User-configurable advertising profiles applied to Web page banners

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ABSTRACT
Advertising banners are graphical elements that are transmitted with the contents of a web page and that serve advertising purposes. Since banners usually do not relate to the users' interests, banners are often rejected. Much effort has been spent on trying to adapt banners to users. While the usual approach is to try to accomplish that by collecting data about the user, we propose a different approach. Using user-configurable advertising profiles and direct feedback we give full control to the users themselves. This approach is currently being implemented and evaluated in the context of an Internet TV program guide.

KEYWORDS
banner, advertising, World Wide Web, adaptivity, adaptability, configurable, user modeling, user profile, pull strategy

INTRODUCTION
During the last few years, economical aspects have gained more influence on the World Wide Web. For today's commercially managed sites refinancing has become an important issue. Since the technical support for transferring small amounts of money through the web is still poor, subscription fees are hardly feasible. Therefore advertising has gained significance for refinancing the increasingly complex and expensive services.

Advertising on the World Wide Web today is typically done using so-called 'banners'. Banners are graphical elements that are transmitted together with the contents of a web page. In most cases banners are simple bitmap images, sometimes animated images or even small interactive objects. Figure 1 gives an example. Clicking the image usually leads users to the advertiser's Web pages.

Figure 1: Example of an interactive advertising banner on a web page. As depicted in the four snapshots the user has to solve a little puzzle before the link to the advertiser appears.

But Web adverting is still far from reaching its potential. The number of advertisers is still small, especially in Europe []. Possible reasons are that advertising banners seem to have low impact on their viewers [] and that standards for measuring this impact are still not available []. Advertising on the Web has not yet reached the same standards that have been common for print media for decades now.

In this article we will focus on the first aspect, i.e. the missing impact of advertising banners on users. The problem to solve is that Web users tend to reject advertising banners. The reasons are obvious: Usually they see no use in the banners, just costs. Banners lengthen the transmission duration of the surrounding page, thus raising transmission fees—while usually not being related to the users' interests.

USER RELATED ADVERTISING

A way to improve the user involvement in advertising banners is to heighten the correspondence between the users' interests and the contents of the banners. This approach is expected to raise the user's acceptance thus increasing the advertising clients' acceptance and ultimately helping to refinance the web site presenting the banners. Figure 2 shows the desired effect.

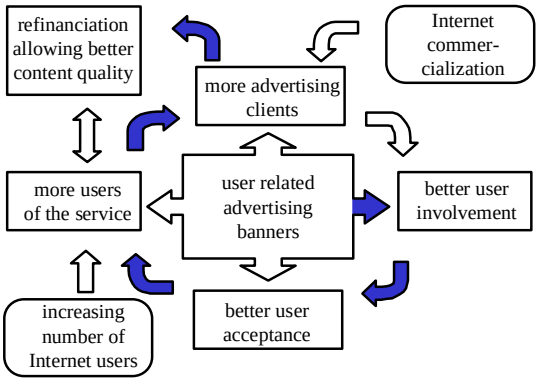

Figure 2: The desired effect of user related advertising. The highlighted path in the diagram shows: The concept of user related banners in the center is expected to lead to a higher user involvement, leading to a higher user acceptance, leading to more users, leading to more advertising clients, finally helping to finance the site. The higher number of advertising clients allows the improvement of the user adaptation, thereby closing the circle.

REQUIREMENTS

Various mechanisms of adaptation are possible. To be successfully applicable a system should fulfill the following requirements:

1. *effectiveness:* The mechanism must reach a high level of correspondence between user interests and banners to assure that only relevant banners are presented.
2. *wide applicability*: The approach should not be restricted to specific banner or site contents.
3. *low effort for users:* Interaction effort is typically a knock-out criteria on the Web. Unless direct profit is promised users will not spend any effort on additional interactions.
4. *low effort for the site provider:* If possible, no user profiles, databases with background information, etc. should be necessary. If they are, they should be easily maintainable.
5. *low effort for advertising clients:* Easy insertion, maintenance and removal of banners; clear, easily understandable banner structure; comprehensible accounting system.
6. *respect user privacy:* This criteria, today often not taken into account, could soon become a knock-out criteria [Roßnagel 95].

