Graaasp: a Web 2.0 Research Platform for Contextual Recommendation with Aggregated Data

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Abstract

In this paper we describe *Graaasp,* a social software currently under development to support the creation of a real usage database of social artifacts. Our goals are twofold: First to offer a generic aggregation service and user interface to people and communities. Second, to experiment with recommendation and reputation models and algorithms in e-learning.

Keywords

Focal and contextual views, Web 2.0, Social Software, Syndication, social computing, social navigation

ACM Classification Keywords

H5.3 Information Interfaces and Presentation: Group and Organization Interfaces, Computer-supported cooperative work, Web-based interaction.

General Terms

Design, Human Factors.

Introduction

A common way for developing and evaluating recommendation and reputation models and algorithms

is to gather and exploit real world usage datasets; such as Netflix, MovieLens or Epinions.

Part of our research in e-learning consists in developing and evaluating recommendation and reputation models and algorithms. We aim at embedding these solutions into Web 2.0 sharing and social network applications to suggest people, resources and activities for learning. However, when it comes to that domain, it is much more difficult to find available and relevant datasets. It is true that many social Web sites, such as Facebook or LinkedIn, are opening their APIs, but this is not sufficient to constitute datasets that can span several users' social graphs. Moreover, complying with terms-of–service restrictions may also limit datasets span.

This has led us to develop a social application and user interface, named Graaasp[1]. Our goals are to create custom datasets by aggregating data that crosses the boundaries of Web 2.0 sharing and social network sites, and to have a platform for experimenting with recommendation and reputation models and algorithms. During 2010-2011, the system under development will be used by 3 mashed up personal learning environments test beds within the frame of a collaborative European research project[2]. The data collected will be used to propose live recommendations and reputation metrics and to evaluate their relevance and utility with database log analysis.

The first part of the paper presents the Graaasp user interface for creating different contexts for sharing information with others. Then it describes how to

[1] http://graaasp.epfl.ch/

[2] http://www.role-project.eu/

aggregate data from multiple sources. Finally it explains the model of the combined social graph of all the aggregated data and it gives some future directions of work.

Graaasp Design

The design has been inspired by learning scenarios in engineering education. This section describes first such type of scenario. Then, it details the main user interface.

Scenario
The goal of the scenario is to create a learning activity that students can personalize and share. First, a tutor creates the activity with some initial entities for a group of students. For instance, in the context of an engineering course, the initial activity involves reading a book chapter and watching a recorded video. Some online exercises are also proposed.

Then, the students are expected to complete the proposed activity by importing and commenting their own related media objects (entities) from the Web. As example, students can grasp (link/embed) related videos and/or slides to enhance the initial activity. The online exercises also require widgets, such as an oscilloscope to measure signals on remote laboratory equipment. These measurements are then saved as new entities and linked to the activity. The students can rate and comment any aggregated resources.

As Graaasp opens the access to its data, internal or external recommendation and trust algorithms can be exploited. For instance new videos or widgets are proposed to the students. The collaboration model also remains opened as external users or friends can be

invited to collaborate. External tools to support the activity are easily added as widgets. These tools have access to the existing activity content and can provide new entities.

Views

The Graaasp user interface combines focal and contextual views [1]. A focal view shows the details of a currently selected entity that defines the context. The other related entities are displayed in a contextual view

(with respect to the focal one) on the right side. The contextual view shows only thumbnails of entities directly linked to the focal one. The context contains one column for each type of entities. Thumbnails also use a color-coding scheme.

There are currently 4 types of entities: People, Space, Assets and Tools that correspond to our generic social graph model described in the last section.

Local search engine

Breadcrumbs showing the last visited entities and avoiding cycles

Focal view of the currently selected entity. From top to bottom: entity title, entity content (depends on the media type) and users' comments.

