Chapter 59
Gravizor:
A Graphical Tool for the Visualization of Web Search Engines Results With Multi-Agent Based Modeling

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ABSTRACT

Users of Web search engines are generally confronted to numerous responses that are rarely structured, making it difficult to analyze the available results. Indeed, the linear results displayed through lists ordered according to a relevance criterion, although still widely used, seem often limitless. A solution to this problem is to improve the interfaces for better visualization of large number of results. In this paper, we propose modeling and implementation of a tool for graphical visualization and manipulation of results returned by search engines. The goal is to facilitate the analysis, the interpretation and the supervision of users' information needs. The architecture of the 'Gravisor' tool is based on Multi-Agent paradigm. It is composed of four agents working in full cooperation and coordination. We hope that besides the web information retrieval field, the three graphical visualization modes offered by the 'Gravisor' tool will be a promising alternative for better information visualization in other areas.

INTRODUCTION

The visualization consists in the action to make visible in a material way the action and the effect of a phenomenon (Sallaberry, 2011). Information Visualization (IV) is a research area that aims to aid users in exploring, understanding, and analyzing data through progressive, iterative visual exploration (Shiravi et al., 2012). IV includes any visual presentation of information from a set of abstract data. Historically, information visualization was born in the 90s of the last century from a convergence between research topics from more general areas: Scientific Visualization, Information Retrieval, Human/Machine Interaction and hypermedia. It aims to facilitate the analysis, the interpretation and the supervision of complex phenomena on the one hand and secondly to provide the user with a qualitative understanding of the

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information content. In this paper, we propose the modeling and implementation of a tool named 'Gravisor' dedicated to the graphical visualization of the web search results. The modeling of the 'Gravisor' tool is made based on Multi-Agents paradigm and its implementation is done in Java. To this end, we first present a synthesis of the existing similar works describing the principles, techniques and the best known graphic visualization tools. Then, we present our contribution while detailing modeling and implementation of the 'Gravisor' tool and we give a view of how it works and the functionality that it offers.

PRINCIPLES, TECHNIQUES, AND TOOLS FOR INFORMATION VISUALIZATION

We present in this section a synthesis giving an overall view of the information visualization field: its definition, its categories and criteria for the classification of the visualization system. We then present the different techniques of information visualization such as maps, trees and graphs. Finally, we describe the best known results visualization tools currently available on the web according to an appropriate classification.

Indeed, the domain of visualization techniques is a very rich area; different techniques can be applied according to the purpose and properties of the data itself. Similarly, several important factors related to ergonomics are also to be taken into account in choosing a visualization technique. Generally, a suitable visualization technique must, to the extent possible, meet the following requirements (Bouthier, 2004):

1. Have a global view: allows getting an idea of all the data;
2. Zoom: allows to access, in context, to a specific data;
3. Have a detailed view: allows access to all the details of a specific data;
4. See relationships: allows focusing on the relationships between the data and not regarding the data itself.

Classification Criteria for Visualization Systems

A synthesis of the work of Kimani (Kimani, 2002) and those of Gomez (Caprio, 2010) allowed us to identify eight (08) criteria for the description and classification of visualization systems. These are: the dynamic construction, type of adaptivity, personalization, the mode of interaction, the dimension, the representation of the visualization, the conceptual engineering and finally the mechanisms used for the development of the system. All these criteria are summarized in Table 1.

Visualization Techniques

Visualization techniques are used for representation and navigation in a variety of systems, such as digital data, software, networks, file systems and virtual worlds. Many methods for representation and navigation have been developed, among the taxonomy of visualization techniques presented in (Shixia et al., 2014), we retain two important categories: