

## Leveraging Social Networking Sites to Acquire Rich Task Structure

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### Abstract

Task management is a core part of knowledge work. However, intelligent assistance for task management is hampered by the lack of large amounts of structured knowledge about user tasks. In this paper, we present a novel approach, Social Task Networks, for obtaining rich user contributed task information by integrating task management with social networking sites.

### 1 Introduction

A central part of knowledge work is the collection, assignment, sharing, tracking and scheduling of tasks. Such *task management* activities are performed using a variety of tools, most commonly to-do lists, calendars and email. Both commercial companies<sup>1</sup> and the AI community have developed systems to extend these tools to provide intelligent assistance for task management [Myers, K. et al. 2007]. These systems take advantage of both the content of task artifacts but also their structure [Kushmerik, N., et al. 2005]. For example, a system may analyze the text of an email but will also derive information from how the text is organized into sender, receiver, subject, and body fields. Indeed, this structured information can make the development intelligent assistants significantly easier.

However, the structure available to intelligent assistants is often limited because of the nature of the task management tool being used. For example, the explicit structure in to-do lists, the most popular task management tool [Jones, S.R. et al. 1997], is limited to the order in which the entries occur, which we note is often not meaningful. In addition to this lack of structure, task artifacts are often not collated either through tool limitations or isolation of the data in personal repositories (notepads, sticky notes or individual email accounts). This limits the information that systems can leverage.

Thus, our goal is to investigate mechanisms to enable task management using richly structured user contributed task knowledge. To achieve this, we have designed a new approach to task management, termed a Social Task Network, that combines ideas from task representations in hierarchical planning, scripting in distributed environments and sharing

in social networking sites. This approach allows the acquisition of knowledge about how tasks are situated in a social network, the hierarchical organization of tasks in real world settings and the ability for particular tasks to be automated. In this paper, we detail this new approach to task management and how it will enable the acquisition of richly structured task knowledge. The approach is grounded in a study of to-do lists and an initial prototype system.

### 2 The Social Structure of Tasks

Tasks are inherently collaborative. Whether scheduling a meeting, writing a portion of a document for a colleague, or asking a family-member to pick up milk at the grocery store, tasks often require the interaction of multiple people in order to be accomplished. Indeed, a central part of task management is the tracking of how tasks have been delegated and shared.

To confirm this intuition, we performed an analysis of a corpus of to-do list items gathered during CALO, a large project to develop intelligent assistants for office-related tasks. The corpus of 1200 to-dos was gathered over a period of several months from a dozen users. [Gil and Ratnakar, 2008], present a detailed analysis of the corpus. Here we revisit the corpus focusing on collaboration.

We manually checked the entire corpus and found that 17.5% of the to-dos were collaborative in nature. Either the to-do referred to a task to be accomplished for another person (e.g. read John's document), scheduling a meeting (e.g. discuss program with Mark), or assigning a task to another person (e.g. email Mary about John). While 17.5% is a significant percentage of the tasks, we believe that this understates the number of collaborative tasks. From our observation, it seems that many tasks, while not specifically identifying collaborators, are sub-tasks of larger collaborative tasks. For example, background reading necessary to participate in a meeting.

Thus, given the collaborative nature of tasks, social relationships provide a key structure for tasks. However, this social structure is not explicit in common task management tools such as to-do lists and calendars. Social relationships are more evident in email through addresses and have been taken advantage to create task management interfaces [Bellotti V., et al. 2003]. However, email addresses do not capture the nature of the social relationships or information about the participants themselves. Groupware systems do a

<sup>1</sup> <http://www.reqall.com/>

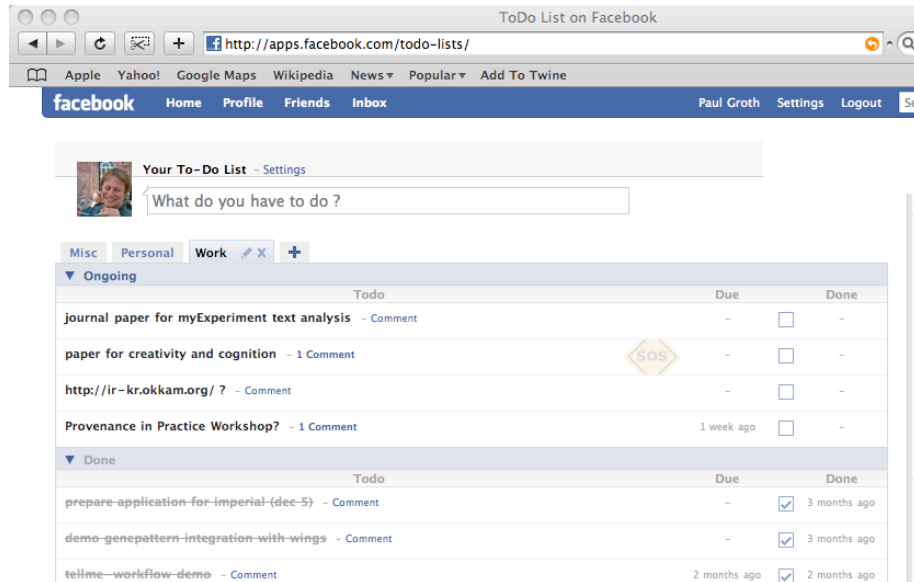


Figure 1: To Do List Facebook Application

better job of explicitly capturing social relationships but are limited to the particular organizations that adopt them.

To address this lack of social relationship information, we decided to integrate task management with a social networking site. We present our initial prototype in the next section.

