Using Agents for Improving Multimedia Virtual Environments Personalization

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ABSTRACT

Nowadays several systems can personalize their user interface according to users profile. This fact is very common in e-commerce systems where this can improve the sells. Besides, this kind of systems focuses web convencional applications basing their aproach in web navigation models and user profiling. This paper presents a proposal to adopt personalization techniques in multimedia virtual reality interfaces environments. Our proposal is based on an agent structure. This agent is an avatar that uses a personalization approach for guiding the user in a multimedia presentation throught a 3D virtual enviroment. Besides, we discuss a real representation for the avatar using a robot. This special property turns possible the communication between virtual and real worlds

KEYWORDS Virtual Reality, Multi-media, Agents, Personalization.

RESUMO

Hoje em dia, existem vários sistemas que permitem personalizar suas interfaces com usuários a partir de perfis. Este fato é muito

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comum em sistemas de comércio eletrônico onde inclusive pode auxiliar a aumentar as vendas. Porém, este tipo de sistema geralmente foca em aplicações web convencionais baseadas em navegação hipertexto e modelo de usuários. Este artigo apresenta uma proposta para utilização de técnicas de personalização em ambientes de realidade virtual e multimídia. Nossa proposta é baseada numa estrutura de agentes. Este agente pode ser visualizado como um avatar que utiliza mecanismos internos de personalização para guiar usuários nesse ambiente virtual. Além disso, discutimos um representação real para o avatar utilizando robôs. Esta propriedade especial torna possível a comunicao entre mundos virtual e real de forma eficiente.

PALAVRAS CHAVE Realidade Virtual, Multi-mídia, Agentes, Personalização

1 Overview

Today the Internet is part of people day-by-day things to do. Since the Internet boom, an increasing number of people use computer for perfoming different activities. The Internet2 Project (1) brought conectivity and made possible the design of web applications using multimedia resources and virtual reality interfaces. Multimedia resources bring to Internet non textual information as videos and audio making user interfaces more attractive and dynamic. Multimedia interfaces are specially interesting for entertainment industry which invests millions of dollars in movie channels and interactive TV applications (2). VR interface provides to users other ways to interact with the application. Virtual Reality (VR) (3) is a high-end user interface that involves the user into a 3D model application so that human users will feel immersed

in a virtual world. Besides, VR techniques brings real worlds to users as the Mars exploration by using a UV (Umnanned Vehicle) called the Mars Exploration Rover (18).

On the other hand, the information growing in the Internet brought new challenges to user interfaces developers. In the past WYSIWYG interfaces enable a positive anwer to the question: "What you see is what you get?", nowadays the new challenge is the question could be: "What you see is what you really want?"

Personalization of Web content is one of the fastest-growing segments of the Internet recent research areas. The idea of personalization systems is based on one human being's personal characteristics. This dataset is also called a profile and can be used for reduce the information overload and give to users a more customized view of Web information. This approach has been explored mainly for e-commerce applications the become a multimillion-dollar industry helping web customers from all the world. From this point of view, the Personalization Consortium (4) defines personalization as the combined use of technology and customer information to tailor electronic commerce interactions between a business and each individual customer.

Clearly, working in personalization systems is closely related to building better user interfaces. Besides, many personalization systems consider only the user needs in web conventional applications. We propose a novel aproach for building personalization systems focusing virtual reality web interfaces. Also, we intend that personalization rules do not consider only user (or client) view but takes into account requirements from the information provider too. This information provider could be an advertiser in an e-commerce application or a custodian in a digital museum exibhition, for example.

2 Related Works

Our approach involves the delevopment of user interfaces based on personalization issues for multimedia virtual reality Web applica-

tions (see Figure 1).

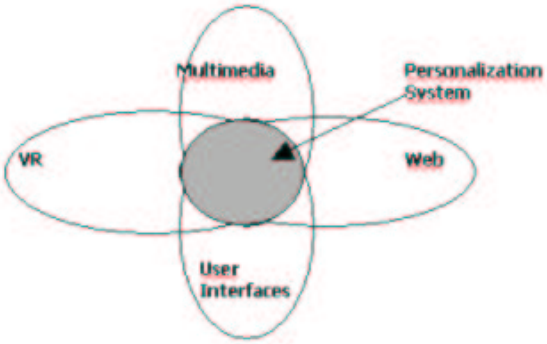

Figura 1. Context of the Proposed Work.

