Chapter XXVI
Intelligent User–Centric Access to Public Information

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INTRODUCTION

The quantity and diversity of information available from public government sources is now quite large. Most people associate governmental information exclusively with prescriptive information such as laws and regulations. However, governments, especially local ones, are using the Web to provide a number of services that are mainly informative and aim at improving the quality of life of citizens and at promoting the local community, for example job placement services, tourist information, and so forth. Finally, government e-services available to citizens represent one of the most frequent and critical points of contact between public administrations and citizens. In addition to common services such as ID cards and permits, e-services represent the only practical way of providing incentives and support to specific classes of citizens.

The key problem is that information must be findable (Morville, 2002). Easy and effective user-centric access to complex information is therefore one of the most critical functionalities of e-government. Without timely and accurate information, the participation of citizens in the government is likely to be an illusion: in short, no democracy without knowledge.

Traditional access paradigms are not suited to most search tasks, which are exploratory and imprecise in essence. The user needs to explore the information base, find relationships among concepts and thin out alternatives in a guided way. New access paradigms supporting exploration are needed. Since the goal is end-user interactive access, a holistic approach, in which modeling, interface and interaction issues are considered together, must be used and will be discussed in this chapter.

BACKGROUND

Public information is usually managed by four retrieval techniques, which are frequently used at the same time for different subsets of the information base: (a) information retrieval (IR) techniques (Van Rijsbergen, 1979) recently dubbed search engines; (b) queries on structured databases; (c) hypertext or hypermedia links and, (d) static taxonomies, such as Yahoo!

IR techniques are the obvious choice for laws and regulations, since they are essentially textual in nature. However, their limitations, especially in the legal domain, are well known: Blair and Maron (1985) reported that only 20 percent of relevant documents in a legal database were actually retrieved. Such a significant loss of information is due to the extremely wide semantic gap between the user model (concepts) and the model used by commercial retrieval systems (words). Other problems include poor user interaction because the user has to formulate his or her query with no or very little assistance, and no exploration capabilities since results are presented as a flat list with no systematic organization. Recently, clustering techniques have been used to support some sort of exploration by clustering the documents retrieved by an IR query according to "significant" terms or phrases that occur in them. This approach provides a summary for query results and is used for instance in the U.S. government portal, firstgov.gov. Cluster summaries do not address the query problems inherent in IR and do not increase the recall, but rather the precision of the result because they allow users to quickly skip clusters that are not relevant. In addition, the exploratory capabilities offered by text clustering are quite limited (Hearst, 2006; Sacco, 2000).

Database queries require structured data and are not easily applicable to situations in which most information is textual and not structured or loosely structured. They are extensively used for informative, promotional services (e.g., job placement services, tourist information, etc.) because in most cases, they rely on structured information. Like IR, database queries do not support exploration.

Hypermedia (see Groenbaek & Trigg, 1994) is quite flexible, but it gives no systematic picture of relationships among documents; exploration is performed one document at a time, which is quite time consuming; and building and maintaining complex hypermedia networks is very expensive. They are currently used in public information portals to manage e-services, because the number of e-services is reasonably small.

Traditional taxonomies are based on a hierarchy of concepts that can be used to select areas of interest and restrict the portion of the infobase to be retrieved. Taxonomies support abstraction and are easily understood by end-users. However, they are not scalable for large information bases (Sacco, 2006), and the average number of documents retrieved becomes rapidly too large for manual inspection. Solutions based on semantic networks, ontologies and Semantic Web (Berners-Lee, Hendler & Lassila, 2001) are more powerful than plain taxonomies. However, general semantic schemata are intended for programmatic access and are known to be difficult to understand and manipulate by the casual user. User interaction must be mediated by specialized agents, which increases costs, time to deployment and decreases the transparence and flexibility of user access.

DYNAMIC TAXONOMIES

Dynamic taxonomies (Sacco, 1987, 2000, also called *faceted search systems*) are a general knowledge management model based on a multi-dimensional classification of heterogeneous data items and are used to explore complex information bases in a guided yet unconstrained way through a visual interface.

The intension of a dynamic taxonomy is taxonomy, which is a concept hierarchy going from the most general to the most specific concepts. Directed acyclic graph taxonomies modeling multiple inheritances are supported, but rarely required. A dynamic taxonomy does not require any other relationships in addition to *subsumptions* (e.g., IS-A and PART-OF relationships).

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