Impact of Visual Tools for Webmaster – Heatmap on E-marketing Strategies*

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Abstract: Web site navigation is possible thanks to the developers of these kind of applications. With the help of the webmasters (who take care of the maintenance), the navigation is easier and more pleasant. In order to improve a website, the administrator needs direct or indirect feedback coming from the users, and along with the tools at his disposal, transforms a stressful and hard navigation into an enjoyable experience. A very important tool is the Heatmap which offers indirect feedback to the webmaster with the help of which he can determine the website's areas that need improvement. Our project's theme is exactly one of these tools, coming in the aid of the administrator and website owner that want a bit more from their website.

Key-Words: internet, webmaster tools, heatmap, clickmap, website using, capture clicks

1 Introduction

One can say that with the passage in the XXI century the Internet passed into a new period of its existence. It comes the moment to ask questions about the future evolution of the Internet and the impact this will have on mankind. The coming years will certainly results in a significant increase of velocity data through the Internet. Once the period get beyond the dispute to impose its own standard and seizure of a large segment of the Internet suppliers services market, we could see the "revolutionary" changes of the Web sites, with an increasing emphasis placed on designing of an exciting virtual reality, complex and fantastic at the same time. The introduction of 3D graphics, audio and video clips, advanced animations and stereo surround sound, will increase the feeling of immersion in a virtual space.

The interactive Web site content will also be improved so that the current click on hyperlinks will become a memory of the past. It will try using all human senses to create a special atmosphere in which the interaction will not only sense of sight or hearing but also the sense of touch and smell. Surfing the Internet will be like to start by walking through a game of "first person", and later will be more like a walk in the street, being able to give voice commands, to communicate with others and meeting or interact with the objects present in the landscape by means of a virtual body. Thus we have the image of a true Internet matured technology, able to take and to harmonize the characteristics of the most advanced programs created for computers, so that the end result is an existential virtual experience to rival the real existence and at the same time to supplement it, which is the ultimate goal pursued by all those involved in Internet development.

The purpose of this paper consists on the followings:

- to analyze the impact of using free tools for webmasters in order to help them to develop an optimized website and attract more visitors;
- to design and develop a "Heatmap" tool which is the focus of this study;
- to demonstrate the utility and convenience of instrument developed using LAMP technologies such as PHP, AJAX, JavaScript, maximum exploited technology to get what we wanted.

2 Internet impact on the development of knowledge-based society

At present, two major phenomena revolutionize the economy and daily life throughout the world, including Europe, leading to the development of

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knowledge-based society. On the one hand, the economic globalization, economies around the world becoming increasingly interdependent, and, on the other hand, the technological revolution includes the Internet and new information and communication technologies.

The Internet has quickly become a techno-social phenomenon, much publicized. It has had and it would have a decisive impact on society and its future. People are drawn to this phenomenon and devote a lot of time, changing modes or affecting human interaction. It is obvious the tendency of Internet to revolutionize the information and means of entertainment, affecting production and consumption, transforming the social life and our behavior, even political institutions and their citizens' role. Studies conducted on a sample of users and non-users of the Internet revealed the following:

- The higher the number of years since the Internet is used, the greater the number of using hours, the Internet becoming indispensable. Participants in the survey agreed to sit without internet for two weeks. After only two days some of them "felt strange" and, after five days, they gave up the survey. A very small number of people have resisted, but said they would not like to repeat that experience.
- Approximately one quarter of frequent Internet users (more than 20 hours per week) feel that they have significantly reduced the time spent with family, friends and leisure.
- More than a quarter of those who use the Internet at work, says that the number of hours worked at home, the Internet has grown, and that does not mean reducing the number of hours spent at work.
- 60% of frequent users of the Internet, says the Internet has reduced the number of hours spent watching TV, and a third say that they spend increasingly less time reading newspapers.

