how the facets can be exploited to improve search and learn semantics among tags and categories.

2. TAGGING FACETS IN TAGME!

TagMe! is an online image tagging system where users can assign tags to pictures available in Flickr. Users can directly import pictures from their own Flickr account or utilize the Flickr search interface. If users tag their own images in TagMe! then the tags are propagated to Flickr as well. Moreover, TagMe! maps DBpedia URIs to tag assignments by simply selecting the most prominent URI returned by the DBpedia lookup service[3] for a given tag. The mappings of this naive approach, which results in a precision of more than 75%, are finally completed by hand. The metadata created in TagMe! is made available according to the principles of Linked Data using the MOAT ontology[4] and Tag ontology[5] as primary schemata.

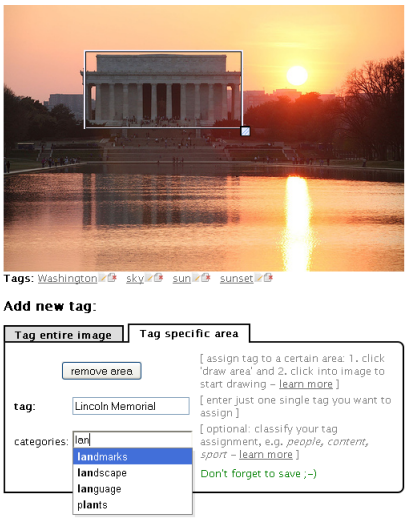
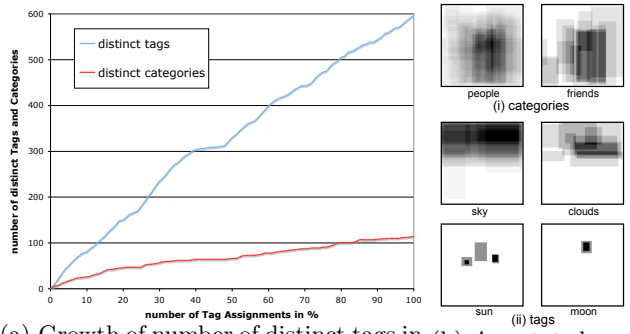


Figure 1: User tags an area within an image and categorizes the tag assignment with support of the TagMe! system.

TagMe! extends the Flickr tagging functionality in two further facets, specifically *categories* and *area tags*. For each tag assignment the user can enter one or more categories that classify the annotation. While typing in a category, the users get auto-completion suggestions from the pre-existing categories of the user community (see bottom in Figure 1). TagMe! users can immediately benefit from the categories as it provides a faceted search interface that allows to refine

[1]http://faviki.com
[2]http://dbpedia.org
[3]http://lookup.dbpedia.org
[4]http://moat-project.org/ns
[5]http://www.holygoat.co.uk/projects/tags



(a) Growth of number of distinct tags in comparison to distinct categories.

(b) Annotated areas.

Figure 2: Annotation behavior in TagMe!

tag-based search activities by category (and vice versa). Additionally, users are enabled to attach a tag assignment to a specific area, which they can draw within the picture (see rectangle within the photo in Figure 1) similarly to *notes* in Flickr or annotations in LabelMe[6]. When tagging, people usually only tag the main content of the picture, giving less or almost none importance to supplementary scenery images. Area tags motivate the users to do so adding significant semantic value to each annotated image. While the area tags add an enjoyable visible feature for highlighting specific areas of an image and sharing the link to such areas with friends, we consider them as highly valuable to improve search by detecting tag correlations.

3. ANALYSIS AND BENEFITS OF TAGME!

An analysis of the TagMe! data set reveals that the users appreciate the multi-faceted tagging in TagMe! as 874 of the 1295 tag assignments, which were performed within the three weeks after the launch of the system, were categorized and 645 times the users assigned a tag to a specific area within a picture. Figure 2(a) shows the evolution of the number of distinct tags and categories: Although categories can freely be entered like tags, they grow much less than tags. Further, only 31 of the 79 distinct categories (e.g., "car" or "sea") have also been used as tags, which means that users seem to use different kinds of concepts for categories and tags respectively.

The TagMe! system supports users in assigning categories by means of auto-completion (see Figure 1). During our evaluation we divided the users into two groups: 50% of the users (*group A*) got only those categories as suggestion, which they themselves used before, while the other 50% of the users (*group B*) got categories as suggestions, which were created by themselves or by another user within their group. This small difference in the functionality had a big impact on the alignment of the categories. The number of distinct categories in group A was growing 61.94% stronger than in group B. Hence, the vocabulary of the categories can be aligned much better if categories, which have been applied by other users, are provided as recommendations as well.

Categories can be differentiated according to their usage. For example, some categories have never or very seldomly been used when a specific area of an image was tagged (e.g., "time", "location", or "art") while others have been applied almost only for tagging a specific area (e.g., "people", "animals", or "things"). The areas, can moreover be used to learn relations among categories and tags. Figure 2(b) shows (i) the areas that have been annotated whenever the categories "people" and "friends" have been used (the darker an area the more tags have been assigned to that area). As the areas that have been tagged in both categories strongly correlate and as category "people" was used more often than category "friends" one can deduce that "friends" is possibly a *sub-category* of "people" even if both categories would never co-occur at the same resource. Relations between tags can also deduced by analyzing the tagged areas. Figure 2(b) shows (ii) the areas that were tagged with "sky", "clouds", "sun", and "moon"[7] and via the size and position of the area it is possible to learn that an entity *is part of* or *contained in* another entity (e.g., "sun, moon, and clouds are contained in sky"). The learned relations among tags and categories are moreover used to learn and refine relations between URIs (ontology concepts) as TagMe! maps tags and categories to DBpedia URIs.

The two tagging facets that are applied in TagMe! also have a positive impact on the retrieval of folksonomy entities such as searching for resources or receiving tag recommendations as it can exploit more facets to detect correlations between the entities. For example, tag recommendations are usually based on tag co-occurrence, e.g. if different tags are often assigned to same resources then they can be considered as *tag pair* and whenever one of the tags occurs at some resource it is likely that the other tag is relevant for that resource as well. By exploiting the category facet, TagMe! can increase the number of such tag pairs by 367%. Further, the category dimension has potential to compute the similarity of two tags more precisely, e.g. in addition to the (relative) number of times two tags occur at same resources one can consider the (relative) number of times these tags have been used in the same category. The areas of tag assignments can be exploited similarly to refine the correlations between tags. The analysis of the size, position, and overlap of areas moreover promises to improve the quality of search and ranking.

4. CONCLUSIONS

In this paper we discussed multi-faceted tagging in the TagMe! system. TagMe! is a Semantic Web powered tagging and exploration interface for Flickr and enables users to (1) categorize their tag assignments and (2) attach tag assignments to a specific area within an image. Our analysis reveal that both facets can be exploited to automatically learn new relations among tags and categories and therewith also among the corresponding ontology concepts. The new tagging facets give the users new means to navigate through images and further allow for advanced search and ranking algorithms.

5. REFERENCES

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[2] A. Passant and P. Laublet. Meaning Of A Tag: A collaborative approach to bridge the gap between tagging and Linked Data. In *Proceedings of the WWW 2008 Workshop Linked Data on the Web (LDOW2008), Beijing, China*, Apr 2008.

[6]http://labelme.csail.mit.edu

[7]The visualizations are based on 25 ("sky"), 10 ("clouds"), 6 ("sun"), and 2 ("moon") tag assignments respectively.