

DEVICE, METHOD AND SYSTEM FOR GENERATING A RECOMMENDATION OF OFFERINGS TO A USER

TECHNICAL FIELD

[0001] Various aspects of this disclosure relate to methods, devices, and systems for generating a recommendation of offerings to a user. The recommendation may be in the form a marketing campaign for offerings, such offerings include products and/or services.

BACKGROUND

[0002] Businesses, big or small, invest in marketing in increasing the likelihood of sales of their products and/or services. A marketer may set a performance target as part of justification of marketing expenditure.

[0003] Currently, the performance target of a marketing campaign may typically be expressed in one of the two ways as follows: (a.) The marketing cost per order attributed to the campaign or (b.) The ratio of the sales value attributed to the campaign to marketing cost.

[0004] Online platforms, such as e-commerce or electronic transaction platforms, may offer two types of marketing levers to marketers. The first type is advertisement, where marketers pay a marketing platform for boosting their service visibility to consumers across the marketing platform. The second type is promotion, where the marketer provides a discount to the consumers to entice more attention and sales. When only one of the two marketing levers is used, it is relatively straightforward to measure and satisfy the performance target when appropriate features are available. For example, suppose the marketer has a cost per order performance target of less than X dollars. If the platform offers a cost per order (CPO) pricing model, the marketer can simply run an ad campaign with an X dollar CPO bid, which

guarantees his marketing cost for each order is below his target. Similarly, if he chooses to run a promo campaign, his performance target will be met if he offers a discount of less than X dollars per order.

[0005] However, the use of only one of the two aforementioned levers may not be sufficient to achieve the marketing objective. Advertisement only boost visibility, therefore if the offers themselves are not attractive enough to the target audience, the resulting sales may not be sufficient to meet the marketing goal. Promotion campaigns without visibility boost from ad campaigns make them less discoverable. As a result, the sales may not increase as much as desired.

[0006] Currently, there is no systematic solution that helps a marketer combine or integrate the two marketing levers in a system or device to meet the performance target. In most situations, if marketers set up campaigns with each lever as if that is the only one available, they will end up not meeting their specified performance target. Using the aforementioned example, if a marketer executes both an ad campaign and a promo campaign simultaneously, the total marketing cost for each order will be the sum of the cost incurred in the two campaigns, which is likely to exceed his target of X dollars per order. If the marketer adjusts both campaigns manually to try to meet his performance target, it will require a significant amount of manual trial and error.

[0007] There exists a need to determine optimal or near optimal combinations between these two levers, and yet guaranteeing performance targets.

[0008] Accordingly, the disclosure seeks to address the aforementioned need at least in part.

SUMMARY

[0009] The disclosure seeks to provide a system, device and method for generating one or more recommendations of offering(s) to a user. Using a data processing module (recommendation of offerings generation module) of the present disclosure, any generated recommended offering(s) is guaranteed to meet a user-defined performance target. In addition, the present disclosure comprises an optimization module arranged in data connection with the data processing module to optimized the generated recommended offerings so as to maximize likelihood of conversion, that is, acceptance of the recommended offerings(s) so that marketing revenue can be maximized.

[0010] According to an aspect of the disclosure there is provided a system for generating a recommendation of an offering to a user, the system comprises: a user-interface module configured to receive an input dataset, the input dataset comprises a performance target value, a performance type, and a budget of the recommendation of offerings; a recommendation of offerings generation module configured to receive the input dataset to determine a performance target inequality equation and generate a plurality of eligible candidates, each of the plurality of eligible candidate comprising a minimum purchase value of the offering and a corresponding discount parameter; wherein each of the plurality of eligible candidates satisfies the performance target inequality equation.

[0011] In some embodiments, the performance type is a marketing cost per order and the performance target value is a maximum allowable marketing cost. The performance target inequality equation may be determined in a manner such that the marketing cost per order is less than or equal to the maximum allowable marketing cost.

