ENHANCING DIGITAL ADVERTISING USING DYNAMICALLY CONFIGURABLE MULTIMEDIA

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ABSTRACT

Digital signage networks are a newly emerging form of multimedia advertising technology that is rapidly growing in popularity but has received little attention in multi-media literature. In this paper we motivate the cost reduction and increased effectiveness of advertising that is displayed and managed using digital signage networks as opposed to traditional signage.

As an example, we describe a method for customizing advertising messages for particular demographics in different locations using dynamically configurable multimedia. We describe a partially automated intermediary, namely the digital signage exchange, that forms a virtual marketplace for the purchase and sale of multimedia advertising on the digital signage network.

1. INTRODUCTION

Since the late 1990’s significant work has been performed towards developing advertising and marketing technologies based on the Internet. All of these techniques promise to allow organizations to market to customer segments with a size of one, i.e., provide tailored advertising and customer service to each individual customer. Both the Internet, and also the customer’s workstation (or PDA), are utilized for banner advertisements, e-mail marketing, pop-up browser windows and mechanisms for state retention to simplify the users buying experience (cookies).

There is another newly emerging form of advertising technology that exploits the Internet and is rapidly growing in popularity but has received very little attention in e-commerce literature. This technology, digital signage, is poised to disrupt a major component of the advertising industry.

The advertising industry spends billions of dollars annually for the manufacture, distribution and installation of traditional static signage [5]. Digital signage, with its ability to present dynamic multimedia, offers significant improvements in cost and effectiveness. When connected to networks, digital signage offers near-real-time, low cost, distribution and installation of digital advertising. It also offers ad customization based on viewer demographics.

A wide range of organizations are now deploying digital signage or are experimenting with prototype systems. These include the largest clothing retailers and fast food chains, shopping malls, movie theater chains, airports, hotel chains and large gaming and entertainment resorts nationwide. In many cases, an organization’s digital signage is connected via a private network and used to distribute their internal advertising.

However, some organizations are now starting to allow external advertising on their digital signs either as part of a reciprocal agreement with another organization that owns a digital signage network or simply to gain revenue from the sale of the display time on the signage located at their properties. As the market for this external advertising has grown, it has become fragmented and inefficient. Our research attempts to improve the efficiency of this market via the design of a partially-automated, supervised intermediary, which we call the digital signage exchange.

In this paper we motivate the cost reduction and increased effectiveness of advertising displayed using digital signage as opposed to traditional signage. We then show how these gains are amplified when the digital signs are connected to form digital signage networks. As an example, we describe a method for customizing advertising messages for particular demographics using dynamically configurable multimedia. We then introduce the digital signage exchange.
2. CONVENTIONAL SIGNAGE

Conventional signage is ubiquitous. Advertisers rely heavily on both indoor and outdoor signage as major component of many advertising campaigns. The creation, distribution and installation (CDI) of conventional signage material is expensive in terms of labor and material. The cost of the graphic artist is a very small component of the total costs. The majority of the costs result from the production of plastic film and other material that the artwork is rendered on. This material needs to be distributed by a transportation service. Finally, a team of installers must replace, and then dispose of, any preexisting advertising material to deploy the new material in the sign fixtures. The CDI cycle consumes a large component of an advertiser’s budget.

In addition to being expensive, the CDI cycle is slow. A CDI cycle can consume many days, and sometimes several weeks or more. A marketing executive who wishes to exploit an opportunity may often not be able to deliver the advertising message to the signage in time to exploit the opportunity.

After completion of the CDI cycle, the signage displays only one static image. Individuals who are exposed to a sign for long periods could receive more than one message but do not. A static image does not have the impact of more dynamic media, e.g., MPEG video with superimposed text customization.

3. DIGITAL SIGNAGE

Digital signage allows for the display of much more compelling advertising. Instead of a single static image, digital signage supports dynamic multimedia presentations that better attract and retain the viewer’s attention. Digital advertising can contain video, animation and audio and is at least as compelling as television advertisements.

In its most basic incarnation, a digital sign is comprised of a display device and a display controller. The display device is typically a gas plasma display unit but other technologies ranging from flat panel monitors to very large projected images are common. The display controller can range in sophistication from an ordinary DVD player to general purpose computers. Indoor digital signs often include speakers and in some cases include digital cameras.

In addition to allowing the display of more compelling advertising, the use of digital signage also reduces the cost of the CDI cycle. Firstly, there is no need for a manufacturing facility to create new custom signs for each advertising campaign. The work performed by the artist serves directly as the media. Hence the creation component of the CDI cycle is greatly reduced. Furthermore, the installation component of the CDI cycle is also greatly reduced. In the case of the most basic digital signs, namely a display device and DVD player, the installation task degrades to simply loading a new DVD into the player. A very low skilled worker can perform this task.

