

Exploratory Semantic Video Search with yovisto

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I. INTRODUCTION

In recent years, especially audiovisual media have become the predominant media of the internet. To enable content based video retrieval, high quality textual metadata have to be provided that describe the content. Keyword-based search in general is particularly applicable if the searcher really knows what she is looking for and how to find it, i.e. to know the appropriate keywords to obtain the desired results. But in many cases either the objectives of the searcher are intrinsically fuzzy or she has no idea of the appropriate keywords. Complex search tasks often cannot be answered by retrieving a single document, but require subsequent searches that build on one another. Moreover, if the user tries to achieve an overview of actually available information about a certain topic, today's web search engines are flooding search results by millions. Thus, giving the user no chance to review but the first few resulting pages. Traditional keyword-based search does not consider the meaning (semantics) of the content of the underlying information and result ranking is mainly based on link popularity.

One way to solve this problem is to navigate and explore the search space along guided routes. In this paper we show, how Linked Open Data can be adopted to facilitate an exploratory semantic search for video data. We present a prototype implementation of exploratory video search and show how traditional keyword-based search can be augmented by the use of Linked Open Data.

A. Semantic Technologies and Semantic Search

The Semantic Web is about making meaningful links between heterogenous data sources (Linked Data) to enable persons and machines to explore a "web of data" [1]. The interlinking enables navigation from one resource to another thus to discover complementary and useful information. Semantic search promises to enhance keyword-based search by taking into account the actual content of the information and its semantics. A semantic search system can make use of all the properties of its information resources and their relationships among each other to enable the guided exploration of the search space as well as the possibility for serendipitous discovery.

In the context of the emerging Semantic Web, Linked Open Data (LOD) has become one of the most popular topics[2]. The LOD project aims to identify datasets in the Web that are available under open licenses, re-publish these in RDF [3] and

interlink them with each other. Interlinking resources across various data sources leads to a huge network of data, referred to as the LOD cloud, currently consisting of more than 13.1 billion RDF triples interlinked by more than 142 million RDF links (May 2010) [4].

B. Exploratory Search

In complex search tasks, the user first has to retrieve some facts (i.e. documents containing those facts), which are required to enable further search queries to solve the overall search problem. Often, the user is not familiar with the topic she is searching for, and sometimes, the user isn't sure about her search goal in the first place. This kind of search often is referred to as 'exploratory search' [5]. Contrariwise to faceted search approaches, which aim to further refine a search query by clustering its results according to common properties, exploratory search broadens the search scope by suggesting associated terms, concepts, and resources. These suggestions can be used to navigate among the entire search space and to explore the repository content by user guided browsing [6].

C. The yovisto Video Search Engine

Yovisto is a video search engine specialized in academic lecture recordings and conference talks. Unlike other video search engines, Yovisto provides a fine-granular time based video index, which allows to search within the videos' content. Automated analysis techniques such as scene detection or intelligent character recognition complemented by collaborative annotation features are used for metadata generation [7]. Yovisto allows faceted search to filter and to aggregate the search results and currently provides access to more than 8.000 academic videos. Following the Linked Data principles Yovisto's metadata is mapped to the LOD cloud [6] to enable exploratory semantic video search.

II. YOVISTO - SYSTEM ARCHITECTURE

Unlike traditional recommender systems Yovisto's exploratory search is based on the utilization of LOD interwoven with video metadata to reveal implicit relationships among video data content. In particular we use DBpedia data, which provides RDF information about general domain extracted from the famous encyclopedia Wikipedia [8]. In the course of the exploratory search process first of all the user query string has to be mapped to appropriate DBpedia entities (named

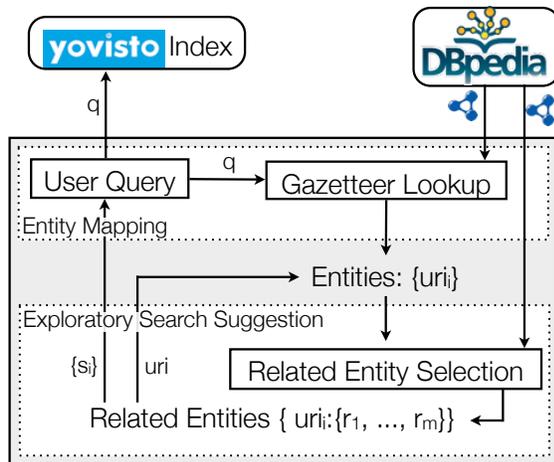


Fig. 1. Simplified Process of Exploratory Search

entity mapping). This has been achieved with the help of a gazetteer list being generated from the DBpedia entity description that provides synonym sets (e.g. labels, URIs, redirects, ...). For every mapped entity we determine a list of related entities ordered by rank. The rank of related entities is determined by a set of heuristics based on graph properties of DBpedia RDF data [9]. Finally, related entities have to be aligned with Yovisto’s search index and are suggested to the user to complement the conventional search results. On the basis of these suggestions the user may start a new queries following content-based associations. Fig. 1 illustrates the simplified workflow.

III. DEMO: EXPLORATORY SEARCH WITH YOVISTO

Fig. 2 shows a detailed section of the yovisto search result page with the exploratory search widget. Conventional search results have been omitted for sake of clear arrangement. The query string ‘obama’ (1) has been mapped to the DBpedia entity ‘Barack Obama’ (2). Relevant related entities are listed underneath headed by their corresponding properties, as e.g., ‘Hawaii is the birth place of Barack Obama’ (3). The number in braces next to the entity label denotes the number of hits in Yovisto’s search index for the according related entity. Each entity can be expanded to show its associated videos in a brief preview (4). By clicking on an entity, a new query is issued (5) replacing the GUI with new results. ‘Breadcrumb’ navigation supports to move back in search history (6).

IV. CONCLUSION

We have implemented exploratory semantic video search by using semantic web technologies and LOD resources. An user centric evaluation of the prototype has proved the positive aspects of the proposed GUI in terms of user satisfaction, search task accomplishment, and motivation [9]. The prototype implementation is online available at: <http://testing.yovisto.com/>.



Fig. 2. Exploratory Search Result

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