Analysis of user behavior when reading Digital Interactive Magazine online on various devices

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ABSTRACT

This paper is aimed to analyze user's behavior when reading a Digital Interactive Magazine online. General tendencies of user behavior on various devices are analyzed. A model of user behavior is proposed.

Keywords

Digital Interactive Magazine, user behavior, user devices, behavior model, action prediction, server side analysis.

1. INTRODUCTION

Being able to predict the next action of your visitor can be very beneficial for many web-based services. That can allow you to prepare and cache the expected next page to be requested, start transfer of a video or take other actions that can improve user experience overall.

2. USER BEHAVIOR IN WEBSITES AND DIGITAL INTERACTIVE MAGAZINES

When visiting a website user's behavior is unpredictable in general. The visitor can follow any link from menu. There are special tools that allow analyzing user's behavior in website. They provide statistical and analytical data that allows building websites which are more suited for a particular goal. But still generalizing visitor's behavior in websites is a complicated problem and it's hard to create a general model to benefit from.

Digital interactive magazines are a unique media where reader's behavior is quite predictable in contrast to a regular website. While people browse the Internet usually in pursuit of some information, when reading a digital magazine the main objective is leisure and entertainment. In Internet pages the visitor usually navigates from page to page by links seeking the information he needs or is interested in. Unless there is a certain "wizard" interface with "next" and "previous" buttons, user behavior is random and unique for each website (1) (2).

In case of digital interactive magazines (from now on DIM) reader's navigation is more or less sequential: the reader usually starts on the cover page and goes from page to page in the order they are in (1). Of course this statement is generalized and there are some exceptions to this, we'll discuss them later.

When reading a DIM user's navigation can be split into two cases:

- Sequential: pages are requested in the order they are in.
- Link-oriented: after opening a page (usually the cover page of DIM) user prefers to use a link to another page instead of flipping pages to reach the desired one.

Of course mixed behavior is also very common. The reader can navigate to a page via a link and then continue reading the pages in sequence.

Next important aspect to take into account is the device DIM is read on. There is a vast variety of devices that allow reading Digital Interactive Magazines. Let's discuss user behavior tendencies in 3 general groups of those devices:

2.1. USER BEHAVIOR ON DESKTOP COMPUTERS AND LAPTOPS

Desktop computer and laptop experience can be combined into a single case as in both cases manipulation is based on use of a pointing device (mouse or touchpad) and keyboard. Reading a DIM on a desktop computer is most general case, as many different behavior models are possible. Let's discuss two general behavior models.

2.1.1. READING DIM AT WORK ON A DESKTOP COMPUTER OR LAPTOP

Many readers read DIMs at work. In most cases this applies to magazines that are somehow associated with their work or contain some important information. This causes the reader to navigate through the magazine in most efficient way, to minimize seek time of the info he needs. This results in most efficient use of links available in DIMs.

2.1.1. READING DIM FOR LEISURE ON A DESKTOP COMPUTER OR LAPTOP

When reader uses desktop computer for reading a DIM for leisure (usually at home) the most common navigation is based on sequential page reading or flipping. In this case the inconvenience of using a mouse or keyboard for navigation is mostly ignored. The reader navigates in pages in the sequence they are in, rarely using links.

2.2. USER BEHAVIOR ON SMARTPHONES

Smartphones are currently the least used and inconvenient environment for reading DIMs (3). With small displays and often slow Internet connection speed (usually via cellular connection) smartphones prove to be least suited for comfortable reading of DIMs. Users that read DIMs on smartphones usually try to minimize number of gestures (because of small displays) and avoid loading redundant pages. Link-based navigation is predominant here.

2.3. USER BEHAVIOR ON TABLET DEVICES

Tablet devices are the most quickly expanding and important media for DIM read. In the past few years we've witnessed tremendous growth in number of available tablet devices and their capabilities. Taking into account the fact that tablet devices, in their size and form are most similar to books (or magazines) they are the best candidates of becoming main media for DIMs and by time replacing books and magazines completely.

Currently most readers use tablet devices for reading DIMs for leisure. In my opinion this will change in future, but at the moment general attitude to tablet devices is not very serious and they are seldom used at work (this area is covered by Desktop computers).

Sequential reading behavior is predominant when the reader uses a tablet device. But this is not always true as, in case of slow Internet connection, reader may prefer link-based navigation.

2.4. OTHER FACTORS THAT AFFECT USER BEHAVIOR

Reader's geographic location is another factor to be taken into account when trying to predict reader's navigation. Readers from different countries may have different interests and that will result in different navigation. For example if a magazine discusses football teams, readers from a specific country will probably first prefer reading pages that are about their team (4).

Having only geographic location is very little information to be able to predict reader's next action, but if combined with statistical data from previous readings, geo-location can become a very accurate criterion in prediction of reader's next action.

There are some other values that if available can be used in user behavior model. Values like visitor's age group or gender. But as those values are not usually provided by browsers, they are hard to depend on.

All user behavior tendencies mentioned above are deducted from analysis of statistical data gathered from DIM hosting services.

2.4. CREATING A MODEL OF USER BEHAVIOR

Using the tendencies described above a model of user behavior can be created. The model should be individual for each client reading each magazine and in case of web applications can be stored in user session.

The User Behavior Model (from now on UBM) should contain the following information.

- Magazine identifier
- Current page
- Device type
- Internet connection speed
- Navigation mode (sequential or link-oriented)
- Hit ratio
- Additional optional data (such as Geo-location)

Magazine identifier is used simply for identifying model's object in a session where multiple magazines can be read.

Current page is the page to be analyzed for links and active components (2) for user's next action prediction.

Device type is used for placing priorities in navigation, when no initial data is available. This criterion is not used separately. Internet connection speed is used along with device type to determine navigation priority. For example, if user has opened the magazine on a tablet device navigation mode will be set to sequential priority and the server will start preparing the page next to the current one. But in case of a slow Internet connection (serving the first page has taken quite long) the priority will be set to link-oriented.

Navigation mode as in the example above is a flag that determines which action is most likely to take place in current state. Moving to next page or navigating via a link on the page. In case there are no links on the page, navigation mode is set to "sequential".

Additional information such as geographic location can add accuracy to the prediction and will have separate logic for each piece of information. In case of geo-location analysis of previous readings of the magazine will be required.

Hit ratio is another important part of UBM. Initially set to a neutral value (0.5 or 50 in 100 point scale) it changes its value depending on successful or failed predictions. A threshold can be defined and if hit ratio drops below that threshold, we can change the navigation mode as predictions by current approach prove to be wrong.

3. CONCLUSION

By exploiting the tendencies in user behavior when reading a digital interactive magazine, a model of user behavior is created that allows predicting reader's next action. The model can be used for preparing data to be served, preloading it or for detecting malicious attempts in case of abnormal behavior.

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