Towards an Architecture for an Adaptive Persuasive System

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Abstract. Marketing is essential to the survival of any product. Marketing a product is persuading people that the product can benefit them and meet their needs. Due to the diversity among people, a successful marketing strategy needs to adapt to individuals. Moreover, for certain products such as houses, the final decision tends to involve a group of people rather than an individual. In this paper, we propose an architecture for a system that produces an interactive video, which can adapt to a user or a group of users to promote a new product.

1 Introduction

According to consumer behaviour theory, lifestyle is the motivation for buying [1] and this has been applied heavily in marketing. Salespeople often present a product in a different way to each customer to maximise the chance of selling it. The need for utilising lifestyle has also been acknowledged for adaptive hypermedia [2], but very few systems have addressed this.

In contrast to recommender systems that try to find a product that suits the user, we are investigating how to sell *one specific product* to a user or a group of users (e.g. a course or a house). So, we will deal with the user(s) a limited number of times, and are unlikely to know their opinions on similar products. However, we can find out which features of our product were liked or disliked by previous users (who may or may not have bought our product). This can be used to predict the opinions of a new user based on their similarities with the previous users. Hence, we propose a solution that combines a lifestyle-based approach and collaborative filtering to anticipate which product features should be presented to the user. The system promotes a product by showing the user(s) an interactive and personalised video.

2 Architecture

As discussed in [2], the adaptation process consists of 3 stages: acquiring information about the user, processing the acquired information to build or update the user model, and finally using the user model to provide the adaptation. Our proposed architecture, shown in Figure 1, follows this 3-stage model. Each component of the architecture will be explained in detail in the following sections.

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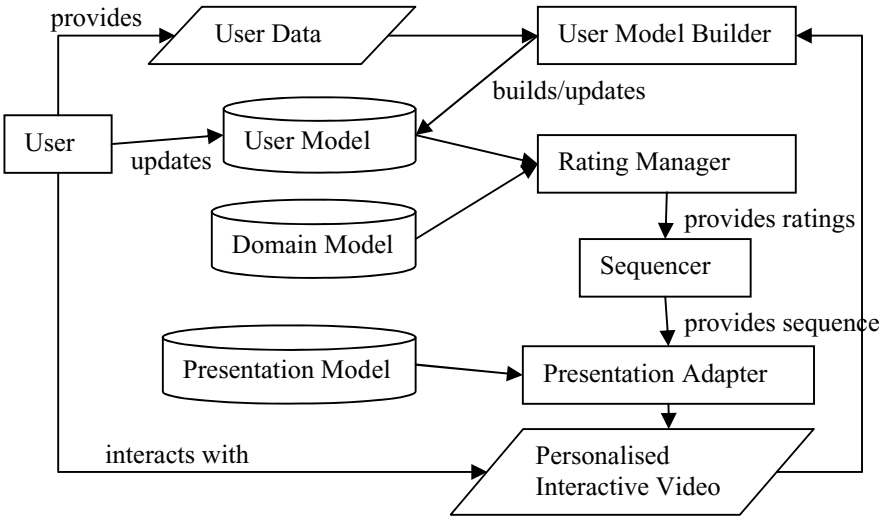

Fig. 1. System architecture

2.1 The User Model Builder and User Model

The User Model Builder handles the first and second stage of our adaptation process. It processes data provided by the user to build the User Model of our system. It collects data about the user by asking him/her to answer an "adaptive" questionnaire when they use the system for the first time. The questionnaire mainly consists of questions about the user's background and lifestyle. Adaptive techniques used in hypertext systems can be applied in the process of administrating the questionnaire. For example, if a user is single and young, then the system will not ask if he or she has any children. These adaptations will be partly based on stereotypes. The questionnaire will take the form of a conversation, rather than a form to fill out. Once the initial User Model has been built, it can be updated explicitly by the user or implicitly by the User Model Builder based on observations of the user's interaction with the system.

