Personalization of a Virtual Museum Tour using Eye-gaze

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Introduction

In many situations, the amount of information that can be given to a receiving party exceeds practical constraints such as the time available for the information exchange, motivational limitation on the receiving party, or the maximum complexity that the receiving party is willing to process. A typical example of this situation is a professional, educated museum guide touring an interested party of art novices through a museum. The guide has access to much more knowledge than the party can handle, so she has to limit the information given during the tour. Based on the perceived interests of the party, the guide can adapt her tour, selecting from her extensive knowledge of the works exhibited in the museum, to better align the relayed information to the interests of the party.

One way to extract interest from a user is by inferring eye-gaze (Henderson, 2003). Qvarfordt and Zhai (2005) found that when people are interested in a certain item, they look at it with great intensity and long accumulated duration. This may reflect top-down control on eye movements (Henderson, 2003), as opposed to the stimulus-driven bottom-up control. One way of using eye-gaze in personalization research is by assessing the effect of top-down control. For instance, information on the most attended item on a painting can be used to present specified, personalized background information on that painting. In other words, long fixations on a specific item might reflect interest in that item, which can be used for providing background information on that item.

Experiment

In a study, we applied these insights to a virtual museum setting. A series of paintings were presented on a computer screen, accompanied by a voice – the virtual tour guide – telling anecdotic background information on specified items on the paintings. The goal of the study was to find out whether personalization of this kind had an effect on the users' experience.

In the study, works of art were randomly assigned to one of two conditions: In the maximum condition participants were presented with background information on the most attended items on the paintings. In the minimum condition participants received background information on the least attended items.

Attendance to items was simply calculated as the accumulated fixation time within the boundaries of one item on the painting. After each painting, participants were asked to grade the quality of the virtual tour guide on a scale of 1 to 10.

The results showed that participants gave slightly higher grades to the virtual tour guide in the maximum condition than in the minimum condition. Moreover, if participants received background information on the items they were attending, they kept attending these items, whereas background information on unattended items (as in the minimum condition) did not result in increased fixations on these items.

Discussion

These preliminary results suggest that fixations are indeed a good indicator of interest. If people are interested in an item on a painting, they fixate on it longer. On top of that, presenting background information on unattended items does not greatly influence eye-gaze.

It seems however that more information can be gathered from eye-gaze. For instance, frequent switching of the eye-gaze between items may indicate interest in the relationship between these items (Qvarfordt & Zhai, 2005).

In the next version of the virtual tour guide, semantic relations between items on one painting and between items on different paintings could be considered, because interest in one item might indicate interest in other items that are similar in meaning. We plan to use a spreading activation mechanism (Collins & Loftus, 1975; Van Maanen & Van Rijn, 2006) to achieve this. Thus, fixation on one item on a painting will contribute to the selection of background information on a similar item on the next painting.

References

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