Improving personal and social information management with advanced tagging

Vanesa Mirzaee
vanesam@ece.ubc.ca
Department of Electrical and Computer Engineering
University of British Columbia

Maryam Najafian Razavi
maryamr@ece.ubc.ca
Department of Electrical and Computer Engineering
University of British Columbia

Lee Iverson
leei@ece.ubc.ca
Department of Electrical and Computer Engineering
University of British Columbia

Abstract
This paper describes an innovative tagging model incorporated into a web 2.0 social and personal information management application. Our work utilizes web 2.0 tagging concepts in a new way in an effort to provide better support for users' needs for contextualization and personalization of their information spaces for both personal and social purposes, management of social engagements, and formation of user-defined social relationships. In this paper, we first give a brief overview of OpnTag, a research implementation developed by our group which we have used to experiment with various aspects of organizing and managing personal libraries of information within a social environment. We then explain how OpnTag supports each of the aforementioned concepts (both personal and social contextualization, social engagements, and social relationships) through its advanced tagging features. We also describe the motivation behind each of these features and their envisioned usage.

1. Introduction
Recently, Web 2.0 applications have presented “tagging” as an incremental, user-centered strategy for organizing personal information in a public space [Rashmi, 2005; Shirky, 2005; Vander Wal, 2007; MacGregor and McCulloch, 2006]. The tagging classification model grew out of the need to address the long obvious inadequacy of the traditional filesystem models to manage the ever growing range of kinds of information pieces (as seen in personal information management systems [Malone, 1983; Dourish et al., 1999, Whittaker, 1996]) in a cohesive, intuitive and user-centered fashion. Tags often become the fundamental organizational structure of a Web 2.0 application. In essence, each tag becomes a “category” within its user’s own information space and given that the user can utilize any number of tags to describe an item, each item can thus be placed in as many categories as the user deems necessary. Tagging also plays out socially by allowing each user to see others’ bookmarks and tags, find out what resources have been tagged the most, and who else has tagged the same items or has used the same tags. In other words, tagging simultaneously provides a viable solution to a wide array of existing limitations of current personal and social information organization systems such as multiple categorization, recommendation and even the discovery of like-minded others, all without imposing any top-down “correct” organizational model on any user [Shirky, 2005].

Although Web 2.0 applications and their tagging classification model have transformed online personal information management and organizational models from system-recommended classification schemas to user-generated categorization, these applications are still mainly used as a publicly accessible repository of user-collected-and-organized information pieces. However, we believe that the tagging model used in most web2.0 application designs has potential to offer its users a workspace that allow them to better contextualize and personalize their information spaces, facilitate social engagement and form user-defined social relationships.

With these principles in mind, we have built OpnTag [Iverson et al., 2008], an open source, online, social-personal information management system (SPIIM) for note taking and internet book marking which we have used to experiment with various aspects of organization and management of personal libraries of information within a social environment. In OpnTag, we utilize tagging as the key organizational model; however, we take advantage of certain unique characteristics and what we believe to be certain unexplored aspects of the web 2.0 and its tagging concepts to better support contextualization and personalization of users’ information spaces, social engagement and the formation of user-defined social relationships. In the following sections, we provide a brief introduction of the technical structure of
OpnTag. We then proceed in sections 3, 4, and 5 to discuss how OpnTag supports each of the aforementioned concepts (contextualization, social engagements, and social relationships) through its advanced tagging features. Section 6, presents our plans for further development and research.

2. Opntag

OpnTag is an open source web 2.0 application that allows note taking and bookmarking. Its main goal is to facilitate the creation, organization, and consumption of information for an individual operating in a social environment. In other words, we can describe OpnTag as a personal information management application for an individual operating in a social (or public) environment.

A personal information management application is a computer-based system designed to assist an individual to create, collect, organize, maintain, or retrieve his/her collection of information, which is referred to as personal information [Bergman et al., 2004]. Personal Information Management is usually done by one person who is typically the sole owner and user of this information [Barreau, 1995; Bergman et al., 2003]. It is called Personal Information in the sense that the person who keeps the information has control over it. It does not mean that this information is necessarily about that person; or that it wholly created by that person, nor that it is private [Lansdale, 1988]. Conventionally, personal information management is considered a private activity. However, personal information is often created with sharing in mind or as a result of information sharing activities. This gives PIM a social dimension and therefore we consider sharing and exchange of information a part of PIM activity and not something separate [Erickson, 2006].

The following sections describe OpnTag’s main key features and concepts, which were designed keeping in mind our goal to create a usable social-personal information management system (SPIM).