[0012] In some embodiments, the discount parameter is a discount value.

[0013] In some embodiments, the performance type is a ratio of sales attributed to the marketing campaign to the marketing cost and the performance target value is a minimum allowable ratio of the net sales attributed to marketing cost. The performance target inequality equation may be determined such that the ratio of the net sales attributed to marketing cost is less than or equal to the minimum allowable ratio.

[0014] In some embodiments, the discount parameter comprises a maximum allowable discount value and a corresponding discount percentage.

[0015] In some embodiments, the system further comprises a database for storing the plurality of eligible candidates and a requestor module configured to receive requests for marketing service, and access the database to retrieve at least one of the plurality of eligible candidates.

[0016] In some embodiments, the system further comprises an optimization module configured to receive the plurality of eligible candidates to determine a rank score of each of the eligible candidates based on a probability of an acceptance of the offering, and a bid value derived from the performance target value.

[0017] In some embodiments, the optimization module is further configured to determine the best ranked eligible candidate.

[0018] In some embodiments, the optimization module is configured to use a generalized second price (GSP) auction mechanism to determine the rank score of each eligible candidate.

[0019] In some embodiments, the system comprises a fulfilment module configured to receive an order for a good and/or service, and provides a settlement data to the requestor module.

[0020] In some embodiments, the fulfilment module configured to receive an order for a good and/or service, and provides a settlement data to the requestor module.

[0021] According to another aspect of the disclosure there is provided a computer implemented method for generating a recommendation of an offering, the method comprising receiving an input dataset, the input dataset comprises an performance target value, a performance type, and a budget of the recommendation of offerings; determining a performance target inequality equation performance target value based on the input dataset; and generating a plurality of eligible candidates, each of the plurality of eligible candidate comprises a minimum purchase value of the offering and a corresponding discount value; wherein each of the plurality of eligible candidates satisfies the performance target inequality equation.

[0022] In some embodiments, the performance type is a marketing cost per order and the performance target value is a maximum allowable marketing cost. The performance target inequality equation may be determined such that the marketing cost per order is less than or equal to the maximum allowable marketing cost, and optionally, the discount parameter is a discount value.

[0023] In some embodiments, the performance type is a ratio of sales attributed to the marketing campaign to the marketing cost and the performance target value is a minimum allowable ratio of the net sales attributed to marketing cost. The performance target inequality equation may be determined such that the ratio of the net sales attributed to marketing cost is less than or equal to the minimum allowable ratio.

[0024] In some embodiments, the discount parameter comprises a maximum allowable discount value and a corresponding discount percentage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The disclosure will be better understood with reference to the detailed description when considered in conjunction with the non-limiting examples and the accompanying drawings, in which:

- FIG. 1 is a schematic block diagram of a system or communications server apparatus for generating a recommendation of offering to a user;
- FIG. 2 is a schematic block diagram comprising the system or apparatus of FIG. 1, implemented in marketing service system;
- FIG. 3 is a flow chart of a optimization process of an optimization module, the optimization process for determining an optimal parameter α and computing a rank score based on the optimal parameter;
- FIG. 4 is a flow chart of a method for generating a recommendation of offering to a user; and
- FIG. 5 shows a server computer according to an embodiment.

DETAILED DESCRIPTION

[0026] The following detailed description refers to the accompanying drawings that show, by way of illustration, specific details and embodiments in which the disclosure may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the disclosure. Other embodiments may be utilized and structural, and logical changes may be made without departing from the scope of the disclosure. The various embodiments are not necessarily mutually exclusive, as some embodiments can be combined with one or more other embodiments to form new embodiments.

[0027] Embodiments described in the context of one of the enclosure systems, devices, or methods are analogously valid for the other systems, devices, or methods. Similarly, embodiments described in the context of a system are analogously valid for a device or a method, and vice-versa.

