"Optimizing Advertisement Targeting Based on Colour and Devices"

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Abstract: *Over the last few years, we have seen revolutions in the internet technology and its adoption in advertising industry. Internet has become the common platform across the world where people visit different web sites for different type of their interests. It is also the cheapest media where they can place their advertisements as compared to other media like newspapers, Radio, TV etc. And hence we thought of putting a basic idea of exploring this smart era of smart devices and using the same for targeting advertisements along with traditional parameters like colour optimizations. In the project we will be implementing client server architecture for displaying and tracking the advertisements. A data store will be implemented using HDFS which will process data coming through advertisement tracking and also give efficient read and write operations for advertisement targeting. A statistical model will be implemented using statistical and probability based algorithms, which will provide feeds to server component to display the targeted advertisement. A device detection layer will also be implemented.*

I. Introduction

In the field of e-advertisements, presenting ads and sales are combined together using hypertext or hypermedia to the nearest retailer or e-shops. So, targeted advertisement could be mentioned as an effective solution in the field of marketing on the web. Scientists have been focused on various variables and features that could be considered to target users in an appropriate way. While mentioning them, some new features are added. In this article, a framework has been proposed which facilitate targeted advertisements; using user interaction with previous advertisements and their interest. This system is used as a tool to target each user according to its preferences and interests. The main goal is to show the most effective advertisements and attract users to share word of mouth (WOM) advertisements with each other. Considering user's type through their activity in a social network and omitting repetitive advertisements ease is our aim.

Marketing is listed as a primary activity in Michel porter's value chain model and it has a critical role in each business[2]. Lots of researches have been performed for finding suitable methods of targeted advertising and making the most impression possible on people. This paper's main goal is not only to fascinate customers, but also to make an improvement in the field of advertising. Users are considered as potential customers and having exact and precise information about each user, would guide us to recommend useful goods or services to them according to their own interests and tastes. This is a good solution to overcome data's redundancies, which is the problem of information century. Receiving information in a proper time could increase user's satisfaction and it is an important issue in customer relationship managements. Using a constant advertisement for many times could cause inattentiveness and ignorance to advertisements in web pages and even the media. The availability of internet and growth of intranets cause e-commerce be mature. Web 2.0's interactivity property and arising social networks, result in having social networks as an appropriate media for targeting advertisement. Targeted advertisements are based on recognizing users well. In case of advertisement locations there were two aspects, the first one was the webpage and the second one was using word of mouth (WOM) to spread advertisement. In this paper, it is tried to use all improvements which prior researches made and also some new ideas to make the targeted advertising system more powerful. Having reviewed basic concepts and related works, the new framework will be illustrated.

II. Basic Concepts

2.1 Advertisement Introduction

The word advertisement means transmitting thoughts or ideas and shares them with people to overcome other ideas. Business advertisements are usually broadcasted in various media. They must be catchy and interesting which companies invest in advertisement industry for producing and broadcasting it[2]. The main idea of all modern advertisements has been driven out from traditional advertisement such as e-banners, pop-up, pop-under, e-catalog, e-WOM and location base advertisement. These advertisements could be shown according to the cookies or the subject each user has searched for in a search engine. Internet base advertisements are more attractive and inexpensive in compare with traditional advertising. They seem to be catchier because they are enriched with multimedia techniques, pictures, videos and animations when necessary. Just like an old saying "a

pictures is worth thousands of words."Advertisements which contain audio and video are called multimedia advertisement[4].

In the field of e-advertisements, presenting ads and sales are combined together using hypertext or hypermedia to the nearest retailer or e-shops. So, targeted advertisement could be mentioned as an effective solution in the field of marketing on the web. Advertisements shown to each user are targeted according to user's preferences and interests. The main goal is to show the most effective advertisements depending upon user's interest[4].

