Adaptive Views as a Mean for Exploratory Semantic Search

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Abstract

The Semantic Web contains well organized information in structured form, what gives opportunity for more effective automated information processing. But its data structure is not directly readable for common users. This with combination of exponentially grooving amount of information on the Web escalates to necessary of additional support for common users to find desired information in information spaces. We hope that possible solution is in exploratory search, which allows users not only to find what they are searching for but it also helps them to understand explored information space. This inspired us to propose navigation approach in the Semantic Web, which helps users to orientate in and explore provided results by search engine and understand relations among results.

Categories and Subject Descriptors

H.3 [**Information Storage and Retrieval**]: Information Search and Retrieval; H.5 [**Information interfaces and presentation**]: User Interfaces

Keywords

Semantic Web, adaptive views, hierarchical search results clustering, graph visualization, exploratory search, view based navigation

1. Motivation

The classical Web was originally proposed as space of linked documents, but this original idea has been naturally changed to the social Web and the Web of linked heterogeneous data [4]. This process had natural flow

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during which web designers made decision to do not use linked heterogeneous data directly but wrap them into dynamically created web pages (linked documents). This decision allows users to stay with exerted tools for the web browsing and navigation. On the other side it complicates machine processing of this data and possibility of personalization of their presentation to users.

This problem is partially solved by expanding Semantic Web, which contains only data with their relations and is not concerned with their presentation to users and possibilities of their applications. Problem of information presentation to users is yielded to researchers that are trying to propose effective form of navigation in this raw data. A lot of approaches of semantic web navigation has been proposed till now that support exploration of domain-specific data [8], browsing with statically defined data visualization [2] and also approaches base on dynamically generated views from ontologies that describe interpretation of domain-specific data [3] and from user models [1] with goal to adopt to user interests and habits [9]. But each of these approaches provides support for only one part of users' navigation during search for information. They are orientated only to support search in the Semantic Web or to navigation in the Semantic Web.

2. Proposed Approach of Navigation

In our work, we proposed novel approach of navigation [6][7] based on exploratory search [5], which utilizes hierarchy of adaptive views to support users' navigation during all phases of search session. This hierarchy contains three types of views on results:

- *Hierarchical search result clusters view* – helps users to understand results provided by search engine and refine their queries;

- *Result details view* – displays details about one result adaptively to result's content;

- *Results graph view* – supports user navigation in information space from identified result.

Hierarchical search result clusters view addresses problem of standard form of results presentation in a list spanning several pages, from which users are not able to understand and explore provided results. We address this problem via results classification into hierarchical clusters, which are presented to users in labelled boxes. To increase usability
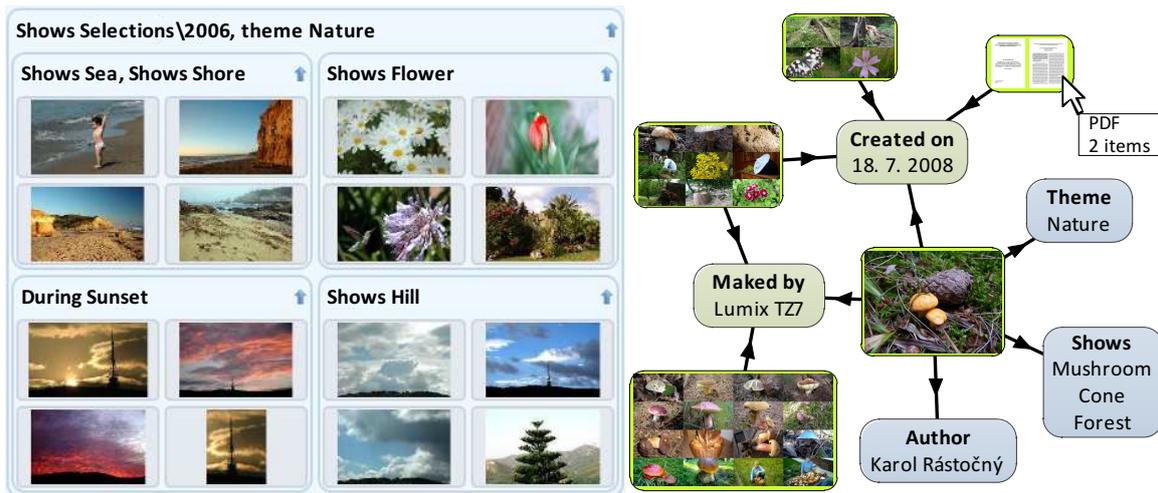
Figure 1: Example of one cluster created from results provided by Factic (left) and visualization of attributes graph (right).

and readability, we present users only two levels of hierarchy at a time, where only four most prominent clusters from the second level with their representatives are displayed (see Figure 1). The next two levels are displayed by double clicking on the cluster.

When users find desired, they can continue in navigation among similar and related results in graph visualization (see Figure 1). By this view we address problems of tabular view, in which users do not seen relations between results. Visualized graph contains three types of nodes:

- *result node* – represents one result. This node is visualized as result's thumbnail;

- *results cluster node* – represents results with same connections, This node's visualization contains thumbnails of clustered results (number of visualized results is logarithmically counted from count of results in the cluster);

- *attribute node* – represents attribute of the result. This node informs users about both attribute's type and its value.

3. Results

We implemented proposed approach as an extension for faceted browser Factic [10], which works with an ontological repository of multimedia content. This prototype was presented to ten volunteers that were asked to solve two tasks and fill out short ranking questionnaire. During these experiments, we decided that proposed concept of navigation is natural, easily understandable and attractive for common users and proposed results views helps users more effectively understand to information space than traditional views utilized in Factic. We have still some readability issues with graph visualization, but we hope that this will be relatively simply eliminated by better layouting algorithm and automatic hiding of nodes that are too far from actual place of navigation.

Although this approach was proposed for arbitrary ontology, it is more usable for data which can be simply represented by apt thumbnails (e.g. photos and movies). It's

usage does not acquit in ontologies of documents, whose thumbnails of first pages have smaller information value than documents' titles, keywords or abstracts.

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