2.1 Memo

The fundamental unit of information storage in OpnTag is the ‘memo’, a tagged textual annotation that may optionally link to a web resource. It has a name or title, an optional link, a set of tags, and some text. It exists within a particular space (see section 2.2) that determines where it shows up and who can edit it. It also has a visibility or audience, which determines who can see that the memo exists and read it. OpnTag users can create memos to save notes or bookmark URLs; browse and tag other users’ shared memos to mark their interest in them; and reply to other users’ memos to create a conversation.

Figure 1. Memo

2.2 Spaces and tags

Every memo exists within a ‘space’, a workspace within which a single user or members of a group (see section 2.4) can work to create, edit, and organize a body of information consisting of memos and associated tags. Each space (and all memos within it) is either owned by an individual or a group. Every memo has a visibility or audience. Only the owner of a memo can set its audience. The audience of a memo can be set either to its owner or any group to which that owner belongs. A user’s personal space contains all memos created, edited, or tagged by the user and a set of tags associated with these memos by the user (this is referred to as a user’s TagCloud). A group’s space includes any memos specifically in that space or specifically visible to that group and their associated tags along with the group’s TagCloud (a group’s TagCloud is a collection of tags associated with memos owned by the group). Within a user’s personal space only that user may create, edit or tag memos whereas within a group’s space, any member of the group may do so. In other words, by placing a memo in a group space, all members of that space can edit it.

OpnTag utilizes tags as a lightweight and flexible way to organize, contextualize, and represent memos. Tags are descriptive terms, keywords, category names, or metadata that can be assigned to memos to describe them. Tags provide meaning, context, and categorization. Tags can be used to support search, representation, and organization.

2.3 Users

Every memo is either acquired or created by a user. A user is an individual who has an account with

http://www.opntag.net

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Figure 1. Memo
Opntag. Being a personal information management application, Opntag provides each user with a personal space where s/he has complete control as how to organize, represent, and share information. Users are the only ones who can create, edit, tag and delete memos within their own personal space.

2.4 Groups

Opntag allows its users to create groups and invite other to join these groups in order to define various communities and collaboratively create and manage information and knowledge. Users can choose to be members of as many groups as they want, and can create as many groups as they want. If a memo’s owner is set to be a group, then any member of the group will be able to create, view, edit, and delete it, or change its audience. The audience for a group memo can be set to be the group itself or any super-group of that particular group. The audience of a memo determines who can see it.

Each group has a tagcloud specific to the group. This tagcloud is the collection of all tags that the members of the group use to describe the memos that are owned by the group. Since groups have their own spaces and tagclouds, a group can be a very convenient way for communities to get a more focused view of their collectively-generated information than by searching or browsing through the public space like other social tagging applications (e.g. Delicious).

The design of each of the aforementioned concepts was inspired by our goal to facilitate SPIM activities. For the remainder of this paper, we will explain the three key innovative tagging features incorporated into Opntag in an effort to improve its utility as a social-personal information management application.

3. Contextual tagging

People usually organize their information according to their perspective, needs, activities, work in hand, and social engagements at the time that the information is acquired, created, or re-accessed. As time goes by, this organizational structure might evolve based on the changing value of the stored information, the owner’s work priorities, changing interest and social engagements [Barreau, 1995; Bergman 2004].

One of the goals behind the design and development of Opntag is provide its users with more effective means to personalize and contextualize their information. OpnTag’s contextual tagging features have been designed considering these information management organizational behaviors. OpnTag allows users to tag, re-tag, or make copies of each memo in their personal or group spaces as many times as is necessary with the set of tags that the particular user (or group of users) finds appropriate in each different context. Opntag allows contextualization of information for social engagement (creation of social context) through the utilization of its groups (section 2.4). It also supports the temporal aspects of contextualization for both personal and social information through a set of functions (tagging, re-tagging, copying, and replying) embedded in the memo architecture. The following sections provide an explanation as to how groups and the existing memo infrastructure support contextual tagging.

3.1 Utilizing groups to create Social context

Previous research has shown that people organize their information based on its context. It has also demonstrated that the social context in which the information is shared and used is an import factor in determining how it gets organized and presented. We took these factors into consideration in the design of Opntag groups. OpnTag groups are designed to facilitate the creation of social context and common ground within a web2.0 community. In this section we demonstrate this feature of Opntag groups by an example. Table 1 illustrates a list of four groups within Opntag along with a brief description of their focus. Each of these communities focuses on a different aspect of food.

