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Sittichai Jiampojarn

Jing Wang

Deepak Ravichandran

Eu-Jin Goh

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Methods and Systems to Identify Potential Users Using Click-Based Referral of Website Visitors

This document describes systems and processes for an advertising platform. The advertising platform increases a size of a target audience (e.g., an advertising list of an advertising campaign) of an advertiser by using information that is known about visitors to the advertiser's website. Advertisers (e.g., website administrators or other such online content providers) often wish to expand advertising to similar users. For example, similar users include web users that have similar interests to users that have visited the website (e.g., visitors, customers, etc.) of the advertiser. These similar users are more likely to purchase a product from the advertiser than a typical web user. However, identifying web users that have similar interests to prior users can be difficult. This is because most advertisers have a relatively small number of visitors to the advertiser's website when compared to the online marketplace as a whole. The systems and processes described below enable the advertiser to target (e.g., send an advertising item to) users that have similar interests to the visitors to the advertiser's website, or to target other web users that have shown an interest in the advertiser's products.

The advertising platform may be implemented in a number of different forms. For example, it may be implemented as a standard server, or multiple times in a group of such servers. It may also be implemented as part of a rack server system. In addition, it may be implemented in a personal computer such as a laptop computer. Alternatively, components from the advertising platform may be combined with other components in a mobile device. Each of such devices may contain one or more computing devices, and an entire system may be made up of multiple computing devices communicating with each other. An example system for the advertising platform can be seen below in FIG. 1.

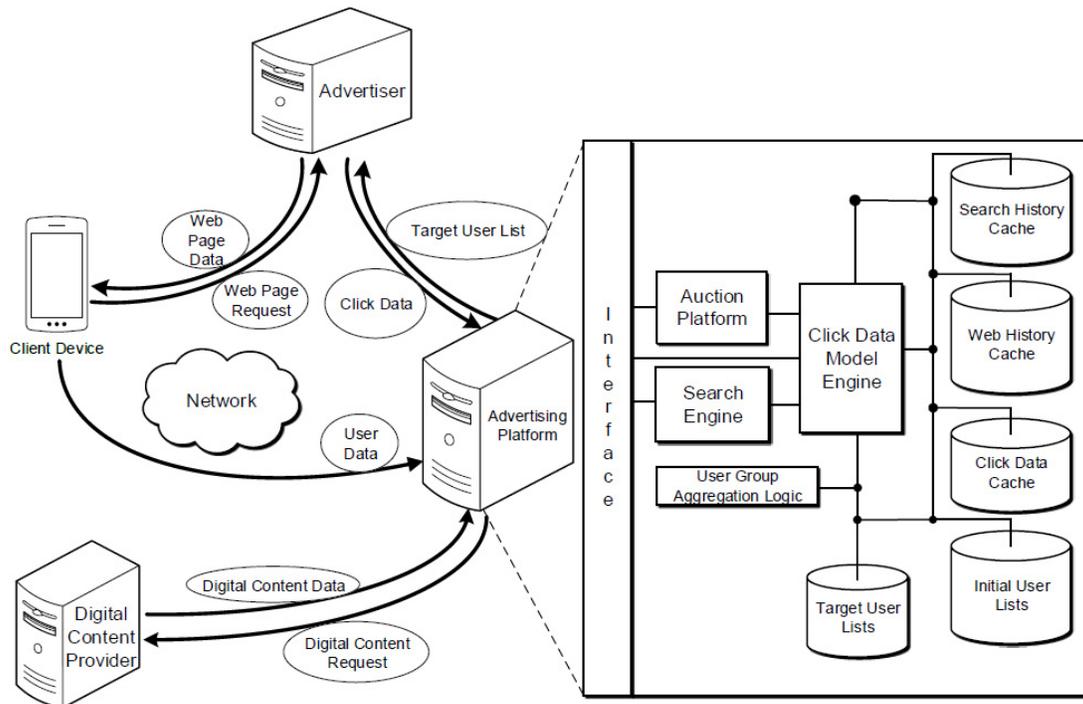
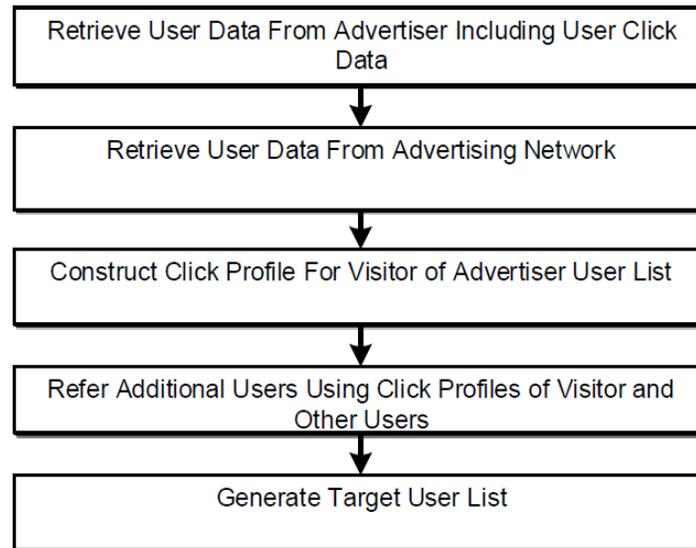