[0028] Features that are described in the context of an embodiment may correspondingly be applicable to the same or similar features in the other embodiments. Features that are described in the context of an embodiment may correspondingly be applicable to the other embodiments, even if not explicitly described in these other embodiments. Furthermore, additions and/or combinations and/or alternatives as described for a feature in the context of an embodiment may correspondingly be applicable to the same or similar feature in the other embodiments.

[0029] In the context of various embodiments, the articles “a”, “an” and “the” as used with regard to a feature or element include a reference to one or more of the features or elements.

[0030] As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0031] As used herein, the term “dataset” may be understood to include information in any suitable analogue or digital form, for example, provided as a file, a portion of a file, a set of files, a signal or stream, a portion of a signal or stream, a set of signals or streams, waveforms, and the like. The term dataset, however, is not limited to the aforementioned examples and may take various forms and represent any information as understood in the art.

[0032] As used herein, the term “recommendation of offering(s)” broadly includes various mechanisms, methods of increasing the reach, attractiveness, competitiveness, and exposure of offering(s) such as one or more goods and/or services. An "offering" may refer to a product or service offered by merchants. Each merchant may have multiple offerings (e.g., multiple products and/or services), and the techniques or algorithm disclosed herein may evaluate each

offering separately. Recommendation of offerings may include marketing, including digital and/or internet marketing which in turn includes one or more advertisements (for example in digital formats) and one or more promotions of goods and services over the Internet or electronic platform. A recommendation of offering in the context of the disclosure may include one or more combinations of advertisement and promotion. In the context of the disclosure, an advertisement is to be distinguished from promotion. An advertisement seeks to inform potential clients/customers about products and services. A promotion seeks to increase the attractiveness of the goods and/or services through discounts.

[0033] As used herein, the term “marketing campaign” may be a type of recommendation of offerings and includes a process or system of generating one or more marketing campaign candidates for satisfying a performance target.

[0034] As used herein, the term “module” refers to, forms part of, or includes an Application Specific Integrated Circuit (ASIC); an electronic circuit; a combinational logic circuit; a field programmable gate array (FPGA); a processor (shared, dedicated, or group) that executes code; other suitable hardware components that provide the described functionality; or a combination of some or all of the above, such as in a system-on-chip. The term module may include memory (shared, dedicated, or group) that stores code executed by the processor. A single module or a combination of modules may be regarded as a device. A processor may include one or more modules. For example, multiple modules described in this disclosure may form a processor.

[0035] As used herein, the term “associate”, “associated”, and “associating” indicate a defined relationship (or cross-reference) between two items.

[0036] As used herein, “memory” may be understood as a non-transitory computer-readable medium in which data or information can be stored for retrieval. References to “memory” included herein may thus be understood as referring to volatile or non-volatile memory,

including random access memory (“RAM”), read-only memory (“ROM”), flash memory, solid-state storage, magnetic tape, hard disk drive, optical drive, etc., or any combination thereof. Furthermore, it is appreciated that registers, shift registers, processor registers, data buffers, etc., are also embraced herein by the term memory. It is appreciated that a single component referred to as “memory” or “a memory” may be composed of more than one different type of memory, and thus may refer to a collective component including one or more types of memory. It is readily understood that any single memory component may be separated into multiple collectively equivalent memory components, and vice versa. Furthermore, while memory may be depicted as separate from one or more other components (such as in the drawings), it is understood that memory may be integrated within another component, such as on a common integrated chip.

[0037] According to an aspect of the disclosure and with reference to FIG. 1, there is provided a system 100 for generating a recommendation of offerings to a user, the system 100 comprises a user-interface module 102 configured to receive an input dataset 104, the input dataset 104 comprises a performance type 104a, an performance target value 104b based on the performance type. In some embodiments, the input dataset 104 may include a budget 104c of the recommendation of offerings. The recommendation of offerings may be implemented as an advertisement campaign. The system 100 may comprise a recommendation of offerings generation module 106 configured to receive the input dataset 104, generate a performance target inequality equation, and a plurality of eligible candidates. Each eligible candidate comprising a minimum purchase value of the offering and a corresponding discount value, and each of the plurality of eligible candidates satisfies the performance target inequality equation.