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian food club</td>
<td>A group of Italian food fans. We use this space to collect recipes of Italian food and information about ingredients used in them</td>
</tr>
<tr>
<td>Nutritionist at Home</td>
<td>We share facts and myths about different types of foods.</td>
</tr>
<tr>
<td>Team Tomato</td>
<td>We are a group of fourth grade students working on our science class project. It is a botany project about &quot;tomato&quot;.</td>
</tr>
<tr>
<td>Home Gardening</td>
<td>We are a group of gardening enthusiasts helping each other and giving each other tips as how to grow plants in a small space.</td>
</tr>
</tbody>
</table>

Table 1. Opntag Groups

Figure 2 illustrates how each of these groups describes, organizes and contextualizes the same piece of information (the URL: https://en.wikipedia.org/wiki/tomato). There are differences in how this URL is represented by each group. This is because each group captures and represents it in a different social context, uses the terms appropriate to its own community to describe it.
and aims to address their own needs, interest and expertise. An Opntag user might be a member of more than one of these groups and treat the information differently based on his/her social engagement with the community. This differentiates Opntag from other social tagging applications where there is no support for the creation of focused communities of interest (i.e. Delicious).

3.2 Tagging, Re-tagging, Copying (functions associated with memos)

Unlike general information management approaches (i.e. librarian approaches) for which management (i.e. classification, organization, and retrieval) policies are predefined and fixed; personal information management policies are dynamic, highly individualized and depend to a large degree, on current personal/social preference, needs, and intended activities [Bergman et al., 2003; Adar et al., 1999; Barreau, 1995]. Opntag allows its users to capture this dynamic and temporal aspect of personal-social information management by introducing a set of functionalities into its memo structure. These include the ability to tag, re-tag, and copy any memos as many times as necessary, in any appropriate space, with any set of tags, in order to capture its context over time. The following section briefly describes each of these features:

**Tagging and Re-tagging:** Like many other tagging applications, Opntag allows its users to assign any number of tags to their memos. This allows users to describe content, context, or any other attributes of their memos at the time that the information is acquired or created. If at a later time the user decides to change, update, or revise the set of tags associated with a memo or the space within which the memo exists, s/he can use the re-tagging feature which allows the user to assign a new set of tags to the memo or save it in a different space.

Re-tagging within the same space replaces the old set of tags with the new set. However, re-tagging in a different space does not replace the old set of tags but creates a co-existing set of tags. Any group...
member can re-tag a group memo, and as a consequence, over time, groups can develop a common ground and certain vocabulary, which facilitates social engagement.

We should note that, by tagging or re-tagging a memo, we do not create a new memo instance but just merely create a link to the existing memo. This means that if the owner of the memo decides to remove it, all the links pointing to it will be gone. This also means that the user can not expand the visibility/audience of that memo; he/she can only narrow it down or maintain it as it is.

**Copying:** Unlike other social tagging applications (such as Delicious) where users can only keep one instance of a webpage (bookmark), Opntag users can keep as many instances of an information unit (a memo) as they desire. This can be accomplished through the use of the *copy function* associated with memos. By copying a memo, the system will create a duplicate (with its own URL within opntag) of the memo. This instance can be assigned any set of tags, located in any space, and have a different visibility/audience than the original memo. This allows Opntag users to capture different values and contexts at various points in time.

### 4. Informative tagging

OpnTag supports social engagement through informative tagging enabled by notification tags. A notification tag consists of a “for:” prefix followed by a user name (e.g. for:leei). By assigning a notification tag to a memo, the particular user specified in the notification tag will receive a message about that memo in his/her personal space, which differentiates that memo from information available to that user in the public space. The user will then have the option to act on the notification and get engaged in a conversation with the creator of the notification tag.

Opntag automatically notifies its users of any explicit message (notification tag) as well as any implicit message (activities happen in their personal or group space) through “Messages”. The "Messages" page contains a list of such notifications for the user both from other users as well as from the system. These messages are created whenever others use a notification tag addressing the user or when someone creates, updates, tags, deletes, or replies to a memo within a space of which the user is a member. The user can see the memos referred to and manage these notices as one might manage email (and may choose to ignore these messages).

Informative tagging supports the consumption and management of information and knowledge by notifying users of both social signals received from other users as well as of activity in their space. Figure 5 illustrates a snapshot of messages for an Opntag user.

![Figure 5. Messages](image)

### 5. People tagging

OpnTag also provides support for managing information in the other extreme of privacy shades (private/semi private information), by providing functionality to restrict the visibility of one’s memos to a certain group, including the ‘private’ group consisting only of oneself (figure 6).

![Figure 6. Memos in OpnTag: public, private, and selectively shared in a group](image)
OpnTag supports both classic, invitation-only groups (similar to google or yahoo groups) with various degrees of visibility for the group and its members, used for defining teams and communities (figure 7), and egocentric groups created as a result of tagging people, used for defining relationships (figure 8).