Because of the Internet, there is almost nothing that can not be made from the comfort of home, from visiting shops of all kinds, paying bills, research work and documentation for various works and even keeping links to friends which are thousands of miles away. Communication, which previously meant writing letters has now been reduced to a few clicks of the mouse, so people are able to correspond through e-mail more quickly and efficiently than through traditional mail.

When we say the Internet, the user typically refers, in fact, the use of websites. Not many people know how much work is in building a website and even less people know about the effort to manage such a site. Once completed development and testing stages of a site, follow the maintenance phase, an optional but very important step in ensuring the success of the website. At this stage the focus is on a number of factors such as off-page optimization, driving traffic, getting "feedback" and monitor site usage. Not by chance we passed monitoring site last, which is the purpose of developing the new instrument.

All the factors listed above have a lesser or greater importance in operating a site according to its type (presentation site, on-line shop, portal, blog, on-line job, etc).

3 Web technologies used in application development

3.1 PHP

At the end of 2007 there was only maintained version 5.x, since July 13, 2007 (exactly three years after the release of PHP5) PHP Group has announced that PHP4 it will be removed from service on December 31, 2007, although it is expected that some security upgrades will be offered until August 8, 2008. Building PHP 6 already begun in December 2007 and it will be offered along with the retirement of PHP4.

Using PHP to develop our application has been essential, because one of the most used languages "server side" has the most developed extensions and libraries. We were interested in using the library - GD2, graphics library that offers a wide range of functions for dynamic image processing. Part of the project that had the most to gain from PHP and GD2 was Heatmap's generation, namely the creation of zones of different colors (from blue to red) to show the intensity of clicks in different parts of site.

3.2 MySQL

To administer MySQL databases one can use the command line mode or by downloading from the Internet, a graphical interface: MySQL Administrator and MySQL Query Browser. Another management tool for these databases is free software written in PHP, phpMyAdmin. MySQL can run on many existing software platforms: AIX, FreeBSD, GNU / Linux, Mac OS X, NetBSD, Solaris, SunOS, Windows 9x/NT/2000/XP/Vista.

Like any large-scale application, the architecture project was developed on three levels (Tier Three): the interface level, the application level and

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database server. Although it was our only option (we could choose to store XML data), MySQL has proven the most optimal and scalable option for instrument development "Heatmap". The necessary data that we needed to store them are the coordinates of the mouse (xOy axis) used by users entering the site. Based on query speed and storage capacity, we chose between two technologies XML and MySQL for MySQL solution. The argument for we chose MySQL concerns the possibilities to optimize the database, both in terms of structure and query-level and facility for generating massive insertions in the database (a single event INSERT for N records), Instructions Flush TABLES, LOCK TABLES or DISABLE KEYS.

3.3 JavaScript

Although all the technologies presented were very important in the development application, the project would not have been completed without the use of JavaScript technology. Used to capture clicks at different coordinates on the page, JavaScript was the only programming language that has enabled this operation. As a language "client-side JavaScript follows the user throughout the site and give it a very pleasant navigation and interaction with the elements.

3.4 AJAX

AJAX removes this interaction way "start-stop-start-stop" of the Web by introducing an intermediate level between the user and the server - AJAX engine. Adding a new level in an loading the page at the beginning of the session, the browser loads an AJAX engine, written in JavaScript and usually placed in an invisible frame. This engine is then responsible for both the interface that is displayed to the user and the server communications for the user. AJAX engine allows the user interaction with application asynchronously, independent of communication with the server. Therefore the user does not have an empty window, waiting for it to load directly from the server.

Using Ajax together with JavaScript made our work much easier. With this technology we were able to insert the coordinates of clicks in the database without having to do "refresh" the page. In order to develop an optimal and reliable application we thought an algorithm that saves the clicks without having more difficult site navigation. To avoid sending requests to the server for every click we developed a matrix for holding the mouse movement and when the matrix reaches a certain size it sends all coordinates to the database.