### 3 Task Management in a Social Network

As previously mentioned, to-do lists are probably the most widely used task management tool. Therefore, we developed a To-Do List application for Facebook, a very popular social networking site. The application is instrumented to collect data from actual use. We obtained preliminary feedback from a small user group. This application was released early December, and advertised to gather a substantial user base. Currently, there are 97 monthly active users. The application is accessible at <http://apps.facebook.com/todo-lists/>. A screenshot of the interface is shown in Figure 1.

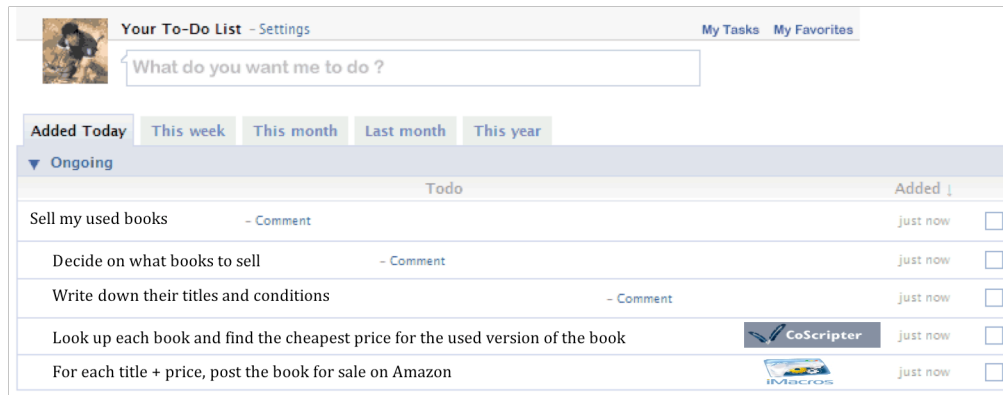
The application provides standard to-do features including setting dates, priorities, categories and comments. Beyond these features, we have also added Facebook specific features for sharing to-do list entries. Users can share their to-do lists with everyone on Facebook, people just in a particular network (i.e. larger organizations of people like a university), group or with only their friends. Additionally, users can post what we term a “SOS”, which is a broadcast to all the users friends that they need help with a particular task. Anecdotally, these sharing features have been of real use to the users. In particular, we have seen users organize everything from evenings out to computer LAN parties. Additionally, we have received requests for more sharing features such as the following:

“Is there any way to possibly choose more selectively who can see each item in the to do list? I am thinking about surprise parties and secret meetings, and right now its either everyone or no one. [sic]”

Thus, the sharing features enabled by Facebook are a core feature set for attracting users. Moreover, they allow us to unobtrusively gather detailed information about how users share tasks and connect that to profiles of the user. For each to-do entry, we maintain the Facebook id of the user and can thus access pertinent user profile information, everything from the age of the user, to their list of friends, and interests. We also maintain which users comment on other users shared to-do entries to track which users are actively sharing tasks.

Thus, this prototype was a good first start towards collecting rich task knowledge structured around social relationships. It also revealed a great deal about the kinds of task people jot in their to-do lists, and about the potential for automatic assistance.

- Many tasks had very coarse granularity. Examples are “Get Christmas presents”, “Study nursing”, and “Get back in shape”. These are high-level tasks that involve many substeps and activities. There are no concrete first steps enumerated, which would be useful for a user to get started on the overall goal expressed in the to-do.
- Many entries were in other languages.
- Many tasks that were concrete had only some aspects that could be automated. For example, “Write Christmas cards” or “Read Dune” could involve some on-line purchasing that could be automated but most of the activity was meant to be done by the person themselves.
- Some tasks could be fully or mostly automated. Examples include “Renew my driver’s license”, “Buy iPhone”, “Rent Aliens movie”.



**Figure 1: Redesigned To-Do List Facebook Application**

- Many tasks were not amenable to automation, for example, “Go to the mall”.
- Some tasks could be accomplished by friends of the users. For example, “Get Volunteers for a Meal”.

With these lessons in mind, we devised a new approach to personal task management: “social task networks”.

#### 4 Social Task Networks

In social task networks to-do lists and other task artifacts are organized around an explicit social network. Tasks are decomposed into subtasks with enough detail to allow tracking and sharing in the network. More specifically:

- To-dos (i.e. tasks) are organized hierarchically and are described in terms of their constituent subtasks. The set of to-dos that are active at any given time are often part of enveloping tasks. This will allow users to express tasks at coarser and finer granularity, giving the task a high level coarser description when it is first jotted down and later drilling down into details
- Tasks include both automatable steps and non-automatable steps. The latter provides context for the user and serves as a reminder that the task is pending their attention and is up to them and not the system.
- To-dos should be assignable so that assistance in terms of automation can be provided by other individuals in the social network. For example, a project assistant may provide the maximum allowable amount to spend on a new laptop purchase, which may be just one step in the overall task of purchasing a new computer. Other users can decline assigned tasks, but if they accept the user should have visibility about its status.
- To-dos should be shareable so that assistance may be provided by other individuals in the social network. For example, if a to-do entry is to find a hotel in Washington DC, someone else may have a list of favorites that they are willing to suggest.
- To-do decompositions should be shareable, so that know-how can be shared. For example, if someone is

looking for job announcements someone else may have just looked and have a task description to share: a set of steps that they followed searching diverse web sites and mailing different individuals.

Thus, social task networks not only provide the context of a social network but also explicitly represent the hierarchal nature of tasks as well as the possible mixture of automated and non-automated tasks. Figure 2 shows a redesigned version of our To-Do List application that follows the aforementioned desiderata. In particular, the design supports hierarchal tasks where both automated and non-automatable steps are mixed together. In particular, we show that some steps could be automated through web scripting applications such as IBM’s Coscripter or Mozilla’s iMacros.

Just as Wikipedia has become a valuable knowledge source for AI researchers, social task networks will provide a powerful new knowledge source for developing intelligent assistance for task management.

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