

Finding without Searching - A Serendipity-based Approach for Digital Cultural Heritage

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Abstract. This paper presents a novel approach for supporting serendipity-based information retrieval systems with regard of different information seeking motivations: seeking for specific information or browsing. We present two working applications that apply the presented methods. Our promising results could contribute to a better understanding of online collections on different device classes, like smartphones, tablets and large screen sized devices, and thus enrich the experience of digital humanities.

Keywords: User centered design, Smartphones and Tablet, Search interfaces

1 Introduction

In the federally funded project *Mediaplattform*⁴, we are researching new and enhanced ways of searching and displaying the online collections of galleries, libraries, archives and museums (GLAMs). Together with our partners we create a working system to retrieve and filter information of digital cultural heritage content in the context of a library platform, respectively museum platform. The applications developed within this research have to meet high requirements in feasibility, usability and performance, as the *Mediaplattform* will represent the Städel Museum in their 200 year anniversary in 2015.

2 Motivation

With todays search engines, finding information is not the challenge anymore, it's thinking outside of the box for a given topic. Modern information retrieval

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(IR) technologies and portals lack the serendipity effect [13] - there is no way of hitting on valuable but serendipitous discoveries, involving a mix of chance and insight [10]. This prevents online portals from being real alternatives to physical collections and complicates research [13]. A serendipity-based approach bears huge potential [1, 11], but due to its lack of systematic control and prediction this effect is difficult to archive in real world information systems [10]. While [3, 1] describes a number of strategies that could contribute to a serendipity effect, these strategies are still apart from the vision of blending “serendipitous content seamlessly into the user’s online environment.” [3]. Serendipitous effects have mainly been tried to achieve by providing chance, rather than by “increasing the rate and accuracy of proposed candidates for serendipitous insight” [1]. We think that this is a little-noticed but important aspect. A working serendipity effect remains to be a desired and futuristic [13], beneficial [2] holy grail in research and practise of search systems. The integration strategy for technology-mediated serendipity has to be selected carefully, matching exactly to a respective search case for a given information need.

3 Novel Approach

We identified two distinctive search cases: 1) the user wants to retrieve specific information, further referred to as direct search and 2) the user has no need for specific information, further referred to as browsing. In the following we describe how serendipity can meet the different requirements.

1) To provide the most relevant information with as few steps as possible, it is necessary to detect the ambiguity of search queries. The disambiguation recommendations need to be based upon structured knowledge in order to perform a hierarchically faceted search. In this search case, the serendipity effect happens when the user follows a recommended disambiguation, out of their curiosity. To increase the possibility that serendipity can occur we recommend to focus the user’s attention on the most important top level facets and their respective sub-facets. To avoid cognitive overload we advise to elide irrelevant facets but to provide at least three sub-facets per top level facet to guarantee diversity. The recommendation algorithm is based on relevance ranking but also grants a room for chance so that a low ranked but diversifying facet will be offered.

2) Browsing can be intentional or unintentional, both without specific goals [2]. In this case we propose to provide a continuous overview of the results and the possibility to compare them with each other. To trigger serendipity effects in such systems we advise to broaden the search results in contrast to 1), where we advise to narrow the search results. This can be achieved by providing recommendations of similar results in different dimensions. Recommendation requires tagged content. We think, that the best tagging approach is a mix of automated methods - like image retrieval - and manual tagging, to provide tags that currently cannot provide feelings-based associations, as explained later on.

Serendipity effects need a period of incubation for the triggers to become useful [11]. Therefore we propose in search case 1) to always display the serendipity

triggers during the whole interaction process of IR, because the trigger is related to the search query, and in search case 2) to display the triggers only, when the user shows interest for an information element, because the trigger is related to the element. We assume that the applied search strategies vary on computers with large screens, tablets and smartphones. Large screen devices might be used according to existing conventions, tablets might be used differently, as there are less strict conventions and the natural user interface invites for explorative approaches. We further assume that on smartphones the user is not willing to interact in a way that requires more screen real estate than on tablets or larger screens, but will utilize direct search and filters more often, regardless if the system is rather positioned similar to search case 1) or 2).

3.1 Library Platform

The library platform offers a direct search, as described in 1). Thereby, a literature search is augmented by a component we call *Topic Wheel*, a novel interaction element for users to apply search facets in a colored, rotatable wheel. If, for example, the user searches for the term “Java”, such facets are “Informatics”, “Indonesia”, and “JavaFX”. The *Topic Wheel* then shows several colored slices representing these facets hierarchically, each slice can be clicked to refine the original search, as shown in Figure 1(a). This way the user is able to rapidly reduce the number of displayed results, get inspiration on further refinements, or try out certain facets to see their impact on the result list. Because the *Topic Wheel* contains further refinements and classifications the user did not know or did not consider, it acts as a serendipitous inspiration to assist and to enhance their search. The *Topic Wheel* also provides the university’s departments as an entry point, addressing the need of basic knowledge about the collection in order to work with keyword based searches [7]. An important success factor for a GUI is that users must not think about how to use it properly [8]. The design goal is to wire the serendipity effect into an easy, non-disturbing visual element. So the color-coded slices form a natural understanding on how the underlying collection is faceted. The possible refinements of the *Topic Wheel* are filled by heuristics operating on collection-statistics as well as on the authority file GND [6].

3.2 Museum Platform

In contrast the museum platform supports a browsing-based search pattern. The shift from a keyword search to a browsing-based search is supported by recommendations to related exhibits. This is fostered by providing the navigation via the content itself in form of images. Each exhibit resource consists of an image, a description text, audios and videos. Together they build a cluster, see Figure 1(b). Each cluster provides recommendations of related exhibits in the five different dimensions of main motive, subject, atmosphere, association and emotion. The first two dimensions describe the content. Thus it is possible to compare images based on their color composition and shapes, similar as image retrieval systems are able to [5]. The latter three dimensions, atmosphere, association

and emotion, describe relations that are based on human feelings. Establishing the user's participation in an exhibition platform can create a contemporary understanding of the exhibitions, beyond scientific understanding [4].



(a) *Topic Wheel* disambiguation recommendations related to the query. (b) Associations on the upper left to the image in the center.

Fig. 1. Visual elements of the two different serendipity-enabling search interfaces.

4 Related Work

Letizia [9] assists the user in automatically retrieving documents of user interest. [1] gives an overview of serendipity fostering IR systems: *Max* aims at inspiring the user by querying search engines with random words within the domain of the user's interest, but proves low in accuracy. In contrast the *Mediaplattform* focuses on providing candidates for serendipitous insights. *Haiku* visualises mined data interactively fostering the support of serendipitous finds. [14] introduced a serendipitous music recommender, based on the users' taste. With *ScentTrails* the user queries keywords and the system highlights hyperlinks on websites that links to content related to the keyword [12].

5 Conclusion and Future Work

Serendipity involves chance, a prepared mind and the act of noticing [3]. Primary research demands for sophisticated utilisation of serendipity-based IR systems and presents initial requirements. This paper pursues these approaches and extends them by proposing further requirements that ensues from different information seeking motivations like seeking specific information or browsing. Also we present two distinctive working applications as a seamless implementation of the proposed principle. We will continue our research in regard of automatic

personalisation as it seems to be a promising amplifier for the serendipity effect. If the user's interest is known to the system, serendipity can be triggered not by chance but by purpose, as offered information can tie on to existing knowledge.

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