Temporary User Modeling for Adaptive Product Presentations in the Web

Tanja Joerding

Department of Computer Science, Dresden University of Technology, Germany

Abstract. This work proposes a temporary user modeling approach that enables the immediate adaptation of product presentations in the Web to the individual customer at runtime by using a machine learning algorithm. We focus on the question of how monitored user interactions can be preprocessed to get example data for the learning algorithm and how existing decision tree or decision list algorithms fit the requirements of the new application field of electronic shopping.

1 Introduction

In the area of electronic shopping static product presentations in the Web cannot always meet the expectations of all customers. There are various hardware and software preconditions, customers have different preferences for multimedia elements, and they are interested in different information concerning the product.

First approaches of adaptive product catalogues with conventional user modeling techniques are not convincing. Customers are not motivated to answer questions and they are often distrustful to give private data. Most of the user modeling techniques, like e.g. rule-based systems or collaborative filtering, are not flexibel enough in that changing preferences of the customer are not taken into account.

2 Temporary User Modeling

This work focuses on a temporary user modeling approach, that monitors the behaviour of the customer and that realizes adaptive presentations without storing user data for other sessions. The customer can remain anonymous but uses a system that recognizes his needs and preferences and that adapts the product presentations immediately. The development of temporary user models consists of three steps:

Monitoring interactions. To get information about the customer, we use only implicit knowledge acquisition by monitoring the behaviour of the customer on the side of the client. These are interactions with single presentation elements, e.g. if the customer follows a certain link, starts audio or video players, interrupts the downloading of images, saves or prints an image or text, or takes a step in virtual reality worlds. Because of the permanent observation the system gets up-to-date information and it is unnecessary to annoy the customer with explicit questions.

Preprocessing data. Using a set of general rules, the system evaluates for every presentation element whether the customer was interested in it or not, e.g. if a video seleted by a link was

played for more than 5 sec, then the interest of the customer in the video is assumed to be positive. The evaluated presentation elements are then used as example data for an incremental learning algorithm.

Learning preferences. To learn the preferences of the customer, we use at present an incremental algorithm based on CDL4 (Shen, 1996). This algorithm considers three attributes for every presentation element: type of medium, content description, and downloading time. Example data looks like the following tuple (audio, {car, VW-Golf, engine}, 3sec, negative). The result of the algorithm is a decision list that can be interpreted as a list of rules, e.g. if the presentation element gives information about "cars" and the kind of medium is not "video", then the customer may be interested. The chosen algorihm works incrementally, i.e. when the customer moves from one product presentation to another one, the algorithm receives the interaction data of the customer and updates its rule base. This means that the user model for each customer consists of individual temporary changing rules. If there are contradictory data, the algorithm prefers more recent data over older data. These properties are important because many customers navigate only for a short time in a catalogue. Additionally, while navigating in the product catalogue, the preferences of the customers can change.

3 Future Work

At present, we have implemented a first prototype system named TELLIM (inTELLIgent Multimedia) and have applied the system to a small jumble sale for selling second-hand cars (Joerding and Meissner, 1998), (Joerding and Michel, 1999).

It remains to evaluate the approach of temporary user modeling. As a first step in this direction we will consider the preprocessing of monitored user interactions to answer the following questions: Do the interaction possibilities fit the needs of the customers? Is it possible to use general rules to infer the interest of the customer? Are the implemented rules adequate? How can we get more detailed evaluations? Is it helpful to replace binary variables by fuzzy ones?

In a next step we will look at the learning algorithm and work on the following questions: What are the specific requirements of the learning task? What existing decision tree or decision list algorithms can be applied? Are there adequate algorithms that can process fuzzy values? How can we evaluate their usefulness by user studies?

References

Joerding, T., and Meissner, K. (1998), Intelligent Multimedia Presentations in the Web: Fun without Annoyance. In: *Proccedings of the Seventh International World Wide Web Conference*, Brisbane, Australia, 649-650.

Joerding, T., and Michel, S. (1999), Personalized Shopping in the Web by Monitoring the Customer. In*: Proceedings of The Active Web - A British HCI Group Day Conference*, Stafford, UK.

Shen, W.M. (1996), An Efficient Algorithm for Incremental Learning of Decision Lists. *Technical Report, USC-ISI-96-012*, Information Sciences Institute, University of Southern California, http://www.isi.edu/~shen/papers_by_date.html