# Incentives for Social Annotation

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## ABSTRACT

Researchers are exploring the use of folksonomies, such as in social bookmarking systems, to build implicit links between online resources. Users create and reinforce links between resources through applying a common tag to those resources. The effectiveness of using such community-driven annotation depends on user participation to provide the critical information. However, the participation of many users is motivated by selfish reasons. An effective way to encourage these users is to create useful or entertaining applications. We demo two such tools – a browser extension for bookmark management and navigation and a game.

## Categories and Subject Descriptors

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

## Keywords

Games with a purpose, social tagging

## 1. INTRODUCTION

Social bookmarking tools allow web users to store, share, and organize their Internet resources in a central online location. Many participants of these applications apply keywords, or tags, to their web resources. Tagging serves two main functions. First, it allows users to arrange their resources as they see fit for recalling in the future. Second, tagging allows the user to join or participate in a community by sharing personal resources and tags with others.

Researchers are exploring the use of these annotations to create implicit links between online resources. An individual may create or reinforce a relationship between two resources by applying a common tag or organizing them in a common folder. We explore the use of these implicit relationships in the context of `GiveALink.org`, a social-bookmarking system developed for research purposes [3].

## 2. DEMONSTRATIONS

GiveALink relies on bookmark donations. The implicit relationships among resources and among tags are aggregated across users in GiveALink. We have evaluated different similarity measures for quality of results and scalability [2, 1]. The effectiveness of a system like GiveALink depends on the critical density of annotations, and thus on user participation. If two bookmarks, or two tags, do not appear together in any user's bookmarks, GiveALink cannot calculate a direct relationship between those two items.

An effective way to encourage users is to incentivize participation through applications that provide added value or that entertain. For this purpose, we have developed one of each – a browser extension providing tools for bookmark management and web navigation, and a game to generate annotations [4].

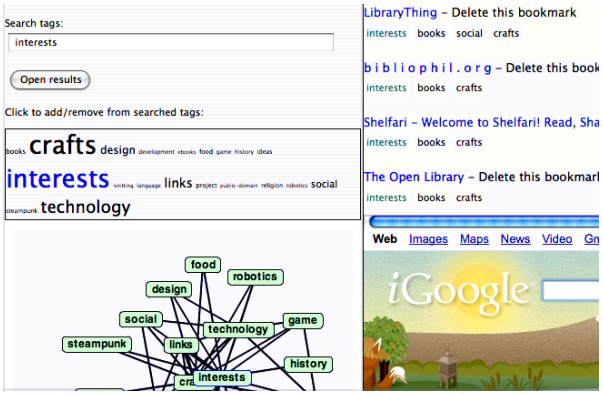


**Figure 1: Tag clouds and networks augment the traditional folder/list interface**

## 3. BROWSER EXTENSION

We are developing a browser extension for Firefox 3 providing a set of GiveALink tools to users. Bookmark management tools aid users in maintaining their own bookmarks (Figure 1), which in turn provides GiveALink with more data for supporting applications such as search, recommendation, and navigation. Navigation tools aid users in discovering resources of interest from the collective GiveALink data (Figure 2).

**Bookmark Management:** A bookmark manager provides users with a single interface for maintaining their tags and resources (Figure 1). They can manage online bookmarks in the browser, using an interface that allows tagging, searching, and moving through their bookmarks, and visualizes the networks of relationships among tags.

Traditional in-browser bookmarking systems allow a user to organize their bookmarks in a hierarchical structure of folders. When using and maintaining bookmarks, a user can see the relationships

between folders in this hierarchy. Users can also manage bookmarks by dragging bookmarks or folders into other folders. The bookmark management tools in the GiveALink extension allow users to view tags as similar to folders, allowing users to drag bookmarks and tags (sets of bookmarks) into other tags and to see the relationships between tags.

The manager will increase the amount of annotation by making it convenient to organize resources; in turn, the relationship networks can enhance the user experience by suggesting tags to users based on their own bookmarking behavior in combination with GiveALink data and by showing users the implicit structure of their own bookmarks.

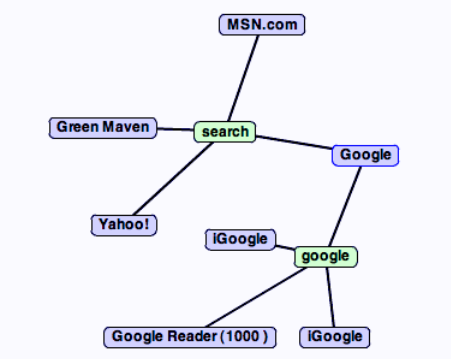


**Figure 2: Semantic neighborhood of Google for one user**

**Web Navigation:** Currently, browsers do not visualize a page's semantic context beyond its content. When browsing, users make decisions based on the information in the page itself, and their own understanding of its context. Visualizations of GiveALink relationships provide users with semantic maps, showing the context of the current page in terms of related tags and pages (Figure 2). Users can use such a map as an alternative way to understand the content and context of the page, as well as an alternative way to navigate the web, by visiting or exploring related pages and tags.


**Figure 3: Screenshot of a prototype for the tagging game**

## 4. TAGGING GAME

As an incentive for users to annotate resources, we are designing an online game (Figure 3). The game presents users with a starting resource and a target resource. Users tag pages to find a path from the given start to the given target, winning when the chosen tag is known to connect to the target. Game mechanisms for advancing the path and for scoring have to take into consideration attempts to cheat by applying a tag for the target to a resource for which it is not relevant.

When an accepted tag does not apply to the target, the game suggests a small set of resources that do relate to the tag. The user then selects one of those or a previously tagged resource to be the next to tag. The game selects resources to suggest based on the implicit relationships to the target, to simultaneously help getting to the target with a short path and encourage strengthening relationships that seem to be weaker than they should be (based on indirect relationships).

The game will entertain users while simultaneously addressing an important problem, namely the sparseness of the semantic networks. As users tag resources in the game to find a path from one resource to another, GiveALink stores the tagging metadata. When tags have been confirmed by enough participants in the game, this information is added to the database for calculating the relationships among tags and resources.

The development of scoring mechanisms takes into account the motivation of increasing the network density by rewarding users who make use of less frequently used, more specific tags, assuming the tags have been confirmed by previous users (through bookmarks or the game); new or overly rare tags require confirmation, in order to reduce the noise being added to the system.

## 5. CONCLUSION

Social bookmarking tools have facilitated the discovery of relationships between resources that might otherwise be unknown and difficult to infer. However, doing so depends on the participation of the users who provide the annotation data used to infer those relationships. User participation can be improved through either useful tools or entertaining distractions that result in the production of desired data. We have developed a set of tools to assist users in managing and using their bookmarks, and in making use of other users' bookmarks, as well as a tagging game where users try to find paths from one resource to another, providing us with additional information about the relationships between tags and resources along the way. These can help us gather data to improve the coverage and density of the annotations, thereby improving the effectiveness of GiveALink's recommendation, search, and mapping.

## 6. ACKNOWLEDGMENTS

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