OpnTag's access control model centers on the joint concepts of ownership and audience. For each memo, the creator can specify the memo's owner, which controls who owns the memo and thus can edit and delete it, and its audience, which controls who can see that the memo exists and read it. Audience restriction is the fundamental mechanism for selective sharing in OpnTag: when creating a memo, the user has access to both his classic group memberships and his relationship tags and can thus set the audience of the memo to either a classic group he/she is a member of or one of these egocentric groups (figure 9).

While most Web 2.0 applications enable definition of social relationships only in terms of 'networks of friends' in which all 'friends' are created equal and are often required to be reciprocal (i.e. facebook\(^2\)), the people tagging feature in OpnTag enables users to categorize their social network into groups of target audiences for their information in terms of their (often changing) relationships with them, by creating one-sided, egocentric, user-defined social relationship groups to which they can grant or deny access to various pieces of information in their personal space.

Figure 8 shows how the people tagging concept is implemented in OpnTag. When visiting another user's profile page, a user can tag the profile owner with keywords that represent his/her perception of that user (i.e. "ruby expert") or their relationship ("research fellow"). In the same way that tagging resources both identifies and groups them (e.g. all memos tagged "rails" can be treated as a group), each such "people tag" represents a relationship group that will later appear as an access control option for each of the tagging user's memos.

Each new tag applied to a person has a distinctly specifiable visibility. The choices for people tag visibility include only the tagger, the tagger and the taggee, only the set of people tagged with the same tag (by the same tagger), "Users", and "Anyone", with the default visibility set as private (tagger only).

Figure 10 shows how the tags applied to or by a user are represented on user's profile page. The “Connections” section shows both the incoming and

\(^2\) http://www.facebook.com/
outgoing tag cloud for each user, typographically modulated based on the tag frequency. Different color codes imply various degrees of visibility. It is possible to pivot on the incoming or outgoing tags, either individually or collectively, to have various filtered views. For example, all people who have used a certain tag (or a combination of tags) on this user, all people this user has tagged with a certain tag (or a combination of tags), all tags applied by a certain user to this user, and all tags this user has applied to a certain user.

5.1 Enhanced support for social interactions

Unlike classic groups in which membership is voluntary (e.g. google or yahoo groups), people tags are assigned and removed by the tagger without a notification or confirmation process for the taggee. As such, the relationship groups that are created as a result of people-tagging are entirely controlled by the creator; meaning people do not need to agree to be in the group, and they may not even know that they are included in a certain relationship group. An important implication of users being able to assign their acquaintances to different relationship groups (potentially without their knowledge or approval) is the opportunity for handling some social situations that are generally hard to handle in online world. One example of such situation is discreetly concealing exclusions; i.e. I may want my ‘friends’ (i.e. those others I have tagged with ‘friend’) to see that they are included and have special privileges to my information store as a result, but non-friends should not be visibly excluded. In OpnTag this situation can be handled by making the “friends” tag visible only to the people tagged as such.

5.2 Built-in control against antisocial tagging

Current implementation of the people tagging concept in OpnTag allows a single tag to have different visibility to different taggees (e.g. I may not want to share my assessment of others as “interesting” with everyone I assess as such). However, in no case can the tagger make a tag visible to anyone other than the taggee without also making it visible to the taggee himself. Since all such tags are visibly attributed to the tag creator, this design choice was made to discourage antisocial tagging by forcing such taggings to be exposed to their subjects (e.g. I can’t let my friends know that I’ve tagged someone as a “jerk” without letting the “jerk” know too).

5.3 Support for social scoping

The current implementation also supports the concept of social scoping, in the way that the same tag applied by different users will result in two distinct relationship groups. For example, people tagged “friends” by user A will comprise a relationship group called “A’s friends”. Using the same tag by another user (B) will result in a different relationship group called “B’s friends”. Furthermore, Both of these relationship groups will be independent of the classic group “friends”, if either A or B are a member of such group.

5. Current Status and Future work

The implementation of the aforementioned advanced tagging features in OpnTag is complete and these features have been introduced to about 100 active users of OpnTag. We are currently proceeding to the next step, which involves the empirical evaluation of each of these features, in order to gain some insights into how each of them is understood and utilized by real users in their day to day tasks. We are
currently evaluating the application and the advanced tagging features in terms of both utility and usability. In other words, we are trying to determine whether the combination of informative tagging, contextual tagging, and people tagging features has improved user experience with OpnTag.

Questions of particular interest to our ongoing research include whether each of the introduced tagging features is adopted for the particular purpose it was designed for, or if users creatively find other usage for them, something we didn’t anticipate. We are also interested to see if the advanced tagging features properly satisfy users’ requirements for personal and group information management, and how we can improve our initial design. We hope to find answers to these and other questions through a combination of quantitative and qualitative evaluation methodologies, including usage statistics, surveys, interviews, and a holistic usability evaluation of the OpnTag application.

References and bibliography


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