[0038] The plurality of eligible candidates may form an output dataset 108 or part thereof. In some embodiments, the output dataset 108 may be sent to an output module 110 for storage

and retrieval by one or more other modules in the system 100. The output module 110 may comprise one or more databases for storage of the candidate solutions. In some embodiments, the databases may include at least one static database and at least one dynamic database.

[0039] The system 100 may be implemented as a device, and in particular, a communications server apparatus. The communications server apparatus may comprise a processor and a memory, and the communications server apparatus may be configured to execute instructions in the memory to generate recommendations of offerings for access by a user. The system 100, in the form the communications server apparatus, may be a single server as illustrated schematically in FIG. 1, or have the functionality performed distributed across multiple server components.

[0040] The user-interface input module 102 may include a transmitter module and/or a receiver module allowing the server apparatus 100 to communicate over a communications network. The user interface input module 102 may be provided for user control and may include, for example, one or more computing peripheral devices such as display monitors, computer keyboards and the like.

[0041] It is contemplated that the system 100 may form part of a system 200 for provisioning marketing service to one or more clients/consumers. In such a context, the system 100 may be configured to generate one or more recommendation of offerings or marketing campaigns, based on the input dataset 104 provided by a marketer or a provider of the recommendation of offerings.

[0042] FIG. 2 shows an example of the system 200 used for provisioning marketing services. The system 200 may broadly comprise four sub-systems, comprising, a campaign management sub-system 202, a marketing service sub-system 204, an order fulfilment sub-system 206, and a promo tracking sub-system 208.

[0043] The campaign management sub-system 202 may include the system 100 for generating a recommendation of offerings. The sub-system 202 includes a universal marketing platform (UMP) 222. The UMP 222 may be part of the interface module 102, for receiving various marketing related data and parameters from marketers.

[0044] In some embodiments, the UMP 222 may include a web application responsible for rendering the marketing page where a user, for example the marketer, can provide the input dataset 104 required to run the campaign.

[0045] In some embodiments, the UMP 222 may be data connected with a verification database to perform verification and/or authentication of a registered user.

[0046] A campaign type, known as a promo ad campaign, may be available in the UMP 222, where marketers can create marketing campaigns that use one or more combinations of advertisement and promotion levers without the need to specify detailed information and advertisement parameters of each lever. In some embodiments, a user marketer is merely required to provide the following input to form the input dataset 104, that is, the performance type 104a, the performance target value 104b, and optionally budget 104c. The performance target value 104b may be input together with the performance type 104a which may be in the form of either:

- (a.)The marketing cost per order attributed to the campaign (lower than a performance target value T); or
- (b.)The ratio of the sales attributed to the campaign to marketing cost (higher than a performance target value R).

[0047] In some embodiments, the user-interface module 102 may define various data field for receiving input of different types from users.

[0048] The UMP 222 may be arranged in data connection with an ad manager 224.

[0049] The recommendation of offerings generation module 106 may include the ad manager 224 and a promotion creation module 226. In some embodiments, the ad manager 224 may be a separate backend service that handles a set of marketing application programming interfaces (APIs) and allows the input dataset 104 to be processed.

[0050] The ad manager 224 may use a combination of an advertising lever and a promotion lever to maximize sales for a merchant. The ad manager 224 may create the recommendation of offerings for the marketer automatically based on correlating a minimum purchase value of the offerings with a corresponding discount value in various combinations so as to utilize advertisement and promotion.

[0051] Upon the creation of a campaign through UMP 222, the ad manager 224 may be configured to create the advertisement and promo campaigns based on the performance type. As an example, if the performance type 104a and the performance target value (T) 104b are input as a maximum marketing cost per order T attributed to the campaign, a recommendation of offerings with a maximum bid of T is created.