EXISTING APPROACHES

The different approaches used today and presented in this section try to improve the perceived relevance of presented banners.

Internet demography: The simplest approach is to adapt banners to the demographic base structure of the World Wide Web. Since the typical Web user is a young, educated male [], banners should be more successful if they aim at this specific group of people. Since this approach does not demand any extra effort and can be combined with other approaches it is widely in use.

Page content: An often very effective approach is the adaptation of banners to the content of the surrounding Web page or site. The level of effectiveness that can be reached depends heavily on the site's contents. If, on one hand, a page's content is very specific and can directly be related to consumer products, the results can be excellent. If, on the other, the content of a page is not related to any advertisable consumer products (i.e. a page containing an online dictionary) the results are rather poor.

User demography: More complex is the adaptation of advertising banners to the geographical or demographic attributes of individual users. Demographic attributes include sex, age, education, profession, and income. Since these attributes correlate with user interests and consumer habits, this method is very popular in conventional advertising. On the Web, user data can be gathered explicitly using a form, or unnoticeably by analyzing users' IP addresses. As an example for the form method the Web service 'Mind's eye fiction' [Mind's Eye]

allows the creation of a password-protected user profile that contains demographic and geographic information. The second method of raising user data, analysis of IP addresses, is used by the American site Double-Click [Double-Click]. Double-Click maintains a database of firms that can be identified by their IP addresses. If firm members access a site, their IP addresses are used to look up information like name, size and turnover of the firm.

Web history: The Web history approach takes the set of sites into account that the users have visited before. The basic idea of this mechanism resembles the page content approach, but it attempts to overcome the applicability restriction of the page content approach by referring not only to the current page but also to other pages users have visited before. Again, there is an explicit and an automated way of collecting data. The explicit way has been implemented by the Web directory provider Yahoo [MyYahoo] who ask their users to upload their 'bookmark' file. The bookmark file contains the users' preferred web sites. Assuming that the users do have an elaborated bookmark file, this approach seems to be very effective while being relatively widely applicable. In the service MyYahoo, bookmark uploads are justified by the fact that they are used as a base for Web site recommendations. The automatic way to gather Web history information is to analyze the users' *cookies*. Cookies are small files that are left on the users' hard disks by other web sites, typically for identification purposes. Both methods, using bookmarks and cookies, suffer from the problem of associating the huge number of potentially visited sites with corresponding banners.

CLASSIFICATION AND RATING

The presented approaches can be classified as shown in Table 1. The vertical ordering criterion determines whether an approach is truly adaptive or merely restrictive. The restrictive methods improve the correspondence between user interest and advertising banners by allowing only banners that are relevant to some average user. The restrictive approaches are less widely applicable: The Internet demography approach excludes all groups and products that differ from the young educated male stereotype. The page content approach is only applicable if the page content relates to a sufficiently high number of Web-advertisable products.

	Demography /geography		**Web pages**	
restrictive	Internet demography		page content	
adaptive	User demography		Web history	
manual/ automatic	Form	IP-address	Bookmark	Cookies

Table 1: Classification of existing approaches that increase advertising relevance to users.

The adaptive approaches adapt advertising to the user by choosing banners according to gathered user data. They result in a higher effort for site providers and users. Since users do not want to fill in forms or upload bookmark files at the beginning of every session, these services require user accounts to store the gathered data. Therefore, site providers have to maintain user profiles or even databases with background information. Furthermore, a minimum number of different advertising banners is needed to make sure that enough matching banners can be found for any user. Good adaptation and thus good effectiveness can only be obtained if many different banners are available.

The table columns determine the data that restriction or adaptation is applied to. The approaches shown in the left column are based on the users' demographic data, those in the right column on current or preferred Web pages. Since Web pages can be related more closely to advertisable consumer products, approaches based on page contents can be more effective.

