Model of Collaborative and Synchronous Navigation for Large Information Space

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ABSTRACT

The paper focuses on the design of synchronous collaborative navigational techniques for information spaces because they play a central role in information searching. We identify four types of collaborative and synchronous navigation that we characterize using the Denver model. We illustrate our approach using our Co-Vitesse prototype that enables users to navigate synchronously on the Wold Wide Web.

Keywords

Design Method, Collaborative/social navigation, Computer Supported Cooperative Work, World Wide Web.

INTRODUCTION

Few systems have been developed to support collaborative search based on synchronous collaborative interaction. On the web, one of the main rationales is the inadequacy of the http protocol to develop synchronous [2][7]. We roughly distinguish two types of systems that support synchronous collaborative search. On the one hand, there are systems such as C-TORI [4] that enable users to synchronously formulate a query. On the other hand, there are systems that enable users to synchronously work on the result space of a query or more generally on an information space. Our work focuses on the synchronous collaboration of users while navigating in an information space. The existence and significance of collaboration in information seeking have been shown in [8]. Observation of a group of students in a library using terminals highlights different types of synchronous collaborative interactions [8]: for example informal exchange occurs when information interests intersect (through a communal resource such as a printer).

In this paper, we focus on the design of synchronous collaborative navigational techniques for information spaces because they are of great assistance in finding information in large spaces. In the following section, we describe the four types of collaborative and synchronous navigation. We then describe the CoVitesse system that implements those types of navigation.

FOUR TYPES OF COLLABORATIVE AND SYNCHRONOUS NAVIGATION

The four synchronous collaborative navigational tasks, that we identified, are named:

- Guided tour: The guide freely navigates and the members follow the guide. A user can join a guided tour at any time. The guide is by definition an expert of the information space and/or the domain.
- Relaxed navigation: This defines an open group without a leader. No objective is clearly defined and this level is completely informal. Users navigate independently. Nevertheless at any time the user can give the control to someone else if she/he needs help.
- Coordinated navigation: There is again no leader. Each member has to explore a predefined section of the space. All the members can accept or decline a newcomer. Each member automatically receives the current findings of the group (for example marked web pages) when leaving the group.
- Cooperative navigation: The leader decides the goal of the group and has the responsibility for accepting a newcomer and for assigning a section of the shared information space to each member. The member can individually work on her/his assigned section until the leader decides to gather the findings of all the members. In addition the leader can group together (" teleport") all the members in a particular location of interest for the group.

THE COVITESSE SYSTEM

The Co-Vitesse system enables the users to navigate synchronously on the WWW. The four types of navigational tasks are explicitly available to the users. Co-Vitesse is based on a single-user application, Vitesse.

The Vitesse system

The Vitesse system visualizes the results of a query submitted to a search engine on the WWW. As shown in Figure 1, the overall graph structure of the results is displayed: each retrieved page (node) and their links are displayed. One retrieved page or node is displayed by a polygon. The selection of a node (double click) enables the user to access the web page. We performed a usability study to identify the relevant information to be displayed inside a polygon [5]. The 2D space is obtained by placing the most relevant retrieved page at the top left of the space.

In Vitesse the user has the choice of the seven visualization techniques of the result space: birdeye view, polar and cartesian fisheyes. In Figure 1, the current visualization technique of the information space is the truncated spherical view. At any time the user can freely switch from one visualization technique to another one (menu "Modalities").

The Co-Vitesse system

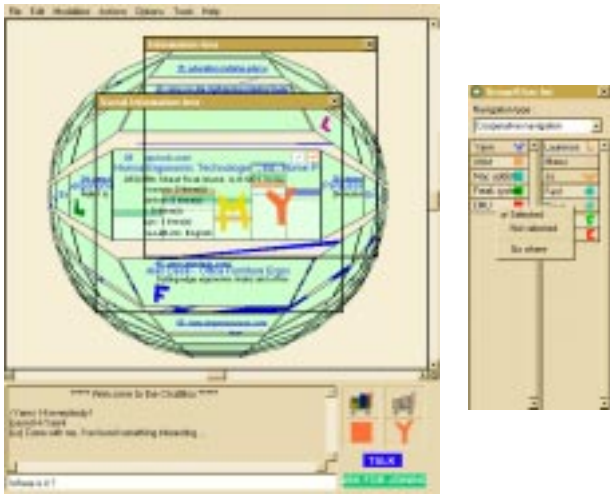

Figure 1: A snapshot from the Co-Vitesse system: main window and the palettes of groups and users.

When starting a session, a Co-Vitesse user defines his/her avatar by a shape and a name. The user then either selects an information space or specifies a query that will be sent to a selected search engine. The results of the query define a new information space. The user can then navigate in the information space, observe other users (in Figure 1, five users are navigating), create or join a group. A chat room, dedicated to the communication between users, is available, under the information space.

The user can make visible an additional window containing two palettes, which are displayed in Figure 1. One palette displays all the single users and the groups in the information space. Selecting a group will make the corresponding members observable on the information space and in the second palette. The user can then opt to only observe some of the members of the group by selecting their corresponding icons. A group is represented by a color and a name. If a user belongs to a group, her/his shape will be displayed in the color of the corresponding group; else a predefined color is automatically assigned to a user.

Additional windows are available through the menus at the top of the main window. The windows are organized according to three sets of tasks: single-user tasks, group tasks and communication tasks (chat room). One of the main single-user tasks is the creation of a group: at any time, a single user can create a group, its objective and its style of collaborative work by selecting one of the four types of navigation. At the end of the session each user collects the findings of the group gathered in his/her bookmark.

Co-Vitesse supports both the semantic and social navigation as defined in [3]. Semantic navigation requires that the underlying semantic relationship in information is spatially displayed on screen. Semantic navigation is supported by Co-Vitesse that displays the information space in which the user can navigate. Social navigation as defined in [3] corresponds to "moving towards a cluster of people or selecting objects because others have been examining them". In Co-Vitesse users can observe groups of users and visited pages. Such social navigation is then supported by Co-Vitesse. For example if several users are located on the same web page, a newcomer in the information space may be interested in visiting the page.

CONCLUSION

The goal of our work, partly presented here, is to gain understanding of collaborative navigational tasks and their design. Four types of navigation have been defined. Our design approach advocates distinction between high level navigational tasks that can be characterized by the Denver model and low level navigational tasks that can be organized according to the Clover model.

In addition collaborative navigation on the web is a concrete and observed phenomenon although few tools support it. Co-Vitesse is a tool that supports synchronous collaborative navigation. Further experimental evaluation of Co-Vitesse with "real" users outside the laboratory must be carried out. Our design is based on observed social behaviors and we believe that the evaluation of Co-Vitesse may lead us to define new types of navigational tasks that are not possible in the real world. Moreover, before starting the experiment, we plan to integrate audio/video communication tools in Co-Vitesse by reusing the ones of our mediaspace [1]. Indeed the textual chat room has been shown not to be sufficient by our preliminary experiments.

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