FIG. 1

The advertising platform performs the following process for expanding an advertiser's target audience. The advertising platform collects data representing the visitors to the advertiser's website. The collected data includes click behavior data for the visitors. The advertising platform collects data representing other web users, including click behavior data, browsing behavior data, etc. The advertising platform constructs a click profile for one or more visitors to the advertiser's website and a click profile for one or more other web users. The advertising platform identifies potential customers for the advertiser by comparing the click profile of visitors to the advertiser's website and the click profile of other web users. The advertising platform identifies additional users for the advertiser to target by using the click profile of one or more of the visitors to refer a number of other web users to the advertiser as potential customers to target with advertising. Each of these steps is described in more detail below. A summary of the process can be seen in FIG. 2, below.

**FIG. 2**

The advertising platform identifies an initial user list (e.g., the initial set of web users) that characterizes the type of user that is of interest to the advertiser. The users of the initial user list can be called “seed users,” because the advertising platform will discover new potential customers based on data representing characteristics of the web users of the initial user list. The initial user list can be taken from a list of users that have visited to the advertiser’s website. The initial user list can include all visitors to the advertiser’s website, or a portion of the visitors to the advertiser’s website, such as visitors that meet particular criteria. For example, the advertiser can target visitors that put items into a shopping cart but did not purchase the items. The advertiser can target visitors that viewed a particular product, webpage, or combination of products or webpages, viewed products or webpages in a particular order, spent a threshold

amount of time viewing a product or webpage, viewed a webpage a threshold number of times, viewed a product or webpage at a particular time of the day or on a particular date, and so forth.

To identify an initial user list, the advertising platform can be integrated with the web site of the advertiser. The advertising platform can monitor the web traffic at the website of the advertiser to tag the visitors of the website as customers of the advertiser. The advertiser can embed, in a webpage of the advertiser, a tag (e.g., a snippet of code) that is provided by the advertising platform. When the webpage of the advertiser is rendered by a client device, the tag causes the client device to send data about the client device, which represents the visitor, to the advertiser's server. The advertiser's server sends the data about the client device to the advertising platform. The data collected by the advertising platform about the client device can include a client device identifier, an internet protocol (IP) address, a cookie identifier, or other identifier that represents the client device, which serves as a proxy for the visitor. In cases where the advertiser's web page includes a login, a profile identifier of the visitor can be sent to the advertising platform. The profile identifier can be anonymized before being stored in the database such that personal information of users is sanitized from the records of the advertising platform.