The third criteria in the table distinguishes

manual versus automatic modes of gathering data in the adaptive approaches. The manual modes, form fill-in and bookmark upload, lead to a higher user effort that will discourage many users. Users will usually not divulge this personal information unless a very rewarding service is promised. Users will be especially critical if they know that input information will serve advertising purposes. The automatic modes based on IP-addresses and cookies on the other hand return information that is much less instructive. Furthermore, not asking users before analyzing their cookies or IP addresses can violate the users' privacy.

Figure 3 gives an overview over strengths and weaknesses of the different approaches.

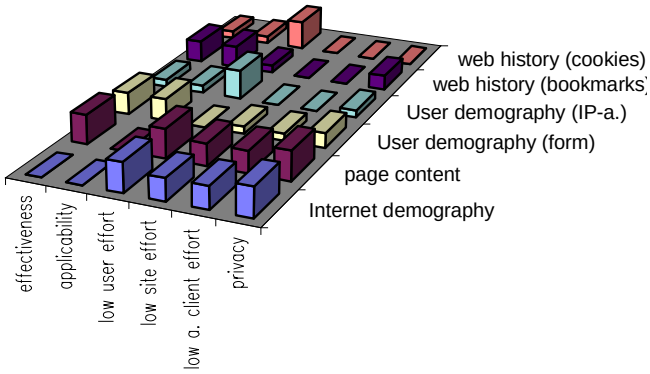

Figure 3: Overview of different banner adaptation approaches and their estimated meeting of requirements. High bars mean good ratings. None of the approaches is sufficiently effective while being widely applicable and requiring only little user effort.

USER-CONFIGURABLE ADVERTISING PROFILES

None of the regarded strategies is sufficiently effective and widely applicable at the same time. One of the reasons is that consumer attitudes towards banners are deduced indirectly from demographic data or user tastes about Web pages. To obtain a higher effectiveness we propose a direct approach, the *user-configurable advertising profiles*. The idea is to allow users to interact with the presented advertising banners to give feedback about their level of interest. This feedback is logged in *a personal advertising profile* and used to determine future banner choices.

Users can issue negative or positive feedback 1) Negative Feedback: Each displayed advertising banner is accompanied by a trash can button. Clicking this button removes the current banner and replaces it with a different one. This interaction is logged in the users' personal advertising profiles that reduce the future display probability for similar banners. The rejected banner itself will never be displayed again. Figure 4 shows an example screen shot. 2) Positive Feedback: There is no extra interface component for issuing positive feedback (reinforcement). The banner itself serves that purpose. If users click a banner, thereby visiting the advertised site, a positive feedback is sent to their advertising profiles. Positive feedback heightens the probability that similar banners are displayed in the future.

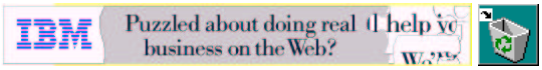

Figure 4: Advertising banners are displayed accompanied by a trash can button. Pressing the button lets the current banner disappear by replacing it with a different banner. The rejected banner will not be displayed again.

INTERNAL REPRESENTATION

Users' feedback is kept track of in *personal advertising profiles*. An advertising profile consists of a set of all currently available advertising banners, each one associated with a display probability. Display probabilities range from 0 to 1 and are modified whenever the profile's owner issues feedback. To allow the described propagation of user feedback from one banner to other banners the entries of the advertising profile, i.e. the banners, are connected by two relations to propagate positive and negative feedback respectively. The edge weights range from minus one to one. Figure 5 shows how user feedback is propagated into the advertising profile. Profiles can be stored in a user account on the hosting Web service, if available, otherwise in a cookie.

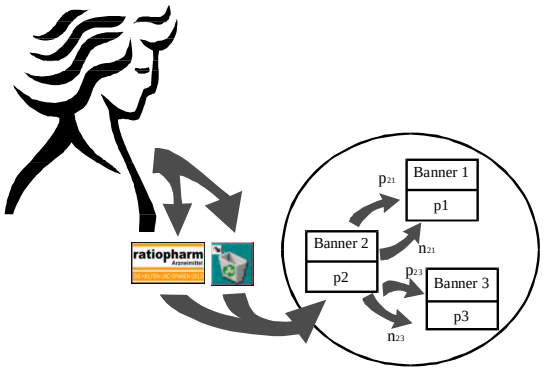

Figure 5: User feedback is sent to the advertising profile. Positive and negative feedback to one banner is propagated to related banners.

