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Experts vs. novices tagging behavior: an exploratory analysis

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Abstract

The universe of knowledge is not exclusively put in order by professionals any more. Traditional expert-oriented approaches are supplemented by organically-evolving user-generated approaches known as folksonomies. Their potentials (and disadvantages) as a new form of knowledge organization needs to be critically evaluated and scrutinized. This paper will review the notion of organization of information in contemporary information environments and contribute to findings and research data on tagging and folksonomies. The authors present results of a study in tagging behavior of an expert and novice group of users. By conducting the research on the student population two questions are being explored: a) what are specific differences in tagging behavior between experts and novices, and b) is the expertise acquired by students through course credits enough to create a significant difference in regard to the novice group with no formal education in the area. Differences of the two user groups in tag assignment are being analyzed with regard to tag number and distribution, both by using descriptive statistic and by introducing the tag efficiency measure. The results have shown that different efficiency levels in tag assignment between the two groups indicating that users with more knowledge and expertise could create folksonomies of higher quality.

Keywords: folksonomies; tagging; tag efficiency; tagging behavior

1. Introduction

The process of describing and accessing online information today mostly relies on different search engine algorithms and their automatic indexing methods derived from page content and structure. The access is then enabled through a web interface that allows keyword or phrase searching that connects the user need with the

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relevant results. The main paradigm of information searching is Google, a web search engine that has managed to ensure relevant search results without the need for user assistance in describing the online content. Apart from search engines, user generated keywords have also emerged as an alternative method in describing online sources where users associate terms (*tags*) to information objects thus enabling keyword based classification [1]. The use of tags can generate a "folksonomy" ("folk taxonomy"), a bottom-up, socially-generated classification that differs from the traditional top-down method of organization [2]. Although tagging can be understood as a method of indexing, according to Peters [3], folksonomies represent a "weak" method of knowledge representation because they don't have means to express semantic relations as traditional methods of knowledge representation such as classifications, thesauri or ontologies have. Thus, unlike metadata assigned by authors, or by professional indexers in libraries, user tags are much more subjective, reflecting the end-user's personal understanding of the content. [4]. Considering these limitations of the structure of folksonomies, the expertise of an individual tagger can be a decisive factor in creating folksonomies of higher quality, i.e. those that represent the described concepts of an information object most consistently. Although there are number of researches on folksonomies either investigating motivations and cognitive levels or taggers by analyzing relationship between the resource and the tagger [3] or researches conducted on large tag corpuses where different communities are analyzed on tag frequency, distribution, tag categories, etc. ([5][6][7]), the difference between expert and novice taggers was not in the focus of many researchers. This research aims to contribute to the field by examining the differences in tagging behavior between users with knowledge in the subject field and indexing rules (experts) opposed to those that have no such skills (novices). The main question explored is: "Can users, with more knowledge and expertise, create folksonomies of higher quality when dealing with an academic text."

2. **Research**

In this article we are presenting a study on a student population where two groups of users are compared on the quality of created folksonomies. The first, "expert group" consisted of graduate students with previous knowledge in both indexing methods (through course credits in courses regarding controlled vocabularies, subject indexing, knowledge organization and specifically folksonomies as a new form of organizing information).. The second group called "novices" was selected from first year students who had no earlier knowledge on the topic or the process of assigning quality keywords. Two main questions are explored: a) is the expertise acquired by students through course credits enough to create a significant difference compared to the novice group with no formal education in the area and b) what are specific differences in tagging behavior between the expert and novice group. For the purpose of the study, a scientific paper from the field of Information Science acquired through the ScienceDirect database was selected (Available at http://www.sciencedirect.com/science/article/pii/S1096751608000183). The paper had a total of 8 pages, and was stripped of author keywords to exclude simple copy-pasting and ensure original user tags were assigned. The paper was written in English language, so both groups were selected from the students that had adequate English skills to understand the text. Each student was given a copy of the article and an amount of time they found necessary to complete the assignment. Participants had to assign freely chosen keywords or tags to the article, with a minimum of five and a maximum of ten tags. Although the paper was written in English language, students were told they can add tags in either Croatian or English language as they choose.

2.1. Methodology and results

First, the tag sets were analyzed using descriptive statistics. The total of 80 participants (40 experts, 40 novices) generated 612 tags, from which the expert group assigned 321 tags (52,4%) and the novice group 291 tags (47,6%). The average number of tags per expert user was 8,02, while the corresponding number for the novice user was 7,2. It is important to mention that each had to assign at least 5 tags, with a maximum of 10 tags.

Further analysis showed that the expert group had 113 different tags (35,2,%), while that number was 124 (42,6%) for the novice group. A tag with the highest frequency was *web 2.0*, assigned by 37 experts (92,5%) and 21 novices (52,5%). Figure 1 illustrates the tag frequency distribution, where top 10 tags for the expert group were responsible for almost 50% of entire expert tags (160), a distribution that follows the power law. The respective number for the novice group was significantly smaller, 116 (39,8%). This is clearly visible on the comparison graph, where the expert group produces a longer head and the novice group distribution creates a longer tail.