[0052] In some embodiments, a set of admissible fixed discount promotion with discount value ranging from a minimum discount allowed up to a maximum discount allowed, below T through the Promo Creation module 226. The admissible fixed discount promotion may refer to those with discount value and minimum purchase that consumers found acceptable. As non-limiting examples include discount value and minimum purchase with rounded numbers, and discount value not too low, minimum purchase amount not too high relative to the average expected order value.

[0053] As an example, consider a recommendation of offerings, comprising a marketing campaign, which is created with a maximum total marketing cost per order of \$5. The ad manager 224 may create an advertisement model based on a cost per order (CPO) model with

a maximum CPO bid of \$5. In addition, the ad manager 224 may access and/or call the promo creation module 226 to generate promotions based on considering the maximum allowable marketing cost per order as a hard constraint. The hard constraint may be expressed mathematically as an inequality equation. Each of the plurality of eligible recommendation of offerings candidates (hereinafter referred to as eligible candidates) may comprise the minimum purchase value and a corresponding discount value.

[0054] The plurality of eligible candidates may be generated as output dataset 108. In some embodiments, the output dataset 108 may be stored in a cache. In some embodiments, the cache may implement an elastic search cluster that is capable of supporting one or more common document retrieval capabilities.

[0055] An example of three generated eligible candidates using the maximum total marketing cost per order of \$5, is expressed as follows:

Candidate 1: \$0 discount value, for purchase less than minimum purchase of the offerings (no promo)

Candidate 2: \$2 discount value, minimum purchase of \$10 of the offerings.

Candidate 3: \$4 discount value, minimum purchase of \$20 of the offerings.

A set of creatives will be added to a dynamic creative store 228 corresponding to these three promos (eligible candidates).

[0056] In other words, the recommendation of offerings generation module 106 is configured to determine a maximum allowable marketing cost per order based on the performance target value (T), and generate a plurality of eligible candidates. The plurality of eligible candidates based on the maximum allowable marketing cost per order. Each of the plurality of eligible candidate has to satisfy the inequality equation wherein the marketing cost per order is less than or equal to the maximum allowable marketing cost. Each of the plurality

of eligible candidates may comprise a minimum purchase value and a corresponding discount value.

[0057] In some embodiments, the performance target is provided as a minimum ratio of the net sales attributed to the campaign to marketing cost R , R being the performance target value. A return on advertising spend (ROAS) recommendation of offerings with a minimum ROAS bid of R is desired.

[0058] In some embodiments, a set of admissible discount promotions (expressed in percentage discount value) ranging from the minimum discount percentage allowed up to the maximum discount percentage below $1/(1+R)$ through the Promo Creation module 226. In some embodiments, the ROAS model dataset and information may be stored in the elastic search cluster based cache. The ad manager 224 may access and/or call the promo creation module 226 to generate the plurality of eligible candidates based on the minimum ROAS bid of R as a hard constraint. Each of the plurality of eligible candidates comprises the minimum purchase value and a corresponding discount value expressed in percentage.

[0059] As an example, suppose a campaign is created with a minimum ratio of the net sales attributed to the campaign to marketing cost of \$2. The ad manager 224 may be configured to create a ROAS campaign with a min ROAS bid of \$2. In addition, the ad manager 224 will call the promo creation module 226 to create the set of percentage discount promotions 225. Suppose a set of admissible percentage discount promos are discounts with 10% increment, based on a historic Average Order Value (AOV) of the MEX marketer, the minimum purchase is set at \$10 for the lowest percentage discount promo (10%), and increases proportionately with the discount percentage. The maximum discount amount may be determined using a rule of $2 \times (\text{minimum purchase}) \times (\text{percentage discount})$. The will create the following set of eligible candidates.

Candidate 1: 0% off, minimum purchase less than \$10, no discount.

Candidate 2: 10% off, minimum purchase \$10, maximum discount amount \$2.