Beginning with VR world. Note that today is very common visiting a great number of museums and libraries through the Internet. Museums such as the Louvre (5) in Paris, Van Gogh (6) in Amsterdam and Museum of Contemporary Art of Chicago (7) are some examples. The information contained in those culture centers is decentralized and popularized through the net. Even so, the virtual environment and personalization potentialities had still not been explored effectively in this systems. For example, why not turn possible an individual view of an artist exhibition for each visitor. Also, the interaction modes in this kind of application still limitted to conventional web interaction possibilities. With the goal of overcome this limitations, we are working in a virtual cultural space called ICSPace (8). ICSpace uses the web for extending the real museums walls increasing the exhibition capacity and the scope of those institutions. ICSpace works with any kind of cultural manisfestations represented for digital medias and it presents these works using VRML interface.

Multimedia applications growed faster during the last few years. Many business areas use this facility but it is fundamental to entertainment one (2). Games and videos are provided in web si-

tes and attract a large number of users. The intersection beetwen multimedia and telecommunications is other promising area mixing TV, communication and Internet.

The glue beetwen Multimedia, VR and Web application is the User Interface (UI) or what the user see in any application. We are investigating UI methods and techniques related with this kind of interfaces. We are also considering methods for user profile description (profiling) and techniques to use the profiles to meet personalization requirements.

Personalization systems cover a range of different related areas. The most current personalization method is the preference or profile based one. This method allows the real one-to-one personalization and it can be applied for a large number of custumers. For implementing profile based personalization many methods and techniques is be used. Among them, special atention must be given to AI based technologies, such as neural networks, bayesian networks, fuzzy logic and reasoning (9; 10).

3 The Proposed Agent Description

A very common history in applying IA techniques in a real market is the one that used the data mining to analyze local buying patterns. In one grocery chain they discovered that when men bought diapers on Thursdays and Saturdays, they also tended to buy beer. So, the grocery move the beer display closer to the diaper display resulting in better sale during this period (11).

This idea is very closely with the agent that we are proposing. We intend to apply IA techniques to find profiling and personalization issues relationships. The result of this phase is employed to define how multimedia must be presented for the users in VR environments. Based on related proposals (12; 13; 14) our aproach is structured in four steps (see Figure 2):

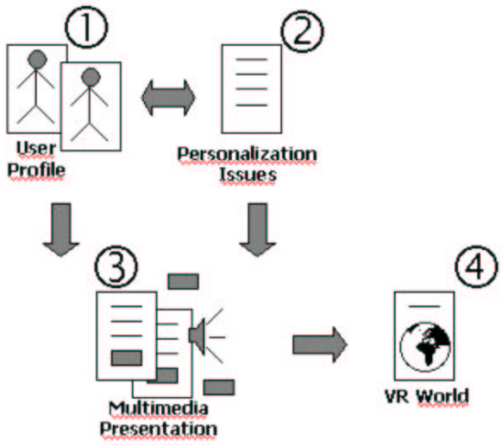

Figura 2. The proposal system fundamental steps.

3.1 User Profile (Profiling)

Defining the user profile is a fundamental phase in personalization systems. A user profile is created from the user's actions. This means that the user's actions have to be collected and stored. So, the system has to know what information is relavant and what is not. In RV applications we have to consider a major set of possible actions as position, proximity, rotation and touch and how it is related with the analysed feature. According with (**?**) the special feature of a user profile is its dynamic nature. User interests may change in a short period of time and the profile should be able to adapt itself accordingly.

3.2 Personalization Issues

Personalization issues are the rules that define the relations beetwen the user profile specification and the multimedia virtual environment presentation. In this phase we intend to detect behavior patterns that can identify users groups. For example, depending on the user hardware a video or a graphical object can be

presented with different resolution. This kind of rules map user restrictions into alternative solutions for display the multimedia virtual environment. Besides, we can suggest multimedia presentations, in a museum context it seems like a guided visit where the visitor (user) will be taken for the application guide (the agent) through the virtual environment.

3.3 Multimidia Presentation

In order to validate the ideas proposed, we intend to implement this agent into an internet virtual museum web site. In this web place the medias represent photos, paints, poeties, plays or movies. This medias can be shown alone or grouped forming expositions. Moreover, an exposition can contain different kinds of medias. For adjusting the medias to a specific user profile we intend to use techniques to control the multimidia presentations envolved in the virtual environment interface.