4. DIGITAL SIGNAGE NETWORKS

The display controllers of multiple digital signs can be connected to form a digital signage network (DSN). In this configuration, the entire CDI cycle, with the exception of the graphic artist’s work to create the advertisement, can be virtually eliminated. The digital advertisements can be transmitted directly from the graphic artist’s workstation to the digital sign almost instantly and with extremely low cost. The costs of the distribution and installation components of the CDI cycle are virtually eliminated. More importantly, the time necessary to perform an iteration of the CDI cycle is dramatically reduced. This offers an advertiser unprecedented control and flexibility in conducting marketing campaigns.

These concepts are illustrated using informal process diagrams presented in the Figure 1 below. The dotted line indicates the workflow for the creation and deployment of conventional signage. The solid arc illustrates the process steps eliminated via the use of digital signage.

![Figure 1. CDI Cycle Eliminated via Digital Advertising and DSN](image-url)
5. DYNAMICALLY-CONFIGURABLE MULTIMEDIA

Information describing the demographics of people expected to view signage can be used to dynamically configure multimedia advertisements to better target customer segments. The advertiser can create an ad that can be instantiated with different audio, video, images and text based on demographics. The instantiation of ad components can occur prior to transmission, or alternatively, can be performed by the display controller in real time. Current multimedia standards provide support for dynamic configuration.

A marketing team can create a dynamically-configurable digital advertisement that includes multiple instances of each multimedia component of the advertisement. Depending on information obtained about the venue and demographics of a sign, different instances of components can be used to construct the advertisement for display on the sign.

For example, consider a hypothetical situation where an automobile company is launching a campaign for a light truck. Assume that the location and demographic parameters obtained from the sign are:

Lake Tahoe, Nevada, Macy’s department store, mixed ethnicity, 35-50 age group, middle income.

The advertisement might then be configured with the parameter set that follows:

Text:  
Language: English

Vehicle Image:  
Ford Ranger 4x4

Background Image:  
Snow-covered mountains

Audio:  
Female presenter speaking English

Audio Background:  
John Denver, “Rocky Mountain High”

Alternatively, if the location and demographic parameters obtained from the sign are:

SW Miami, Florida, Movie theater, mostly latin american, 20-35 age group, low to middle income;

then the advertisement might then be configured with the parameter set that follows:

Text:  
Language: Spanish

Vehicle Image:  
Ford Ranger Sport 2WD

Background:  
Tropical beach at sunset

Audio:  
Male presenter speaking Spanish

Audio Background:  
Ricky Martin, “La Vida Loca”

We have found that accurate demographic information can be obtained by staff at the sign’s venue. However, an alternate effective approach is to have the display controller sample the people viewing the sign using a digital camera that automatically takes still photos at regular intervals. These images can be manually reviewed to obtain infer some demographic information, e.g., age, ethnicity. A microphone can obtain audio samples to identify languages spoken near the sign.

6. DIGITAL SIGNAGE EXCHANGE

Our current research focuses on the design and implementation of a digital signage exchange (DSE). A DSE is a partially-automated, supervised broker that mediates between sellers, namely those organizations that own or control digital signage networks and offer some, or all, of their multimedia display time on their networks for sale, and buyers, namely advertising companies or their agents who purchase display time from the sellers for the purpose of displaying digital advertising. The DSE implements a virtual marketplace that allows buyers to view and purchase the display time that is offered for sale across all displays made available via the DSN. A diagram illustrating the context of the DSE appears in Figure 2 below.

![Figure 2. Digital Signage Exchange](image-url)
In many cases, the buyers and sellers who utilize a DSE will come from different, independent organizations. However, in some cases a DSE may be employed by a single organization that owns the digital signage network and is serving as the sole seller. An example that we encountered is a large fast food chain with digital signage residing in most of their nationwide outlets. The seller has allocated a fixed percentage of display time to be available for internal marketing promotions by its own marketing staff. The remaining time is sold to advertising agencies to display advertisement approved by the food chain’s management.

The DSE could incorporate auction techniques, brokering strategies and pricing strategies that would better allow buyers to compete with each other to purchase DSN display time. There has been significant research performed related to auction techniques [2] [4] [7] [8], brokering strategies [9] and pricing strategies [3] that could be incorporated into the DSE. Due to space limitations, we do not address this integration to instead focus on other novel DSE issues.

7. CONCLUSION

The digital signage network (DSN) is a rapidly emerging advertising medium that offers both significant reductions in cost, and also major improvements in effectiveness, over traditional signage. In this paper we have identified where these efficiencies are realized, which included an approach for adapting an ad campaign in real-time based on changing demographics using dynamically-configurable multimedia.

An organization that owns a DSN can use it for their in-house advertising requirements but can also sell multimedia display time to advertising agencies and trade display time to other DSN owners. When one or more organizations create a (possibly amalgamated) DSN and there are multiple advertisers (either internal, external or both), a marketplace for the purchasing and selling of multimedia display time on the DSN is formed.

We have proposed a partially-automated intermediary, namely the digital signage exchange (DSE), to improve the efficiency of this marketplace and have motivated its advantages.

8. REFERENCES