Persuasion with Smart Digital Signage

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Abstract

In this paper we present Smart Digital Signage, an approach to enable digital signs to automatically decide which information to show in a certain context. We show how many digital signage systems intend to persuade the user to take a specific action, and how measuring the effectiveness of the signs can be used to enable the signs to always show the most effective information. We present two deployments of our approach, a university information system and an advertising system.

Keywords

Digital Signage, Context Adaptivity, Persuasive Computing.

ACM Classification Keywords

H5.m. Information interfaces and presentation: Miscellaneous.

Introduction

In the very near future, digital signs will be everywhere in public spaces. Display prices fall, and new technologies like OLED and e-paper are developed and improved rapidly. As opposed to paper signs, exchanging the content is free on digital signs. Through animation and video they can capture more attention. Digital signs can adapt to the current context and even be interactive. Due to these benefits, in the near future

most of the paper signs that exist today will be replaced by digital signs.

Imagine yourself on a random day in the near future. As you leave the subway for work, it suddenly starts to rain. A digital sign next to you recognizes that it is raining and you do not carry an umbrella. It takes the chance to offer you a coupon for an umbrella in a store around the corner, which you happily accept. As you enter your company, the sign in the entrance recognizes you, gives you a personal greeting and tells you that a spontaneous meeting was scheduled in 5 minutes. As you work out in your fitness center after work, a sign next to you shows you a nice beach scene to make you feel well. When it offers you a free refreshment, you head straight to the bar to get it. The recurring theme in all these scenarios is that the digital signs capture the context and offer you to take a specific action that fits the context. That is, they try to change your behavior, try to persuade you.

Digital Signage

Digital signs are simply computer displays that are installed in a public environment such that people can read them while passing by. The main difference of digital signs from other applications is that the time people spend in front of them (dwell time) is usually very low. Thus, digital signs are different from kiosks and TV, which are designed for people who spend a longer time in front of them. Digital signs are more similar to paper billboards or posters, only with the benefits that exchanging the content is free, animations and movies can be shown, they can adapt to the context and even be interactive.

Figure 1: The Information System deployment.

The main applications of digital signage are advertising, branding and information systems. Advertising signs are installed in public spaces and show ads from various advertisers. They have the goal of increasing the popularity of a brand and bringing people into the shops. Branding signs are installed inside the shops and show content to improve the customer experience. Information system signs are installed in companies or organizations and have the goal to distribute information. Content for digital signs can be actionable, trying to persuade the user to take a specific action. Content that is not actionable can just be useful information or something that makes the user feel well. Important stakeholders for any digital signage system are the owner, content providers, sometimes advertisers, and of course the users. As the owner is responsible for the system, he will want to filter the content shown on the signs in most cases. Any digital

signage system should have a compelling value proposition for all stakeholders.

Smart Digital Signage

Any digital signage system should already show interesting content for the user when he passes it. Thus, digital signage needs to be proactive, anticipating the needs and interests of the user and providing him corresponding information. For any time and location it needs to be decided what should be shown on the signs. When many digital signs are installed, this scheduling problem becomes too complex to be solved by humans. We define Smart Digital Signage as digital signage that decides automatically which content to show in which situation. The signage is provided a utility function that it should maximize. This utility could be the number of people that have seen a specific content, the number of people that have acted upon a specific content, or the number of people that have actually liked a specific content. The key to maximizing the utility of the signs is to measure the effectiveness of showing the information. Displays should measure the current context, decide which information to show, and then measure the effect of showing this information. Some variables, like the current time, can be measured before the decision. Other variables, like whether the user interacted with the display, can only be measured after the decision. Some variables, like whether the user actually remembers specific information, can only be measured in offline experiments. Some variables can be measured without involving the user, like the gender or age. Other variables can only be measured when the user takes a specific action, like using a coupon. For these variables it is important that the user has an immediate benefit of providing the information. Some variables can be

measured without identifying the user, like the current location. For other variables it is necessary to identify the user, like which information he was interested in in the past.

Information Systems

In order to investigate the applicability of Smart Digital Signage for information systems, we installed an information system at the University of Münster. The system consists of 7 digital signs of 19” to 42” size. The signs show information about the environment on the right side, like weather forecast, cafeteria menu or which computers in the pools are available. On the left side, information authored by faculty and secretaries is shown. These information chunks can be submitted via a web interface. Two kinds of signs are installed. News Displays resemble an email inbox and show new information chunks as soon as they are submitted. They are not context adaptive. Reminder Displays are context adaptive and show information chunks that are assumed to be most useful in the current context.
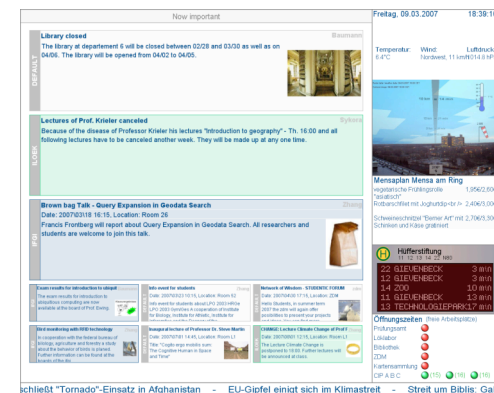

Figure 2: Screenshot of a Reminder Display.

Figure 3: The advertising deployment.

Advertising

To investigate the applicability of Smart Digital Signage to advertising systems, we installed a digital signage advertising network consisting of 19 signs in the city center of Münster, Germany. The signs are installed at public telephones and have a size of approximately 19x25 cm. The signs show coupons from small shops nearby. The signs are enabled to always select those

coupons that are most suited to the context. When it rains, the displays should show a coupon for umbrellas in a store nearby, and when the sun is shining, they should show coupons for the ice cream parlor around the corner. Users can take a photo of the coupon using their mobile phone. The sign shows a coupon code, which the shop employee can write down from the photo on a piece of paper. Using this feedback information the system can learn which coupons work best in a given context.

Conclusion

In this paper we presented Smart Digital Signage, an approach to enable digital signs to automatically decide which information to show in a certain context. We demonstrated how digital signs will soon cover much of public space. We demonstrated the need for automatic scheduling, as well as the need for measuring the signs effectiveness. We showed how many signs are intended to change users behavior, making them a persuasive technology. We presented two deployments, a university information system and an advertising system, that are used to test our approach.

References

[1]   Müller, J., Paczkowski, O., Krüger, A. Situated Public News & Reminder Displays. In *Proc. AmI 2007, Springer LNCS 4794* (2007), 248-265.

[2]   Müller, J., Schlottmann, A., Krüger, A. Self-optimizing Digital Signage Advertising. In *Adj. Proc. Ubicomp 2007* (2007), 64-67.

[3]   Müller, J., Krüger, A., Kuflik, T. Maximizing the Utility of Situated Public Displays. *In Proc. User Modeling 2007, Springer LNAI 4511* (2007), 395-400.

[4]   Müller, J., Krüger, A. How much to bid in Digital Signage advertising auctions? In *Adj. Proc. Pervasive 2007*, (2007).