3.4 VR and Real Worlds Communication

The last step is implementing in VR and real worlds communication tools. For do that we are working with a VR interface which integrates users and medias into a museum virtual building. Our study case will be the ICSpace VRML environment with their tematic rooms organizing the medias and their presentation to users or visitors. ICSpace includes a special hall which represents Casa da Ribeira, a real cultural space. In this hall we plan to mix VR and real world entities by using a robot. This robot is represented in the VR model as an avatar. Other research point is the communciation beetwen real and virtual users where we intend to discuss virtual life concepts (15).

For example, imagine the situation ilustrated in Figure 3, where we have a virtual implementation of an existing real world (ICSpace and Casa da Ribeira). In the real world we have three visitors and a robot (see "R" in Figure 3) as an ER1 robot from Evolution Corp. (16). The visitors are looking two works of art (identified as 1 and 2). The author of this exposition is out of the city but

he wants to introduce their own works to visitors. So, the virtual interface can be used linking real and virtual worlds. The author use the virtual application were he will be represented by an avatar (with his own profile) for guiding the visitors (see "Ar" in Figure 3). In the reak world movements the robot will be sinchronized with the virtual avatar. This way, the robot will be used as a real world avatar. The robot will perform his actions in the real world. On the other hand, the visitors will be also represented in the virtual world as avatars (see "Ar" in Figure 3) and they will communicate with the author through the robot (equiped with microphone and speakers). In addition, Internet users (see "Ar" in Figure 3) wil perceive the presence of the real world visitors and of the author.

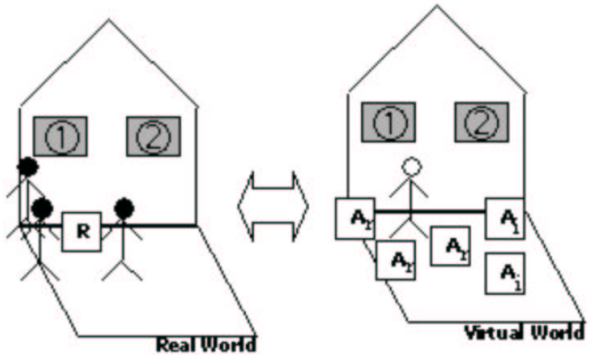

Figura 3. Virtual - Real worlds relationship.

4 Conclusions and Perspectives

This work presented a proposal for multimedia virtual environments personalization. For that, we intend to approach different research areas considering both a practical and a theorical viewpoints.

The practical one involves an apropriated infrastructure in

terms of hardware and software. Actually we are working hard on ICSpace implementation (see Figure 4) and providing real spaces partners as Casa da Ribeira. Casa da Ribeira is an important regional cultural center with to main spaces: the theater, where are presented musical concerts and plays, and the show room where the exposition are organized. The first virtual hall of Casa da Ribeira is a rejoinder of the show room space. We intend to put inside this space an multimedia kiosk for the real visitors take part of the virtual hall. Other idea is the ER1 one, putting an robot to provide interaction between real and virtual visitors.

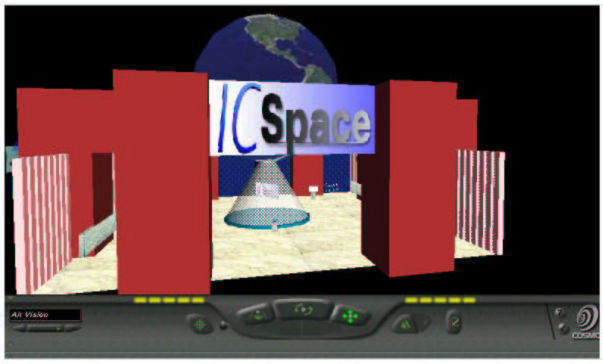

Figura 4. ICSpace VR Interface.

By the way, we need to elaborate a theorical foundation specially when we talk about personalization issues which envolves many complex areas as IA techniques. The first step is to construct a user profile manager with different models of users and their preferences. Some patterns can be used for do that as P3P (Platform for Privacy Preferences) (17). But we still have to resolve how we will integrate profiling with 3D application actions defining the user actions semantics.

Currently, an ICSpace prototype is already implemented. We have video and audio cells operational. The module that deals with the insertion of the work of arts is also implemented with CGI forms. We are now working in the implementation of groupware

tools to promote cooperation among users (and soon with real and virtual users). We intend that ICSpace becomes a multimedia virtual environment with personalization issues which main goal is to promote cultural exchange through the Internet, integrating people, artists and breaking spatial barriers.

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