The advertiser can collect behavioral data about visitors to the advertiser's website and send the behavioral data to the advertising platform. The advertising platform can use the behavioral data to identify the initial user list from the visitors to the advertiser's website, such as to target visitors that added a product to a shopping cart of the website, but did not make a purchase. The advertiser can target these particular visitors with advertising that relates to the product that was added to the shopping cart for each user. For example, the advertiser may offer a time-limited discount on the product to persuade the visitor to complete the purchase.

Alternatively, or in addition, the advertiser can offer a unique discount to the visitor or send other advertising to a visitor that spends more than a threshold amount of time browsing the website of the advertiser, such as looking at a particular product page.

The advertiser can target additional users with similar advertising as the particular visitors identified above by expanding the initial user list. The advertiser is able to target additional users by using characteristics of individual users of the initial user list, by characterizing the initial user list in the aggregate, or by a combination of the two approaches. The advertising platform gathers data about the other users to be used in adding other web users to the initial user list to generate the target user list.

The advertising platform can gather data about other web users using several techniques. The advertising platform has access to click data of other web users, such as using the advertising network of the advertising platform. The advertising platform can also access click data by retrieving the click data collected in other advertising networks, such as by agreement with advertisers and other advertising networks. In some implementations, click data and browsing data can be collected from cookies cached by a browser or other application installed on the client device of a user. The data collected by the browser or other application can be uploaded to the advertising platform from the client device periodically.

For situations in which the systems discussed here collect and/or use personal information about users, the users may be provided with an opportunity to enable/disable or control programs or features that may collect and/or use personal information (e.g., information about a user's social network, social actions or activities, a user's preferences or a user's current location). In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information associated with the user is removed. For example, a

user's identity may be anonymized so that the no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined.

In one implementation, additional users are identified by first characterizing the users of the initial user list in the aggregate. This approach identifies a typical user of the initial user list that is representative of the initial user list. The typical user of the initial user list is found by aggregating the data of the individual users of the initial user list to generate a representation of the typical user of the initial user list. The advertising platform discovers additional users to add to the initial user list by comparing the behavior of other web users to the generated representation of the initial user list. To add additional users (e.g., selected from other web users) to the initial user list, the advertising platform computes a representation for one or more other web users, such as based on data gathered from the other web users. If the representation of the one or more other web users is similar to the representation of the initial user list, the additional user can be added to the initial user list to generate a target user list. For example, the advertiser is able to find new potential customers based on the specific topics or concepts that the users of the initial user list were browsing before being added to that list. The advertiser can add incremental new users to an advertising campaign. The incremental new users exhibit a threshold amount of similarity a typical user of the initial user list. The threshold can be predetermined by the advertiser. The threshold can be dynamically determined based on the number of additional users identified. The threshold can be set to target a specified number of additional users. The threshold can be based on another similar thresholding metric based on the advertising needs of the advertiser. The typical user of the initial user list, which is identified by aggregating the

browsing histories of the users of the initial list, can identify new users that are not similar to any individual users of the initial user list but rather are similar to an average (e.g., a weighted average) of all the users of the initial list of users.

In one implementation, the advertising platform uses the characteristics of the individual users of the initial user list to identify additional users for targeted advertising campaigns of the advertiser. The advertising platform can use the characteristics of individual users of the initial list of users in cases where there is a low number of users in the initial user list. For example, the advertising platform may use the individual characteristics of the users of the initial user list in cases where there are less than 1000 users on the initial user list. This approach solves the problem where a low number of users are each different enough from one another that no typical user representation can be identified and generated by the aggregation approach described above. By using the characteristics of individual users rather than of groups of users, the advertising platform finds additional users that are similar to at least one visitor to the advertiser's website that the advertiser desires to target. The advertiser can target a visitor because the visitor has made a purchase, viewed a particular item, clicked on an advertisement, etc.