Thumbnails views of the different types of entities that are in the context of (i.e. linked to) the entity currently visible in the focal view

Reserved area to present thumbnails of recommended entities

figure 1. Main screen of the user interface: Focal and contextual views. Users link a new entity with the entity in the focal view by drag and dropping its thumbnail either from the Favorite, Clipboard or Recommended drawers on the top, from the Recommendations panel on the bottom left, or by initiating a search query and drag and dropping a thumbnail from the result list to the focus view (not shown). Users can add an entity to the Favorites or Clipboard drawers by drag and dropping its thumbnail from contextual view columns. They can also directly create a new entity linked to the focal one by clicking onto one of the big "plus" button in the contextual view columns. The recommended drawer and recommendation panels are automatically filled by the system based on the current context and past interaction history of the user with the system.

Navigation

When guests or users log into the Graaasp, they see their profile in the focal view, surrounded by linked People, Assets, Spaces and Tools. They can edit their profile or any other entities they own or they have rights on using the embedded Rich Text Editor. Other users can write comment on them. Each user can set access rights to control who can see or modify his/her personal entity and the other entities they own.

Users navigate by clicking on the thumbnail image of any entity in the contextual view. This brings the entity into the focal view and updates both the linked entities in the contextual view and the breadcrumbs. Different entities may have different views as explained in the following sections; nevertheless they can all be ranked and commented.

Data Aggregation

Users collect, organize and share entities of different nature. Graaasp offers a built-in classification of every entity into 4 categories, which is wired in the collaboration model of the platform. Developers can extend the platform with both widgets and plugins for new Media Assets types. This feature makes Graaasp unique among other types of aggregators such as news feed aggregators or site sharing applications; furthermore it serves as a widget portal and as a resource oriented discussion tool.

Media Assets

Data fragments imported from other Web sites are called Media Assets. Users can import them for rating and commenting. They can also import them for sharing and linking with new entities, which is usually not possible in their native Web site. Thus in our

scenario, a book on Amazon or a video on YouTube can be linked to a Space related to the engineering course .

We have currently defined Media Asset objects for a video (YouTube, Dailymotion, etc.), a book description (Amazon), and a slidecast (Slideshare).
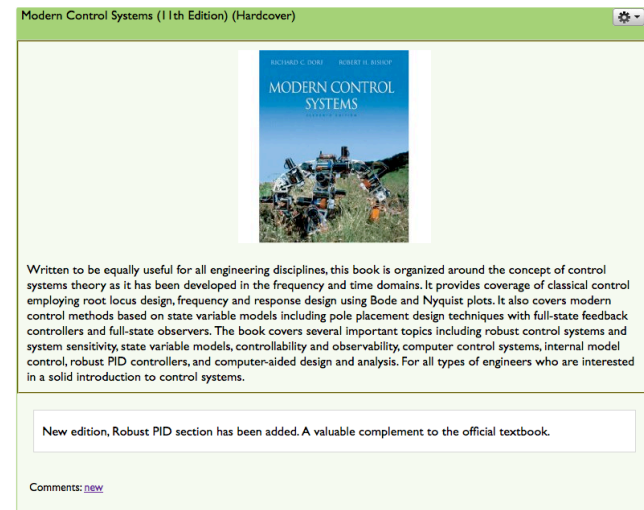

figure 2. Example of a Media Asset entity, a book description from Amazon, as displayed in the focal view.

Media Asset Bookmarklet

Users import a Media Asset by invoking a bookmarklet previously stored in their bookmarks. The bookmarklet is available from a setting menu in their home page into Graaasp. It contains a token that uniquely identifies the user. When invoked, the bookmarklet grasps (scraps) data from the target Web site and sends it to Graaasp as a Media Asset. The token tells Graaasp to link the scrapped Media Asset to the user.