Candidate 3: 20% off, minimum purchase \$20, maximum discount amount \$8.

Candidate 4: 30% off, minimum purchase \$30, maximum discount amount \$18.

A set of creatives will be added to the Dynamic Creative Store 228 corresponding to these four promos (including the one with no promo).

It may be appreciated that a minimum ratio of the net sales attributed to the campaign to marketing cost of 2, a 40% discount will not meet this performance target, and hence not created.

[0060] In other words, where the performance type is a ratio of sales attributed to the marketing campaign to the marketing cost, the recommendation of offerings generation module is configured to determine a minimum allowable ratio of the net sales attributed to marketing cost, and generate the plurality of plurality of eligible candidates based on the minimum allowable ratio, each of the plurality of eligible candidates has to satisfy the inequality equation wherein the ratio of the net sales attributed to marketing cost is less than or equal to the minimum allowable ratio. Each of the plurality of eligible candidates comprises the minimum purchase value, a maximum discount amount, and a corresponding discount percentage.

[0061] Once created, the eligible candidates, which meets the performance target, may be stored as output dataset 108 into the output module 110. The output module 110 may include an inventory storage database 227 and a dynamic database 228. The inventory storage database 227 may be configured to store relevant information relating to the advertisement model, including the eligible candidates. The dynamic database 228 may be configured to store any attributes that may change and can be modified by a service requestor module 230, which will be subsequently described. For example, an example of attributes that can be changed by the

service requestor module 230 may be a promotion selected from the eligible candidate list that may be offered to the end user. The dynamic creative store 228 can be implemented as a store where some of the creative attributes can take multiple values, and the specific value chosen can be changed by the service requestor module 230 dynamically.

[0062] As shown in FIG. 2, the marketing service sub-system 204 may be configured to receive request for marketing service from a client, via a mobile app 290. The mobile app 290 may be configured to send a “FetchAd” request 291 to the service requestor module 230. The FetchAd request 291 may be a request data packet sent to the service requestor module 230 for request for marketing service, and may include information so as to identify and verify the client.

[0063] Upon successful acceptance of the FetchAd request, the service requestor module 230 sends a “Get Ad Candidates” 231 request to the database 227 to retrieve all the eligible candidates. The request 231 may be a database query request sent to the database 227 to obtain the generated eligible candidates based on the output dataset 108 from the recommendation of offerings generation module 106.

[0064] The list of eligible candidates may then be sent to an optimization module 240 to determine the best rank ordered list of ads to serve to the consumer, and the associated pricing of each advertisement.

[0065] The optimization module 240 may comprise an optimization service module 242 to select a best combination of advertisement and promotion, and a ranking and pricing module 244, to rank the eligible candidates in a manner so as provide the best combination to the optimization service module 242, and to meet the requirement of the client 290. In some embodiments, the ranking and pricing module 244 of the optimization module 240 may use a generalized second price (GSP) auction mechanism to rank the eligible candidates based on the

rank score of each eligible candidate, such that the final marketing expense (including advertisement expenses) is guaranteed to be less than any bid submitted by the optimization module 240 when a conversion occurs, i.e. an order for a good or service is placed by the client as a result of the recommendation of offerings, which may include both advertisement and promotion.

[0066] In some embodiments, where the recommendation of offerings is created based on the maximum CPO bid, the rank score may be represented by an effective cost per mille (eCPM) parameter, that is, the amount an advertiser pays a website per one thousand visitors who see its advertisements, as calculated by a particular formula. The eCPM may mathematically be expressed as:

$$\text{rank score} = \text{CPObid} \times \text{Prob}(\text{order}) \quad (1)$$

[0067] In some embodiments, where the recommendation of offerings is created based on the minimum ROAS bid of R, the rank score is represented mathematically be expressed as:

$$\text{rank score} = \frac{1}{\text{ROASbid}} \times \text{Prob}(\text{order}) \times \text{Expectedordervalue} \quad (2)$$

In the equations (1) and (2), the *Prob(order)* parameter is a probability of an order in the range of 0 to 1.