The advertising platform can use click data of the users of the initial user list to recommend additional users to add to the initial user list, thereby generating a target user list. The click data of the users of the initial user list is gathered by the advertising platform, such as by using the tag of the advertiser's website as described above. Click data of a user includes the click history of the user that is indicative of which webpages the user clicked on an advertisement. Click data is different than a browsing history data of the user, which is a measurement of which websites the user visited. Click data can be more useful for determining user intent to purchase a product, click on an advertisement, or otherwise perform an action that

benefits the advertiser. For example, a particular user may frequently access a website of the advertiser or a competitor of the advertiser but may infrequently click on advertisements for a retailer or purchase a product from the advertiser's or a competitor's online store. Such a user can be unlikely to purchase a product from the advertiser, despite visiting the website of the advertiser. As such, click data can be a more accurate representation of user intent than browsing history of the user. The advertising platform can gather the click data of the users of the initial user list. For example, the click data can be gathered for the prior 30 days of activity of the users of the user list, or as described above. The advertising platform can collect click data for other time frames, and can weight more recent activity more heavily than more stale activity.

The advertising platform compares the click data of the users of the initial user list to the click data of other web users to determine which other web users are additional users to be added to the initial user list to generate the target user list. Features of the click data are represent one or more users of the initial user list. The click data is used to determine features for each of the one or more users, such as that a user is very likely to click on ads, purchase from the online store, etc. The advertising platform uses the features of the users of the initial list to generate a model for each user that represents the user. The features can be determined based on an analysis of trends of the click data or other such model developed over time from the click data gathered by the advertising platform.

The advertising platform generates a model for the users of the user list that indicates what click data of users is indicative of purchases, website visits, or other conversions by users. The advertising platform compares the model that represents initial users to models representing other users, and adds the other users to the target list if the models are comparable above a threshold. For example, the advertiser can be a car dealership, and a visitor "V" to the car

dealership's website can be a user that eventually bought a car. The advertising platform can determine that the visitor V clicked on two prior advertisements of the car dealership over the past 30 days, and several other advertisements for cars including ads A, B, C, and D. The advertising platform can identify other web users that have clicked on one or more of advertisements A, B, C, and D over the past 30 days, such as using the ad network described above, and add those users to the target list. The additional users that are added to the target list are called referrals or referred users of the visitor V.

The advertising platform is configured to limit the number of referred users added to the target list for any one user of the initial user list. If a particular user of the user list is permitted to refer an unlimited number of additional users, the model of the particular user can dominate the target list. In situations where a particular user model dominates the target list, the target list can be a relatively poor representation of the users of the initial list, relative to situations where many user models contribute to the target list. For example, each user on the initial user list can be capped at referring five additional users, ten additional users, or some other amount of other users. The number of referrals permitted for each user can depend on the size of the list, the user model itself for a user (has a particular user made a large number of purchases, clicked on a large number of ads, etc.), or other similar metrics. For example, a user that has made a larger number of online purchases from the advertiser can be allowed to refer more additional users than a user that has made a smaller number of online purchases from the advertiser.

The advertising platform adds the referred users to the initial user list to form a target user list. In some implementations, the target user list does not include the initial users, such as to avoid targeting users that have already made a purchase. The advertising platform can be used by the advertiser to generate an advertising campaign to the target list, generate another list of

similar users using the above described techniques, or perform other advertising operations on the target user list.

ABSTRACT

This document describes systems and processes for an advertising platform. The advertising platform increases a size of a target audience (e.g., advertising list of an advertising campaign) of an advertiser by using information that is known about the visitors to the advertiser's website. The advertising platform can enable advertisers (e.g., website administrators or other such online content providers) to expand advertising to web users that have similar interests to users that have visited the website (e.g., visitors, customers, etc.) of the advertiser. These similar users are more likely to purchase a product from the advertiser than a typical web user. The advertising platform uses click data to characterize users of an initial user list. The initial user list can be small when compared to the online marketplace as a whole. The advertising platform uses the click data of users of the initial user list (e.g., a seed list) to represent the users of the initial user list. The advertising platform uses the click data refer additional web users to the list and generate a target list. Each user of the initial user list is limited to a maximum number of referrals to the target list to maintain diversity in the type of user on the target list, such that no user's click data model dominates the target list.