4 Case study - making the instrument "Heatmap"

4.1 What is a Heatmap?

A Heatmap is a graphical representation of data points in a two-dimensional area. Each data point is found at the intersection of two axes: X and Y. The values of X and Y coordinatesdetermine the position of a point in the plan. The density of points in a plan is represented by a Heatmap colors.

Heatmap has its origins in marketing research, where scientists used so-called pupil tracking devices to identify and mapping display exactly where people look when they are presented visual information. These maps can provide information not only for marketing but also for the web developers. Thus, a Heatmap indicates where people look instinctively when they open a website or a web page. The map shows the regions colored in blue, green, yellow, orange and red - the darkest color representing the most intense point (Figure 1/Tabel 1).

Certain portions of a web page tend to be more accessible than others and Heatmap can discover them. When we have thousands of visitors, but remuneration is not so high, it is possible that the advertisements indicate how many visitors view or click on certain sections of the website:

Table 1

Colour	Point density
Red	80 – 100 %
Brown	70 – 80 %
Yellow	60 – 70 %
Green	50 – 60 %
Light green	40 – 50 %
Blue	Less than 40 %

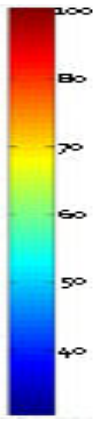

Fig. 1 The range of colors used in Heatmap

Heatmap sites differ from one site to another. These vary depending on the content of the site. However, Heatmap sites have an element in common; most visitors are concentrated in the upper-left corner of the page. Thus was created the concept of "Golden Triangle".

A Google page has been submitted to a test sample and the technicians followed the movement of the mouse and determined the points of interest (visual) for each participant in the test.

Most of the work in a web page is done in the primary areas of the Heatmap. Each web page functions differently, so there is no universally valid strategy, but generally all comes down to:

- Placing the advertisements in the top of the site tend to have better results than the bottom ones;
- The advertisements placed next to a rich content or navigation bars on the page, generally give good results because visitors are focused on those portions of the page;
- The advertisements placed immediately below an article tend to have very good results because the users search for materials relating to the article read, so that the "target" advertisements offer them answers in this regard.

4.2 Heatmap – a tool for marketing analysis

One of the biggest advantages of a Heatmap is that it offers insight into visitor behavior. It can be seen where the most people are clicking on your site or towards which region revolve.

With a Heatmap can be seen which part of a link is accessed more often. For example, if there is a link such as “vending machines”, we can see that most people tend to click on the word "machinery" from the hyperlink at the expense of the party "for sale". Analyzing this behavior as a universally valid, it can streamline the web surfing and the "linking" strategy.

It also can be identified areas of poor performance on the web page. For example, if many visitors click on the images without a hyperlink probably they be expect something to happen by pushing. The action of "waiting for something to happen" is much easier to see with our proposed new Heatmap tool. Discovering these parts there can be applied a hyperlink depending on the place the visitors think they should go.

5 Conclusion

With the Heatmap tool is trying to find portions of the web page with a high density of clicks, areas favorable for placement of advertisements in order to maximize profits. Another aspect that can be taken into account by using the Heatmap analysis refers to areas most frequented from the menu. This fact helps us to an optimal placement of the menus on the surface of the page, in terms of browsing the site.

The project undertaken by us is a software program that uses a series of algorithms in order to represent in a graphical manner, areas of a website where people are watching and clicking.

Using this program gives us information that helps to:

- Determining the correct position of links and advertisements;
- Quickly identify the problem areas before they spiral out of control;
- Positioning and focus the resources where they make most profit;
- Attracting visitors to buy a product or complete a form;
- Anticipate the interaction with the website visitors in the future;
- Discovery of user trends in terms of Web pages, which can lead to other opportunities to win.

As a future perspective we take into consideration the development of the algorithm that take over the mouse events such as:

- Movement of the mouse on page;
- Select the text on page.

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