[0068] To determine the best combination of bid and promotion which will both affect the probability of an order, i.e. the *Prob(order)*, the following rules or theorems based on the performance type, may be used.

[0069] Rule 1 (applicable for max CPO bid recommendation of offerings)

For a given marketing cost per order target value T , the following combination of advertisement costs and promotion campaigns may be considered as mathematically expressed in Equations 3A and 3B.

$$\text{Ad campaign: CPO with maximum CPO bid} = T(1 - a), \quad (3A)$$

$$\text{Promo campaign: Fixed promo of } Ta \text{ with any minimum purchase amount (including zero),} \quad (3B)$$

where $0 \leq a \leq 1$, will result in total marketing cost per attributed order less than T .

Illustrative example as shown in Table 1: Suppose a campaign has a total marketing cost per order target of \$5. All of the following combinations of max CPO bid and fixed promo discount as shown in Table 1 will result in total marketing cost per order less than \$5.

Table 1

a	Max CPO bid	Fixed promo discount
0	\$5	\$0 (no promo)
0.2	\$4	\$1
0.4	\$3	\$2
1.0	\$0	\$5

[0070] The proof for the rule 1 is as follows. Since the ad campaign is using CPO price type, the marketer only incurs advertisement costs or spending when an order attributed to the campaign is completed. Due to the Generalized Second Price auction mechanism used in the

ad selection process, the ad spend per order is always less than or equal to $T(1 - a)$, where T is the target value.

[0071] As the promo is a fixed discount type, the promo spend per order attributed to the campaign is equal to Ta or zero (when the minimum purchase amount has not reached).

[0072] Therefore, the total marketing spend per order satisfies the following condition:

$$totalmarketing\ spend \leq T(1 - a) + Ta = T$$

[0073] Rule 2 (applicable for minimize ratio of the sales attributed to the campaign to marketing cost target R)

For given ratio of the sales attributed to the campaign to marketing cost target R , the following combination of ad and promo campaigns

$$\text{Ad campaign: ROAS price type campaign with ROAS bid} = \frac{R}{(1-a)} \quad (4A)$$

$$\text{Promo campaign: Percentage discount of } \frac{a}{(a+R)} \text{ with any minimum purchase amount}$$

$$\text{(including zero) and maximum discount amount,} \quad (4B)$$

where $0 \leq a < 1$, will result in the ratio of net order value (order value minus promo discount) to total marketing cost per attributed order greater than R .

Example: Suppose a campaign has a net sales to marketing cost target of 2 (get at least \$2 in net sales for every \$1 spend in marketing). All of the following combinations of min ROAS bid and percentage promo discount will result in a net sales to marketing cost ratio of at least 2. See Table 2.

Table 2

a	Min ROAS bid	Percentage promo discount
0	2.0	0% (no promo)
0.22	2.6	10%
0.50	4.0	20%
0.86	14.3	30%

[0074] The proof for the rule 2 is as follows. Since the ad campaign is using ROAS price type, the marketer only incur advertisement costs or spending when an order attributed to the campaign is completed. Due to the Generalized Second Price auction mechanism used in the ad selection process, the ad spend per order is always less than or equal to $\frac{(1-a)}{R}(Netordervalue)$.

[0075] As the promo is a percentage discount type, the promo spend per order attributed to the campaign is equal to $\frac{a}{(a+R)}(ordervalue)$ or zero (when the minimum purchase amount has not reached), or the maximum discount amount when $\frac{a}{(a+R)}(ordervalue) > (maxdiscountamount)$.

