

Technical Disclosure Commons

Defensive Publications Series

September 28, 2017

Allocation of Advertisement Extensions & Formats

Patrick Hummel

Roberto J. Bayardo Jr

Shaohua Sun

Gagan Aggarwal

Kishor Barman

See next page for additional authors

Follow this and additional works at: http://www.tdcommons.org/dpubs_series

Recommended Citation

Hummel, Patrick; Bayardo, Roberto J. Jr; Sun, Shaohua; Aggarwal, Gagan; Barman, Kishor; Uday Bhawalkar, Kshipra; Crespo, Jean-Francois; and Wang, Ying, "Allocation of Advertisement Extensions & Formats", Technical Disclosure Commons, (September 28, 2017)

http://www.tdcommons.org/dpubs_series/695



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

Inventor(s)

Patrick Hummel, Roberto J. Bayardo Jr, Shaohua Sun, Gagan Aggarwal, Kishor Barman, Kshipra Uday Bhawalkar, Jean-Francois Crespo, and Ying Wang

Allocation of Advertisement Extensions & Formats

BACKGROUND

Some advertisers set budget constraints (*e.g.*, spending less than a threshold amount of budget over a period of time) when bidding in auctions. Some of these advertisers can also be opted in to ad extensions or formats (such as call buttons, reviews, sitelinks, seller ratings, etc.) that may be optionally displayed along with their ads that can enhance the probability that their ad will be interacted with by a user. As these advertisers have set budget constraints, if these advertisers are allocated all of the advertising opportunities and ad extensions that they are eligible for, the advertisers may ultimately spend more than their budgets or reach their budget limit very early in the budget period. Thus, it can be beneficial for an advertising manager that connects advertisers with advertisement opportunities to have auctions that can ensure that these budget-constrained advertisers do not purchase as many clicks/impressions as they would if they were allocated all of the advertising opportunities and ad extensions that they are eligible for.

DESCRIPTION OF DRAWINGS

Figures 1 and 2 are diagrams of an example system for an advertisement auction.

DETAILED DESCRIPTION

This document discusses allocating formats to budget-constrained advertisers, including executing an advertisement auction with ad extensions (or formats) in which the ad extensions that are allocated to a particular advertiser in a given auction depend on the advertiser's budget constraint. The advantages of doing so can include that budget-constrained advertisers will have lower effective costs-per-click as they will not be charged for as many formats as before. This

will enable budget-constrained advertisers to obtain more impressions and clicks for a given amount of budget, and thereby enable the budget-constrained advertisers to obtain greater advertising value. The advantages further include optimizing the budget-constrained advertisers' budgets in auctions that do not include enough space on webpages to show all of the ads with all of their formats. This will enable efficiently utilizing the space on the webpage in cases where there is not have enough space to show all the ads with all of their formats for non-budget-constrained ads, and thus facilitate the non-budget-constrained advertisers to have more user interaction while appropriately allocating the budget of the budget-constrained advertisers. Moreover, the advantages include facilitating participation of the budget-constrained advertisers in more auctions, thus efficiently allocating pricing in auctions.

Fig. 1 illustrates an example system 100 for an advertisement auction. The system 100 includes an advertising system manager 102, advertising systems 104a, 104b, 104c (collectively referred to as advertising systems 104), and a client computing device 106. In some examples, the advertising systems 104 are referred to as advertisers 104. The advertising system manager 102 is in communication with the advertising systems 104 and the client computing device 106 over one or more networks.