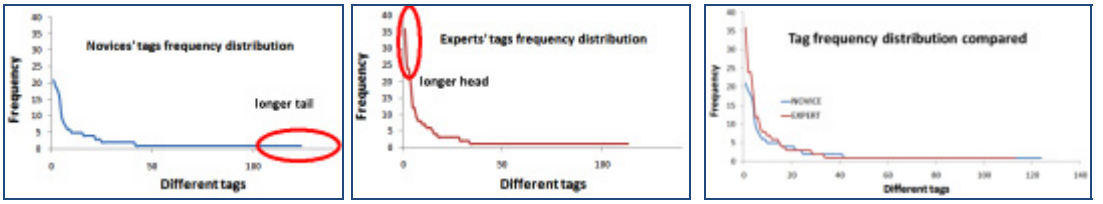

Fig. 1. (a) Novices' tag frequency distribution; (b) experts' tag frequency distribution; (c) tag frequency distribution compared

To further investigate the original assumption that the expert group will produce tags of higher quality, a measure of *tag efficiency* was introduced. Since the chosen scientific paper on which the tagging was done had author keywords assigned to it, the basis of the measure was comparing the tag sets created by each user with the original keywords assigned by the author. It was assumed that when comparing user tags with original author keywords, experts group will be more efficient, i.e. have more common elements. Comparison between author keywords and user tags was carried out using the Jaccard similarity coefficient equation, a statistic used for comparing the similarity and diversity of sample sets as described in [4]. The basic formula for tag efficiency is given (1)

$$Te = Ni/(Nk + Nt - Ni) \quad (1)$$

Tag efficiency coefficient (T*e*) is defined by N*k* (original set of author keywords), N*t* (user tag set) and N*i* (number of elements in intersecting set). For example, the original author keywords {*academic integrity, authorship, citation, referencing, scholarly communication, social software, style guides, web2.0*} when compared to the chosen user tag set {*web2.0, citation, referencing, academic integrity, social bookmarking, authorship, web2.0 authoring, wiki*} had 5 tags in common {*academic integrity, authorship, citation, referencing, web2.0*}, so the efficiency of user tags was 5/ (8+8-5) =0.45. The measure has a range between 0 (no intersecting elements) and 1 (data sets are equal). This procedure was done for each user and generated a total of 80 efficiency coefficients and the averaged data for each group are shown in Table 1.

Table 1. Tag efficiency coefficients

Efficiency	MEAN	MAX	MIN	SD
NOVICE	0,17	0,45	0	0,13
EXPERT	0,24	0,5	0,06	1,36

The data show that the expert group has a larger average efficiency coefficient (0,24) than the novice group (0,17) which indicates that the users from the expert group were better in expressing the article concepts sharing on average at least three tags with the original author keywords. In order to see whether efficiency coefficients are statistically significant depending on the participants' group, a one-way ANOVA of tag efficiency coefficient was carried out. The results have shown statistical significance ($p=0,02$; $\alpha=0,5$ $p< \alpha$) between groups so it was confirmed that the participants' expertise level had a significant effect.

3. **Conclusion**

The starting research hypothesis was that users with more knowledge and expertise would create folksonomies of higher quality when faced with an academic text. There are several results in the descriptive statistics that speak in favor of our hypothesis. It was shown that the expert group assigned a smaller number of unique tags (35,2% vs. 42,6%) making their folksonomy more compact, i.e. larger number of users have shared the same concepts to tag the article. This is even further confirmed with the tag frequency distribution, where the experts' distribution follows the power law, with top 10 tags being responsible for 49,5% of all tags, while that number is significantly smaller for the novice group (39,8%). These statistical data tell us that the expert group shows more homogeneity in tagging as they share a larger number of common concepts which they use to describe the article. Of course, this homogeneity doesn't ensure a higher quality folksonomy because the group can share the same concepts that have no connection to the concepts actually present in the article itself. To examine in what extent have the expert and the novice group managed to express the actual concepts present in the article, tags from both groups were compared with original author keywords using the tag efficiency measure. Author keywords can be considered as an ideal representation of the document content. Terms assigned by authors help to reduce content to a few significant and central terms and are of central importance to the article's topic since the author himself is supposed to be able to choose terms that reflect content best [8]. According to Heckner, Muhlbacher & Wolff [9], authors try to be as specific about the contents of their paper as possible based on a differentiation strategy with respect to a possibly huge amount of literature in the same field. The measuring showed that the expert group had a larger average efficiency coefficient (0,24) than the novice group (0,17) which indicates that the users from the expert group were better in expressing the article concepts sharing on average at least three tags with the original author keywords. Analysis of variance also confirmed there is a statistical significance and that changing tag affiliation between groups has a statistically significant effect on the outcome.

The results of the research have shown significant differences between the expert and novice group both through descriptive statistics and in the tag efficiency. The expert group was shown to be more homogenous in selecting tags, agreeing more often on the same tags. Also, according to the results, the expert group has created a more efficient folksonomy, sharing more concepts with the original author keywords. Since their expertise originated from taking courses on controlled vocabulary and indexing we can conclude that knowledge, skills and understandings in knowledge organization can prove to be a significant factor in creating folksonomies of higher quality.

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