III.   Proposed Work

Advertisements will be displayed using client server architecture. Advertisements will be designed using different parameters like type, template, colour etc. Based on users interest in different advertisements data collection will be done. Data will be collected using client side functionality like sessions and cookie stores.

Also a device detection layer will be used considering device as a parameter. A statistical model will be designed which will provide feeds to the server component to display the targeted advertisements.

Data collected on the server will be stored in a data store. Data store layer will be responsible to process data coming via advertisements and giving efficient reads and writes operation .Data store will be implemented using distributed database. In the system distributed file system HDFS[3] based on Hadoop is used for load balancing as well as map reducing. Performance related optimizations will be done on both client and server side.Based on all operations carried targeted advertisements will be displayed to the user.

First, we report a log analysis of the consistency of users' advertisement interest. Second, we propose a novel method for predicting a user's advertisement interests based on click behavior which combines the genuine interests of the user. Third, depending upon the user's interest advertisements will be shown to the user. When the user first uses the system he will be treated as a new user and he will have to register to the system. Next time when the user interacts with the system he would be treated as old user and he will be identified by username and password which he provided during the registration.

3.1. System Architecture
Components in the architecture:
1.   Web Browser
2.   Load Balancer
3.   Web Server
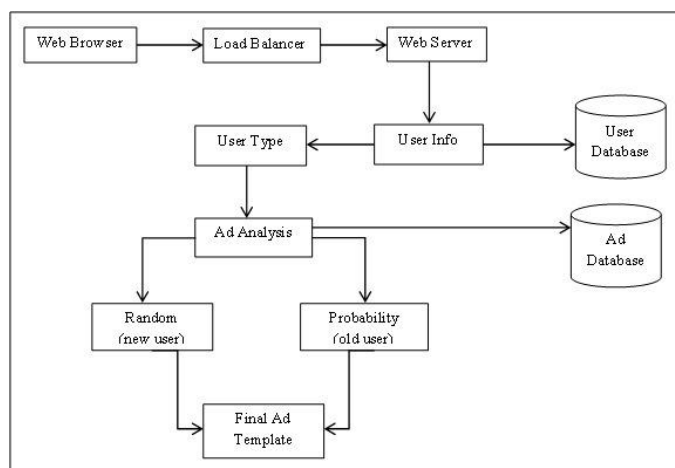4.   User Database
5.   Ad Database

Fig 3.1 System Architecture

1. Web Browser
The web browser (along with other browser applications) becomes the primary application interface through which the user views content, performs services, and manages data on their local machine and on the Web, often without even knowing the difference. Something like Firefox, Safari, or IE.

2. Load Balancer
Server component can be configured with multiple server using a load balancer. Load balancer is used to distribute and redirect request to multiple web servers.

3. Web Server
Web server is a must, a local Web server to handle the data delivery and content display from the local machine to the browser.

4. User Database
The user information such as GUID, cookie, user's interest etc. will be stored in the user database. This Database will be used to decide the type of user i.e. new or old. If database has information for particular user then he will be old user else new.

5. Ad Database
The MYSQL database is used for the collecting and storing the user information. The database stores all the required information and does processing on the data. The MYSQL database does the create, insert, delete all the function on the user data. The updated information is stored in the database.

3.2. Algorithm:
1. Initially the user will have to register and login to the application using web browser. Then the user will have to login.
2. When the user logins a Guid for the user will be created which will be used with combination of session id to track the user clicks.
3. If user is logging in for the first time,
   He will be shown advertisements using the random template algorithm
4. Else (when user is logging the nth time) probability algorithm will be used to show the template
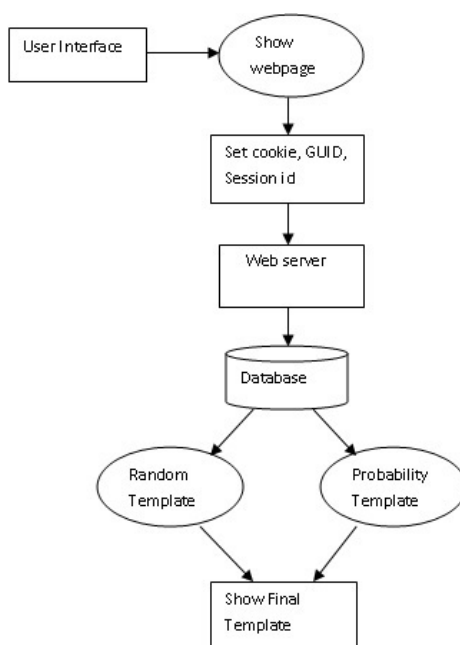5. Final template shown to user
6. End