Developers can create new Media Asset types for a Web site by writing a Javascript class that conforms to a specific Application Programming Interface. These scripts are managed by a central repository. Thus, there is no need to reinstall bookmarklets when scripts are added or updated. The bookmarklet architecture is implemented only for browsers supporting cross-site HTTP requests.
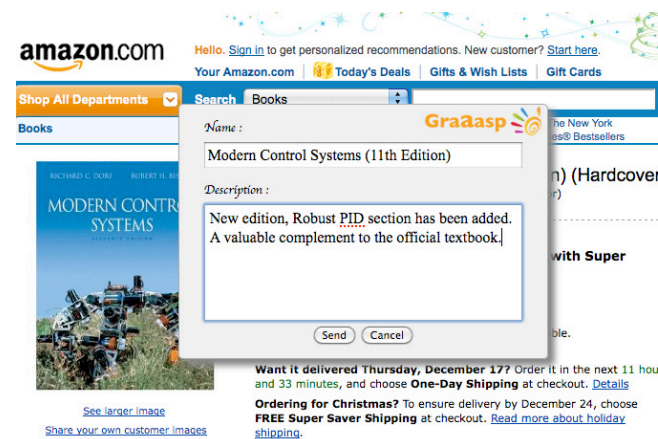

figure 3. GraaaspIt bookmarklet user interface: this window appears when the bookmarklet is invoked on a Web site with a dedicated GraaaspIt! plugin for scrapping data.

Plugins
Each entity, independently of its category, is associated with a format and a plugin to handle it. The format is chosen at the entity creation time. It defines the rendering and the data storage capabilities. For instance there is a format to create a Media Asset (see FIG 3.), a Wiki note Asset, a RSS feed Asset, a chat Space, or a widget instance Tool.

A plugin is made of both a client-side Javascript object and a server-side component. The former builds the view specific to the format (e.g. feeds URLs for an RSS feed Asset) and displays it. The later server-side component manages the format-specific requests from the client (e.g. saving a new RSS URL, retrieving a list of feeds for URLs, etc.).

Social Graph Model
Graaasp's user interface is a visualization of the underlying social graph model. Its structure is a generalization of many social Web sharing applications and is called the 3A model [2].

3A Model
The model comes from activity theory, distributed cognition and actor network theory. It has 3 categories of entities: Actor, Activity and Asset (aka 3A).

figure 4. 3A model corresponding to the internal representation of the aggregated data. This model can be used to derivate an ontology for exporting/importing data.

The underlying assumptions are that an Actor is producing an Asset within an Activity. An Actor could be a person, a software agent or any other intelligent object such as remote device (in Graaasp Actors have been split into People and Tool categories). An Asset represents a document or a collection of items, such as discussion thread, Wiki page or image album. An Activity is the formalization of a common objective to be achieved by a group of actors. It can be the representation of a tangible space such as a classroom, or an abstract space such as a project.

The 3A model has a graph structure. It has nodes (Actor, Activity, Asset) referred as entities connected with directed or undirected links. There can be several links between two nodes, and links are typed.

Applications
The 3A model is the core of Graaasp internal data structures. The structure is open to the "outside" world with the objectives of developing information filtering algorithms [3]. One application is to recommend new entities such as assets or widgets based on the one in focus. For instance in a engineering course the system can recommend specific simulation or data analysis widgets based on the slidecasts students have linked to a course space. The originality of this approach over existing systems is to mix heterogeneous data through the 3A model.

Similarly, we have started to investigate the provision of trust and reputation indicators, based on the structure, comments and ranking generated by users. In e-learning, the development of accreditation systems that can validate students' competencies in personal learning environments is a new challenge.

Currently W3C widgets and Google Gadgets are being added by the means of Apache Wookie and Apache Shindig[3] turning Graaasp into an Opensocial container. Building on this platform, we plan to extend the Opensocial API to export the entire 3A graph so that other researchers and applications could easily use it. Reciprocally we are working toward integrating more external social data applications by the means of standard models for sharing the social graph.

Conclusion

Graaasp is a research platform to grab, aggregate, organize and share heterogeneous data. It is highly extensible. The 3A model and the export functionalities are available to foster collaboration in research on recommendation and reputation construction with heterogeneous social data.

Acknowledgements

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[3] incubator.apache.org/wookie/ & incubator.apache.org/shindig/