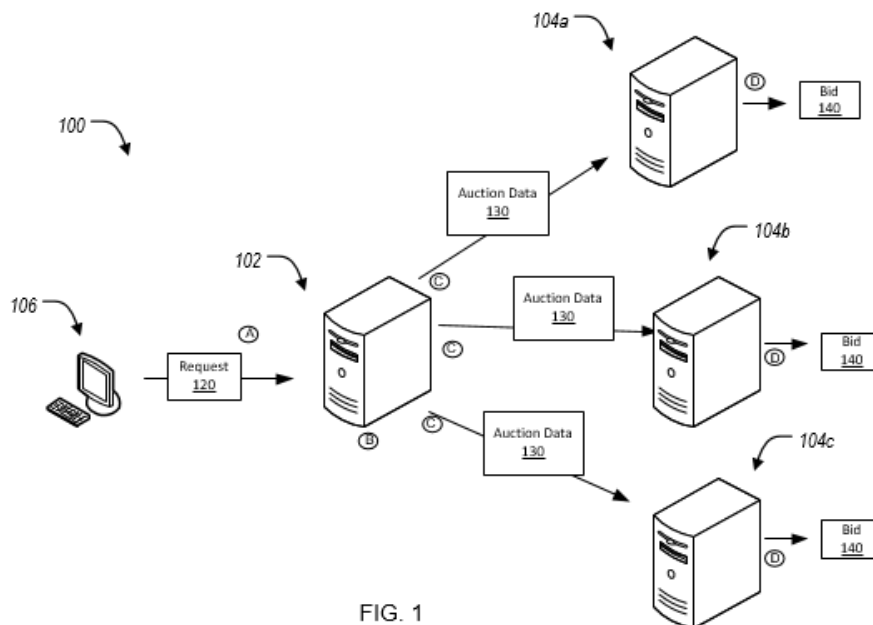


FIG. 1

The client computing device 106 provides a request 120 to the advertising system manager 102, at step A. The request 120 can include a request for advertising content to be displayed on an electronic document provided to the client computing device 106, *e.g.*, from a third party content provider. The advertising system manager 102 receives the request 120, and in response, initiates a real-time bidding (RTB) auction for providing advertising content to the client computing device 106, at step B. When a real-time bid is requested, the advertising system manager 102 provides auction data 130 to the advertising systems 104, at step C. The advertising systems 104 receive the auction data 130, and generate bids 140 based on the auction data 130, at step D.

Referring to Fig. 2, the advertising systems 104 provide the bids 140 to the advertising system manager 102, at step E. The advertising system manager 102 selects winning bid(s) 150 of the auction based on the bids 140, at step F. The advertising system manager 102 then provides advertisement(s) and/or extension(s) 160 based on the winning bid(s) 150 to the client computing device 106, at step G. In some cases, the advertising system manager 102 conducts a

second auction for the extensions based on a ranked order of the bids 140 and/or a ranked order of the advertising systems 104.

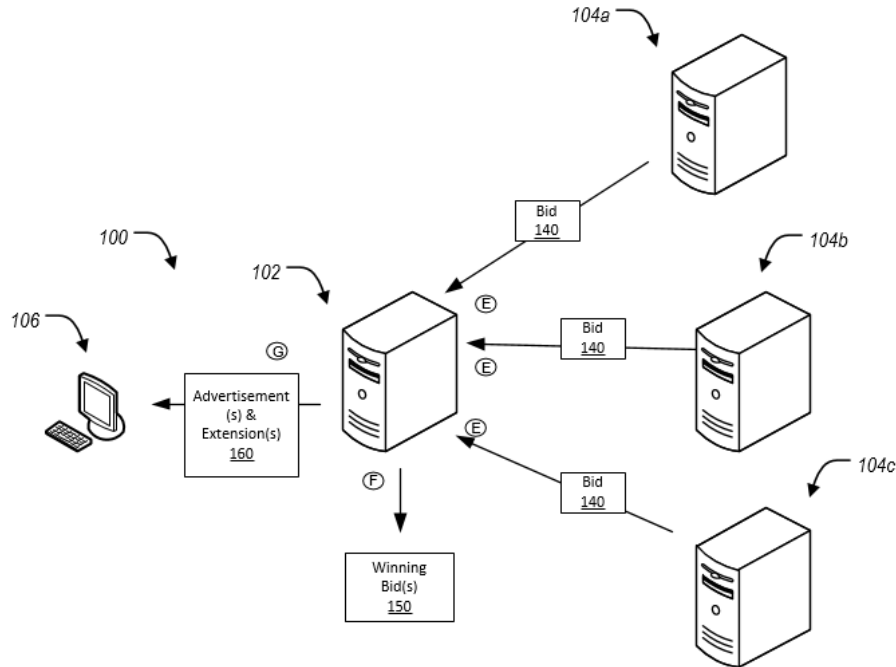


FIG. 2

To that end, for allocation of the extensions for the auction, several implementations are provided below. In some cases, for every advertising system 104, the advertising system manager 102 can determine the impression probability for the advertising system 104. The impression probability is the fraction of auctions the advertising system 104 is eligible for while staying within the budget of the advertising system 104. For a given advertising system 104, if the advertising system 104 participates in a given auction and the impression probability of the advertising system 104 falls below a threshold, then only a minimum number of extensions (or formats) of the advertising system 104 are displayed alongside the ad. Otherwise, the advertising system manager 102 can allocate extensions (or formats) to this advertising system 104 according to a standard (existing) mechanism for allocating formats to ads. Using this

methodology would enable the advertising system manager 102 to only disable formats from budget-constrained advertising systems 104, and thus reduce an amount of budget a budget-constrained advertiser system 104 allocates on each impression and allow the budget-constrained advertising systems 104 to participate in more auctions and obtain more impressions.