Fig 2.1 Data Flow Diagram

3.2.1   Random Model
This is used to show user template when he logins for the first time.
1. When the user logins for the first time a random ad template will be shown.
2. For generation of random ad template all templates with same format but different colour combinations will be assigned nos.
3. Then using a random generation function a random number will be generated and the template who is assigned the generated number will be shown.
4. The template will be changed after a fixed interval of time using a timer property.

5. When the user will click on the particular ad his details and the ad details will be sent to the database as an entry to show user responded to this particular combination The guid and template number can be used as keys.
6. End

3.2.2. Probability Model

This is used when the user is not logging in for the first time.

Predicting User's Genuine Advertisement interest[5].

Let $D(u, t)$: click distribution of individual users for a specific time period t in the past

$D(t)$: represents possible colour combinations in time t

$C = \{c_1, c_2, \ldots\ldots\ldots c_n\}$: be category of all combinations.

The genuine interest of a user in topic category c_i is modeled as

$p^t(click\ category = c)$,the probability of the user clicking on an article about c_i .

Using a Bayesian rule,

$p^t(click \mid category = ci)$ is computed as follows:

interest^t(category=c_i) = $p^t(click\ category = c)$ =

$$\frac{p^t(click\ category = c_i \mid click) * p^t(click)}{p^t(click\ category = c_i)} \qquad \ldots\ldots\ldots\ldots (1)$$

$p^t(click\ category = c_i \mid click)$ is the probability that the user's clicks being in category ci . It can be estimated by the click distribution $D(u,t)$ observed in time period t , as computed in above equation .

$p^t(click\ category = c_i)$ is the prior probability of an article being about category ci. This is the advertisements of different colour combinations about that category in the time period.

$p^t(click)$ is the prior probability of the user clicking on advertisement, regardless of the its category.

IV. Results

  Initially it is assumed that the user will register & login to the web page. He will be shown multiple ad templates which are varied by parameter like colour, generated using the random model, as he is logging in for the first time and no data related to the user is available in the database .When the user responds to a particular ad template the data relevant to the ad will be stored in database with the user associated .Such type of data about users interest will be collected over a period of time for example: 7 days. Based on this data collected a probability is calculated as of which template the user likes the most. This is done using the probability algorithm .The next time the user logins the ad template which is selected based on probability model will be shown to the user.

  This will not only increase the user's interest in surfing the particular product or site but also save his time. It will be easy to target the users interest and at the same time save a lot amount of space on particular webpage.

  As in cases we see nowadays, the webpage is almost filled with ads leaving relatively very small space for the actual content. This problem can be easily solved with this project as the no of ads will be decreased by not showing user the ads in which he is not interested thereby increasing the space available for the actual content. This Project can be mostly used by people into marketing domain who need to target their users.

V.   Conclusion

  In the current position of web domain online advertising is one of the most popular and growing domains on internet. Online advertising is done on the commercial basis up till now but in this project we will be optimizing it.In this paper, we have proposed an architecture which aims at making better influence in targeted advertising of products considering different features. In this approach after defining the user types, the advertisements will be shown according to user's interest which will be very beneficial to users and increase their interest. Thus we will be optimizing advertisement depending on colour and device types to ensure more targeted advertisements to user.

References

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