A Novel Strategy for Recommending Multimedia Objects and its Application in the Cultural Heritage Domain

Massimiliano Albanese, George Mason University, USA
Antonio d’Acierno, ISA, National Research Council, Italy
Vincenzo Moscato, University of Naples, Italy
Fabio Persia, University of Naples, Italy
Antonio Picariello, University of Naples, Italy

ABSTRACT

One of the most important challenges in the information access field, especially for multimedia repositories, is information overload. To cope with this problem, in this paper, the authors present a strategy for a recommender system that computes customized recommendations for users’ accessing multimedia collections, using semantic contents and low-level features of multimedia objects, past behaviour of individual users, and social behaviour of the users’ community as a whole. The authors implement their strategy in a recommender prototype for browsing image digital libraries in the Cultural Heritage domain. They then investigate the effectiveness of the proposed approach, based on the users’ satisfaction. The preliminary experimental results show that the approach is promising and encourages further research in this direction.

Keywords: Information Overload, Multimedia Browsing, Multimedia Information Retrieval, Multimedia Ranking, Recommender Systems

1. INTRODUCTION

Multimedia data allow fast and effective communication and sharing of information about people lives, their behaviors, work, interests, but they also are the digital testimony of facts, objects, and locations. The widespread availability of cheap media technologies (e.g., digital and video cameras, MP3 players, and smart phones) dramatically increased the availability of multimedia data. Images and videos are used, by media companies as well as the public at large, to record daily events, to report local, national, and international news, to enrich and emphasize web content, as well
as to promote cultural heritage. Furthermore, through digitization of all types of data and records, multimedia data plays an increasingly critical role in government administration, from security and justice to the health system.

As a result, huge data collections, in the form of digital video and image libraries, digital documents, news archives, shopping catalogs, virtual museums, and so on, are widely available, determining the well-known problem of information overload. From such a massive amount of data, it is very difficult for a common user to obtain her/his preferred ones, and despite the great amount of research work done in the last decade, retrieving and suggesting information of interest from very large repositories still remains an open issue, especially in the case of multimedia collections.

To cope with this problem, a number of algorithms and tools – generally referred to as Recommender Systems – are being proposed to facilitate browsing of large data repositories, and thus to realize the transition from the “era of search” to the “era of discovery”. Recommender systems help people in retrieving information that match their preferences by recommending products or services from large number of candidates and support people in making decision in various contexts: what items to buy (Zhang & Wang, 2005), which movie to watch (Qin et al., 2010) or even who they can invite to their social networks (Kazienko & Musial, 2006).

They are especially useful in the environments with a vast amount of information where it is difficult to express the semantics of a query since they allow an automatic selection of a small subset of items that appears to fit to the user needs (Adomavicius & Tuzhilin, 2005). The main problem for multimedia is that the semantic gap between users and contents is sometimes so large that very little previous work succeeds in building an effective multimedia recommender system.

In such a context, the main goal of this work is to present a novel approach to recommendation for multimedia objects, based on an “importance ranking” algorithm that strongly resembles the well known PageRank ranking strategy (Albanese et al., 2011). We propose a method that computes customized recommendations by originally combining intrinsic features of multimedia objects (low level and semantic similarities), past behavior of individual users and overall behavior of the entire community of users. Eventually, we have implemented the proposed strategy in a software prototype for browsing digital libraries related to a famous on-line collection of paintings and measured its effectiveness with respect to a user-centric evaluation.

The paper is organized as follows. Section 2 presents some motivating examples that justify the utility our work in different contexts related to Cultural Heritage domain. Section 3 discusses the state of the art of recommender systems, including those applied in the multimedia realm. Section 4 shortly describes the proposed strategy for recommending multimedia objects. Section 4 illustrates the system architecture and provides some implementation details. Section 6 reports preliminary experimental results; finally, Section 7 gives some concluding remarks and discusses future work.

2. MOTIVATING EXAMPLES

In this section we report two typical scenarios in the Cultural Heritage domain that aim at showing how a recommendation system could desirably work during both a virtual – but also a real – visit of an art gallery.

First, let us consider an on-line art museum offering web-based access to a multimedia collection of digital reproductions of paintings. For instance, let us consider users visiting such a virtual museum and suppose that they request, at the beginning of their tour, some paintings depicting the “Bacchus” subject. While observing such paintings, they are attracted, for example by Caravaggio’s painting entitled “Self-Portrait as Sick Bacchus” (Figure 1a). It would be helpful if the system could learn the preferences of the users, based on these first interactions and predict their future needs by suggesting other paintings representing the
16 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the product's webpage:

www.igi-global.com/article/novel-strategy-recommending-multimedia-objects/61309?camid=4v1


www.igi-global.com/e-resources/library-recommendation/?id=2

Related Content

An Innovative Multiple-Object Image Retrieval Framework Using Hierarchical Region Tree

www.igi-global.com/article/an-innovative-multiple-object-image-retrieval-framework-using-hierarchical-region-tree/95205?camid=4v1a

Wireless Video Transmission

www.igi-global.com/chapter/wireless-video-transmission/21315?camid=4v1a
HaMA: A Handicap-based Architecture for Multimedia Document Adaptation
www.igi-global.com/article/hama/182651?camid=4v1a

The Ethics of Reverse Engineering for Game Technology
www.igi-global.com/chapter/ethics-reverse-engineering-game-technology/50735?camid=4v1a