In some cases, in addition to determining each advertising system's 104 impression probability, when an advertising system 104 participates in a given auction and the advertising system's 104 impression probability falls below a threshold, then the advertising system manager 102 can allocate the particular formats that this advertising system 104 can receive for free to this ad. In some auction mechanisms for allocating formats, certain formats are free – that is, the formats do not increase an advertising system's 104 cost-per-click as long as the formats have a sufficiently small effect on the prominence of advertising system 104. By continuing to allocate the free formats to budget-constrained advertising systems 104, the advertising system manager 102 would enable budget-constrained advertising systems 104 to continue to provide their most cost-effective formats, and thus, enabling the advertising systems 104 to obtain more advertising value. More generally, if an advertising system 104 participates in a given auction and the advertising system's 104 impression probability falls below a threshold, then the advertising system manager 102 can only allocate the formats that the advertising system 104 can receive that would have a sufficiently small effect on metrics of the advertising system 104 such as the cost, click-through-rate, or prominence.

In some cases, in conjunction with either of the two implementations above, the advertising system manager 102 determines the impression probability of each advertising system 104, and then modifies the format allocation of the advertising system 104 when the impression probability of the advertising system 104 falls below a threshold and the advertising

system 104 would not be placed in the very top position. Then only a minimum number of formats of the advertising system 104 are displayed alongside the ad or only the freebase formats of the advertising system 104 are displayed. By contrast, when either of these conditions do not hold, then the advertising system manager 102 can allocate formats to this advertising system 104 according to a standard (existing) mechanism for allocating formats to ads. As a result, the advertising system manager 102 does not throttle formats from budget-constrained advertising systems 104 as aggressively when the budget-constrained advertising system 104 appears in the very top position. Specifically, revenues tend to be highest in top position, and thus, this implementation can enable the advertising system manager 102 to better maximize the revenue while creating more value for the budget-constrained advertising systems 104.

In some cases, in conjunction with any of the first three implementations, the advertising system manager 102 determines whether there is enough space on the webpage to display all the ads with all of their formats. When there is enough space, the advertising system manager 102 allocates formats to each advertising system 104 according to the standard (existing) mechanism for allocating formats to ads. When there is not enough space, the advertising system manager 102 then would follow the methodology in either of the first three implementations given above to determine how to allocate formats to the advertising systems 104. This alternative implementation is beneficial in that it will only make use of the above methods for throttling formats from budget-constrained advertising systems 104 in situations where there is not enough space to show all of the ads with all of their formats. By using this alternative implementation, the advertising system manager 102 throttles formats from budget-constrained advertising systems 104 in cases where throttling formats from a budget-constrained ad will enable the advertising system manager 102 to provide more formats for the other ads that the advertising system

manager 102 would not have been able to show otherwise. Thus, the advertising system manager 102 will only throttle formats from budget-constrained ads in situations that create more value for other advertising systems 104 by doing so.

In some cases, at the time the advertising system manager 102 determines whether to throttle formats from a particular budget-constrained advertising system 104, it may be difficult to determine whether there is enough space on the webpage to display all of the ads with all of their formats as the advertising system manager 102 may not be aware of what formats are available to ads that will be shown further down the webpage. To that end, rather than the advertising system manager 102 determining whether there is enough space on the webpage to show all the ads with all of their formats, the advertising system manager would first determine whether the total number of promotable ads (*i.e.*, the number of ads that meet the minimum reserve price) is greater than or equal to the maximum number of ads that can be displayed on the webpage. When the number of promotable ads is greater than or equal to the maximum number of ads that can be displayed on the webpage, the advertising system manager 102 would follow the methodology in any of the above implementations given above to determine how to allocate formats to advertising systems 104. When the number of promotable ads is less than the maximum number of ads that can be displayed on the webpage, the advertising system manager 102 can allocate formats to each advertising system 104 according to a standard existing mechanism for allocating formats to ads. To that end, when the number of promotable ads is less than the maximum number of ads that can be displayed on the webpage, then it is likely that there is enough space on the page to display all the promotable ads with all of their formats as there are relatively few ads that are eligible to be displayed. By contrast, when there are at least as many promotable ads as displaying the maximum number of ads that can be displayed on the

webpage, then it is unlikely that there is enough space on the webpage to show all of the ads with all of their formats as the maximum number of ads that can be displayed indicates there will be relatively less space left on the webpage for formats.