A TEST IMPLEMENTATION

One of the requirements stated above is that the system has to be easily understandable by users as well by advertising clients. Therefore, we chose a very simple yet sufficient data structure for the similarity relations. Banners are grouped as the leafs of a tree with depth two. Each banner is strongly related to all banners in the same low level group, weakly related to banners in the same high level group, and not related to all other banners.

figure 6: Using a simple form-based interface interested users can configure their advertising needs manually. In this example four high level groups, called *info channels,* are offered to the user. In the shown state the channels 'multimedia' and 'sports' have been turned off by the user. The 'daily life' channel is active, only 'shopping malls' is switched off.

To provide an interface for interested users that offers direct control over the advertising profile we designed the settings dialog depicted in figure 6. For the high level groups we chose the name information channels, or simply *info channels.* To keep the interface simple the real-valued banner display probabilities were reduced to Boolean values, i.e. users can click banners on and off but cannot adjust the probability exactly. To speed up interaction whole info channels can be activated and deactivated with a single mouse click.

INTERFACE FOR ADVERTISERS

A very similar interface can be used for advertising clients to place banners. An advertising client interface allows insertion of banners into any channel, removal of banners and modification of initial display probability.

Initializing display probabilities to any value between one and zero allows the specification of banner scopes. On the one hand, advertising clients can decide how many presentations of their banners they want to have (and pay). On the other hand banners can be initialized to '0' which means that they will never be presented without being manually activated in the settings dialog. This might be a useful alternative for small companies with limited, regional scope (and a low budget).

CONCLUSION

Comparing the presented approach with the requirements stated above we estimate the results illustrated in Figure 7. We expect especially high effectiveness, since the users' tastes are asked for directly, which ought to lead to less biases than the rather indirect approaches described before. A potentially weak point is that the system requires some user effort to be effective. Our planned evaluation will show how many users make the extra effort to remove disliked banners and how many are satisfied without adapted advertising. After all the system does not force users to participate.

Compared to Table 1, user-configurable advertising profiles are placed in the second row in a new column labeled 'direct user configuration'. They suffer from some of the disadvantages that apply to adaptive approaches, i.e. they need a user account or

cookie and a minimum number of banners to chose from. Since it might take time for a new service to find advertising clients, the service might start with only a few channels or even a shallow tree instead of a depth-two-tree. As the system evolves over time and more advertising clients can be found, the info channel structure can be extended: New channels can be created, existing channels can be enlarged, deeper nested trees can be used.

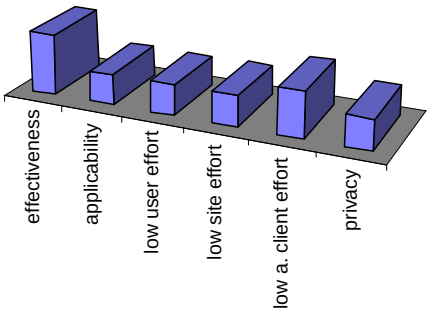

Figure 7: Expected meeting of requirements of the user-configurable advertising profiles.

Finally we expect users to be more content with this straightforward approach. Our approach assumes that users accept the fact that advertising is necessary for financing sites they want to use for free. Traditionally, advertising has always had the rather bad reputation of manipulating people. A transparent approach with a corresponding user interface might help to cope with that. We expect the concept of user-configurable advertising profile to have an influence on the perceived characteristics of advertising banners. As users take control over their information intake, banners might lose part of their push character and thereby adapt to the pull character of the medium Internet. The name *info channel* that we gave to high level banner groups was chosen to underline our expectation that pull media advertising will gain a more informative character.

The described approach is currently being implemented in the framework of an Internet TV program guide [Baudisch 97]. When the system goes online some time during summer ‘97 we will hopefully gain the necessary data to evaluate the described approach.

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