2.2 The Domain Model

The Domain Model holds both positive and negative facts about the product that we sell. Each fact describes a feature of the product and a possible benefit or drawback to the user, and carries a weight (1 = small impact to 5 = large impact) to express the size of the benefit or drawback. If a fact is negative, we also add in a counterargument to overcome the disadvantage. For example, if we sell a house, we might have two positive facts about the garage and one positive and two negative facts about a nightclub nearby as shown in the tables below. The weight of the garage providing a parking space depends on how difficult parking tends to be in that area; the weight of the nightclub's noise depends on how close the nightclub is and how loud the music.

Feature	Benefit	User characteristic	Weight
Garage	No worry about a parking space	Has a car	5
Garage	Can be turned into a playroom	Has young children	2
Nightclub	Entertainment on your doorstep	Likes going out	4

Feature	Drawback	Counterargument	User characteristic	Weight
Nightclub	Noise	Double glazing	Has young children	4
Nightclub	Possible violence	Never noticed	Any user	2

2.3 The Rating Manager

Unlike other adaptive systems, which collect users' opinions about a product by asking them to rate similar products, our system will predict how important each product feature is for influencing the user's opinion. This function is carried out by the Rating Manager, which first rates each fact in the Domain Model with respect to the user. It then calculates a rating for each feature by combining the ratings of its facts. The Rating Manager can rate a fact in two ways. The first approach is based on the User Model providing a likelihood of the user having the characteristics that make this fact important (like having a car). The second approach applies Collaborative filtering in which the user's predicted rating of a fact is based on the rating of that fact by previous users that are similar to the user. We will use a hybrid of these two. The end results might look as follows, for two users who are buying a house together:

	Garage	Bedroom	Lounge	Kitchen	Garden	Nightclub
John	10	4	3	9	6	10
Adam	1	9	8	9	6	3

2.4 The Sequencer

Given the ratings, the Sequencer first decides which features will be brought to the attention of the user. Clearly, showing features that the user dislikes will not increase our chance of selling the product. However, sometimes even negative features will need to be presented. For instance, when presenting a house, you cannot simply skip the kitchen. When selling to a group of users, ratings of individuals will need to be aggregated into a group model. For this, we will use the strategies proposed in [3], but with different weights for different users (e.g. children getting less weight). Additionally, time-constraints and avoiding information overloading for the user should be considered.

Secondly, it decides in which order to present the chosen features. The order can affect the user's mood and opinion, due to emotions wearing-off over time and assimilation effects (i.e. the user's mood impacts their reaction to new facts) [4]. So, it is not best to present features simply in the order of rating. Excellent features may need to be interleaved with less good features. A logical domain order should also be considered (e.g., discussing adjacent rooms in sequence). Finally, it uses a similar process to decide for each chosen feature which facts to present and in which order.

2.5 The Presentation Model and Presentation Builder

Given a sequence of facts to present, the Presentation Builder will have to decide which presentation form of each fact best suits the user, informed by the Presentation Model which holds at least one presentation form for each fact (e.g. text, video). A number of factors should be considered including the user's abilities, time-constraints, allocating a shorter time for low rating items, network bandwidth, etc.

The Presentation Builder also shows the user positive and negative opinions of previous users. Positive reviews are added because of research on social conformity (e.g. [5]). Users have been shown to change their opinion if considerably many other users disagree with them, and they are more convinced if considerably many other users agree with them. Negative reviews are added to make the presentation more trustworthy, as no product can please every customer in reality. However, the Presentation Builder only selects negative reviews that are of little importance to the user given his/her User Model and Domain Model (e.g. complaints about lack of parking if the user does not own a car). The final result is an interactive video that can be broadcasted to the users over the internet or digital TV.

3 Conclusions

We have presented an architecture for a persuasive adaptive system that can market a particular product, to an individual user or a group of users. This work is in its initial stages, and precise algorithms will need to be developed for each module discussed in the architecture, inspired by the ideas presented in this paper. A prototype system will be developed for student recruitment for our department, to sell our degrees. Evaluation of the prototype system will be carried out using empirical methods. We will also extend existing research on group modeling and satisfaction prediction, and investigate new adaptive techniques and user-interface patterns for time-based media.

References

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