

PERSONALIZED DIGITAL TELEVISION

HUMAN-COMPUTER INTERACTION SERIES

VOLUME 6

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The titles published in this series are listed at the end of this volume.

Personalized Digital Television

Targeting Programs to Individual Viewers

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Preface

This book collects selected research reports on the development of personalized services for Interactive TV. Drawing upon contributions from academia and industry that represent current research in the US, Europe and Asia, these articles represent leading research in personalized television. The individual contributions have been carefully selected by the editors from a pool of about 60 papers presented at four professional meetings in this area, namely:

- TV01 (<http://www.di.unito.it/~liliana/UM01/TV.html>), which was held within the UM'01 International Conference on User Modeling in Sonthofen, Germany;
- TV02(<http://www.di.unito.it/~liliana/TV02/index.html>), which was organized in connection with the AH2002 Adaptive Hypermedia Conference in Malaga, Spain;
- TV03 (<http://www.di.unito.it/~liliana/TV03/index.html>), which was held within the UM 2003 International Conference on User Modeling in Johnstown, PA, USA;
- EuroITV'03 (<http://www.brighton.ac.uk/interactive/euroitv/index.htm>), the 1st European Conference on Interactive Television, held in Brighton, UK.

The book also includes four papers selected for publication in the special issue on User Modeling and Personalization for Television (<http://www.di.unito.it/~liliana/UMUAI-TV/>) of the Kluwer Journal “User Modeling and User-Adapted Interaction: The Journal of Personalization Research”.

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Introduction

TV viewers today are exposed to overwhelming amounts of information, and challenged by the plethora of interactive functionality provided by current set-top boxes. While there are hundreds of channels with an abundance of programs available, and large amounts of material that can be retrieved from digital video archives and satellite streams, the available meta-information about this content is poor, so that an informed selection of one's preferred choices is almost impossible. As a result, TV viewers waste a lot of time browsing the available options or end up watching a very limited number of channels.

Future Digital Television (DTV) will have to take usability issues thoroughly into account, to ensure broad adoption of this technology by consumers. Information overload already represents a serious problem for the Internet. It is even less acceptable in DTV because it threatens the entertainment and leisure objectives that most TV viewers have, forcing them to engage in extended information retrieval each time they want to watch a TV show. Serious attention must therefore be paid to facilitate the selection of content on an individual basis, and to provide easy-to-use interfaces that satisfy viewers' interaction requirements.

Given the heterogeneity of TV viewers, who differ e.g. in interests and skills, the provision of personalized services seems to be the only solution to address the information overload problem in an effective manner. The User Modeling and the Intelligent User Interfaces communities have therefore focused on the following main lines of research:

- The provision of Electronic Program Guides recommending TV programs on an individual basis, to prevent users from "being lost in TV program space".
- Information retrieval tools to help users select interesting content in the cases where a prior categorization of the content is not possible (e.g., in news shows).
- The design and development of tools that help users explore large amounts of broadcast television content.
- The provision of adaptive interactive content that can be presented in a personalized way, depending on the viewer's interests.
- The design of suitable user interfaces that enable TV viewers to perform advanced tasks in an intuitive and efficient manner, which is essential for rendering Digital TV usable by any type of viewer, and not merely technical pundits.

Fundamental challenges that must be addressed to enable personalized television include:

- *Viewer Modeling*: The acquisition, representation and utilization of information about viewers, such as their characteristics (e.g., gender and age), preferences, interests, beliefs, and their viewing behavior. This includes models of both individual viewers and groups of viewers.

- *Viewer Identification*: The recognition of the TV viewer(s), which is the basis for the provision of personalized services.
- *Program Processing*: The automated identification, indexing, segmentation (e.g. into components, stories, commercials), summarization, and visualization of television programs, such as interactive documentaries.
- *Program Representation and Reasoning*: representing the general characteristics and specific content of programs and shows, including the possible segmentation of programs into parts. Reasoning about what may make one program similar or dissimilar to others. This can include a range of techniques, including recommendation techniques based on collaborative filtering (e.g., finding unseen programs that others with similar preferences have enjoyed), content analysis, clustering, and data mining.
- *Presentation Generation and Tailoring*: The selection, organization, and customization of television material based on viewer queries, processed programs, and viewer models.
- *Interaction Management*: The design and development of methods of human computer interaction for television, including mechanisms for attention and dialogue management.
- *Evaluation*: The assessment of the benefits for users, including measuring the precision of the techniques to model TV viewers' preferences, the precision and recall associated with the ability of users to find programs they care to watch, the speed and accuracy with which adaptation can be performed, the users satisfaction with the process and result, and the (real or perceived) cognitive load that the system places on the user.

This volume collects leading research addressing some of these challenges. Its chapters have been selected among the highest-quality articles about personalized DTV. The book is organized in three sections:

- The *Electronic Program Guides* (EPG) section includes six papers representing the state of the art in the development of personalized EPGs that customize program recommendations to TV viewers. The described work addresses the identification of the TV viewer's preferences and the personalized recommendation of items to individual users and to groups of users, as is typical of household environments. This section also includes an analysis of TV viewers aimed at defining stereotypical TV viewer classes based on similarities in viewing behavior.
- The *Broadcast News and Personalized Content* section includes three papers presenting the most recent results in the personalization of broadcast (multimedia) content. The papers are concerned with the analysis of the individual TV viewer's information goals, and the subsequent selection of the most relevant news stories. Moreover, the papers propose solutions to the customization of the type and amount of information to be conveyed to viewers, based on an underlying model of the content to be presented. The specification of

meta-level information and the integration of information retrieved from external sources are proposed to extend the presented content and to support the provision of personalized views of such content.

- The *iTV User Interface section* is focused on the design of interactive user interfaces for Digital TV. The two papers included in this section present, respectively, a user-centered approach to the design of the User Interface for a personalized EPG, and a pilot study aimed at evaluating the suitability of 3D interfaces in the exploration of the content in the TV world, including broadcast TV programs and content sharing between TV users.

The papers collected in this book represent the state of the art in personalized recommendation and presentation of TV content. In several cases, the presented proposals have been exploited in commercial applications, which provided positive feedback about the applicability of the approaches in real-world scenarios. The collected experience is also very important for the identification of open research issues that will need to be addressed in the development of future DTV services, a field still in its infancy, but with many opportunities ahead.

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