In some cases, in conjunction with the above implementations, when a budget-constrained advertising system 104 (*i.e.*, an advertising system 104 whose impression probability falls below the threshold mentioned above) will be the very last ad displayed on the webpage, the advertising system manager 102 will continue to use the standard (existing) mechanism for allocating formats to allocate formats to this ad. Otherwise, the advertising system manager 102 will use the methodology described in the fourth or fifth implementation to allocate formats to this ad. To that end, when a budget-constrained advertising system 104 is the last ad on the webpage, then the advertising system manager 102 will have previously allocated all of the formats available for the other ads, and thus the advertising system manager 102 determines that allocating formats to this budget-constrained advertising system 104 that will not have an effect on which formats are allocated to other ads. Given this, throttling formats from this budget-constrained advertising system 104 will not enable the advertising system manager 102 to provide additional formats for other advertising systems 104.

In some cases, the ad auctions can utilize a configuration optimization process in which the advertising system manager 102 has the option of displaying a larger number of ads and showing the ads that are displayed with a relatively small number of formats, or also showing a smaller number of ads but showing the ads that are displayed with larger formats. Traditionally, the advertising system manager 102 has evaluated which configuration of ads to show by comparing total values in these different configurations and showing the configuration that has the largest total value. As an alternative to this, the advertising system manager 102 can

downweight budget-constrained advertising systems 104 in deciding which formats to allocate to the advertising system 104. In particular, if $p(i)$ denotes the impression probability for advertising system (i), $eCPM_i(A)$ denotes the eCPM value for the advertising system (i) in a configuration A, and $f(p)$ denotes some non-decreasing function of the impression probability p (e.g., p raised to a power), the advertising system manager 102 can select the configuration A that maximizes the sum of the values of $f(p(i)) * eCPM_i(A)$ (over all advertising systems 104) rather than maximizing the sum of the values of $eCPM_i(A)$. By weighting the advertising system (i) by this non-decreasing function $f(p(i))$, we effectively place less weight on budget-constrained advertising systems 104 (*i.e.*, advertising systems 104 with low impression probabilities $p(i)$), so that less of the space on the webpage is used to allocate formats or advertising opportunities to budget-constrained advertisers.

In some cases, for each budget-constrained advertising system 104, the advertising system manager 102 can determine the cost-per-click that the advertising system 104 would pay if the advertising system 104 were displayed along with a particular format. The advertising system manager 102 can then throttle the format from the budget-constrained advertising system 104 when this cost-per-click would exceed a particular threshold, where the threshold may be a function of (i) the advertiser's bid, (ii) the advertiser's impression probability, and (iii) other properties of the query and/or the participants on the query. In some cases, the advertising manager 102 can throttle formats from a budget-constrained advertising system 104 when the budget throttling score of the advertising system 104 is less than a threshold which depends on the advertiser's impression probability. The budget throttling score can be a function of (i) the advertiser's cost-per-click with formats, (ii) the advertiser's bid, and (iii) other properties of the query and/or the participants on the query. For instance, when formatted-CPC denotes the cost-

per-click an advertising system 104 would pay with a particular format, then the advertising system manager 102 could throttle this format from the budget-constrained advertising system 104 when $f(\text{bid} / \text{formatted-CPC})$ is less than a threshold, where $f(x)$ is a non-decreasing function of x (e.g., such as x raised to a power).

ABSTRACT

This document describes a process of optimizing the selection of a budget-constrained advertiser's formats when allocating the budget of a budget-constrained advertiser. Such optimization is performed by selectively choosing which formats to allocate to this advertiser based on the advertiser's budget. In particular, this document describes allocating formats to budget-constrained advertisers in advertising auctions to create value for the advertisers and an advertiser manager.