Weight-Aware Multidimensional Advertising for TV Programs

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ABSTRACT

Given ongoing developments in the digital television industry, the consumption habits of consumers are substantially influenced by advertisements, which become the main revenue source for TV broadcasters. Therefore, the effective deployment of advertisements is necessary. Digital television is a thriving sector and the number of channels continues to increase, so that the various dimension information of data on electronic programming guides overwhelm the advertisement recommendation systems for TV programs. In this paper, considering the viewing scenarios the users viewed in the different types of television program, the authors present a weight-aware multidimensional model approach that focuses on the different weights of advertisement or program content parameters and their interrelationship. Furthermore this study is the first attempt at applying the approach to advertisement recommendation. The authors introduce an empirical measure for obtaining the weight values of dimensions, and present the similarity measure model, which enhances accuracy and convergence in advertisement recommendations. The experiment and evaluation show that our approach outperforms the previously reported fuzzy clustering technique.

Keywords: Collaborative Filtering, Recommendation System, Scenarios, Similarity Model, TV Advertising, Weight-Aware Multidimensional Model

1. INTRODUCTION

As digital television thrives and the number of channels increases, television has become a more and more popular medium of entertainment and information (Collazos, Rusu, Arciniegas, & Roncagliolo, 2009; Silva, de Abreu, Pacheco, & Almeida, 2011). It is also widely recognized as the best avenue for product and service advertisements (Velusamy, Gopal, Bhatnagar, & Varadarajan, 2008). The delivery of advertisements should be tailored in accordance with viewers’ needs or interests (Li, Lu, & Xuefeng, 2005; Peng, Bo, & Hong-wei, 2010). Television broadcasters deploy advertisements during commercial breaks, during which achieving a lasting effect on consumers is critical.

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The work of Kosala and Blockeel (2000) and Smyth and Cotter (2000) states that advertisements relevant to programs aired have a better chance of making a good impression on viewers. As stated in Velusamy, Gopal, Bhatnagar, and Varadarajan (2008), advertisement and program content matching is considered as one of the most important parameters in advertisement recommendation. Advertisement content should include dimension information that mirror the presence of objects, people, celebrities, and events in a program. In the process of advertisement push, considering the inter-relationship between these dimensions from a multidimensional perspective and integrating them into a model are favorable approaches. For example, in advertising the same product brand, using a cartoon star as spokesperson or using a cartoon scene as advertisement content can let the audience think this advertisement is related to the current channel, when aired over a cartoon program/channel, as the celebrity and events in the advertisement is related to current scenario. Within the parameters mentioned above, differences in weights may be observed. Moreover, the same dimension’s weight is different due to the different types of programs. For example, in advertising aired over a cartoon program/channel, using a related celebrity as spokesperson would have a stronger influence than does a related event; furthermore in advertising aired over a sports program/channel, the influence difference between a related celebrity and a related event would not be so obvious. To obtain more accurate and convergent advertising, determining the weight of each content dimensions is necessary in the effective matching of an advertisement to a particular type of program.

To the best of our knowledge, we are the first to present a weight-aware multidimensional model approach, which takes into account the scenarios in the watching different channels to precisely define the relevant content dimensions and its weights of advertisements and programs. Furthermore, we applied this model to the application of TV advertising recommendation based on CF (collaborative filtering) (Breese, Heckerman, & Kadie, 1998; Herlocker, Konstan, Terveen, & Riedl, 2004; Su & Khoshgoftaar, 2009) which is a popular method for recommendation systems to recommend non-persistent items based on the preferences of other members, to verify its effectiveness. Being more accurate and convergent, this method is especially applicable in multidimensional information applications such as EPG (electronic program guide) (Bär, Berger, Egger, & Schatz, 1998; Tsunoda & Hoshino, 2008) data, making it a highly desirable approach in advertisement recommendations for TV programs.

2. RELATED WORK

Several studies have been devoted to advertisement recommendation approaches. The work of Lekakos and Giaglis (2004) presents a lifestyle-based approach for the delivery of personalized advertisements in digital interactive television, in which the delivery of advertisements is tailored to individual viewer profiles on the basis of user needs and interests. In such tailoring, advertisement/program content is not considered.

The fuzzy clustering technique proposed by Velusamy, Gopal, Bhatnagar, and Varadarajan (2008) captures the features of video advertisements in terms of annotations derived from MPEG-7 descriptions (Hölbling, Pleschgatternig, & Kosch, 2010; Mokhtarian & Bober, 2011), and these annotation keywords are systematically grouped into a number of predefined semantic categories by a categorization technique. In contrast to our approach, that of Velusamy, Gopal, Bhatnagar, and Varadarajan (2008) largely relies on splitting the annotations, which, according to Karatzoglou, Amatriain, Baltrunas, and Oliver (2010), may lead to loss of information on the interactions among different settings. In a sports product advertisement, for example, an athlete would be a more convincing product presenter and endorser. A more sensitive approach that integrates various related advertising dimensions is therefore required to accurately reflect the association among
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