[0076] Therefore, the total marketing spend per order satisfies the following condition

$$totalmarketingspend \leq \frac{(1-a)}{R}(Netordervalue) + \frac{a}{(a+R)}(ordervalue)$$

[0077] The net order value is given by $Netordervalue = Ordervalue - promodiscount \geq Ordervalue - \frac{a}{(a+R)}(ordervalue)$

[0078] Hence $Ordervalue \leq \frac{a+R}{R} (Netordervalue)$

[0079] Substituting this inequality to the total marketing spend inequality above, we have

$$totalmarketingspend \leq \frac{(1-a)}{R} (Netordervalue) + \frac{a}{(a+R)} \frac{a+R}{R} (Netordervalue),$$

Or $totalmarketingspend \leq \frac{1}{R} (Netordervalue)$

[0080] Hence the ratio between net order value and total marketing spend satisfies

$$\frac{Netordervalue}{Totalmarketingspend} \geq R$$

[0081] Note that the maximum percentage discount that can be offered to meet the final

ROAS target of R may be $\frac{1}{1+R}$, not $\frac{1}{R}$, as the net order value (gross order value minus discount)

should be used in the ROAS calculation. When the maximum percentage discount $\frac{1}{1+R}$ is used,

the ROAS bid for the ad campaign would be infinity, which means there is no non-zero ad spend that can satisfy the ROAS bid.

[0082] When the service requestor module 230 retrieves an eligible candidate from the database inventory 227, it activates the optimization module 240 to find a best combination of advertisement cost and promotion before submitting the advertisement cost and promotion to Ranking and Pricing Service 244 by sending a select candidate data packet 243. In some embodiments, the optimization module 240 will follow the following steps as depicted in the flow chart with reference to FIG. 3, to prepare the eligible candidate for ranking, which is an auction based mechanism:

[0083] Step 302: Receiving the set of eligible candidates and performance type, so as to find the best parameter a that would yield the highest rank score for the eligible candidate based on either Equation 3A or 4A. The eligible candidate with the highest rank score will give

the recommendation of offerings a maximum exposure for the input performance target, thus maximizing the number of orders/sales.

[0084] Step 304: Determining rank score based on all permutations of parameter a for each eligible candidate (brute force method for relatively smaller number of eligible candidates). The rank score may be determined based on a brute force method. The brute force method is to determine the rank score for each eligible candidate in the output dataset 108, wherein each eligible candidate may correspond to a different a value and the optimal a^* value may correspond to the highest rank score. This may be a computationally viable method when the number of eligible candidate is relatively small. However, the computational resources required by the optimization module to compute the rank score may exponentially increase as the number of eligible candidates increase.

[0085] Step 306: Determining rank score based on a pCVR model. As an alternative to step 304, a pCVR model may be used for relatively larger set of eligible candidates. The pCVR model may take into account recommendation of offerings parameters, for example, promotion parameters or attributes, as features to reflect the change in conversion rate due to the promotion parameters. The conversion rate is generally proportional with the amount of discount value or percentage discount, that is, the conversion rate generally increases with the fixed discount or percentage discount. Conversely, the conversion rate is inversely proportional to the minimum purchase to activate any promotion parameters, i.e. the conversion rate decreases as the minimum purchase required to use the promotion parameters goes up.

[0086] If the quality score of the ad as a function of a is modeled in certain form, it is possible to find a closed form solution for a . For example, if the conversion rate is modeled as a quadratic function of a expressed mathematically in Equation (5) as follows:

$$pCVR(a) = \alpha - (a - 1)^2\beta \quad (5)$$

wherein α, β are positive parameters of the model. The positive parameters α, β may be a positive number less than 1. The optimal a^* that will maximize the rankscore for a CPO campaign is $a^* = 1 - \frac{\alpha}{3\beta}$.

[0087] Step 308: Confirming final optimal parameter a^* based on either step 304 or step 306. After the optimal parameter a^* is determined, the final choice of a may be selected based on the one that corresponds to the closest recommendation of offerings available. Step 308 may be an optional step if all optimal values of a^* are computed based on step 306.

[0088] Step 310: Adjusting the advertisement costs bid. Once the optimal parameter a^* is determined, the adjustment of the bid according to the performance type and the best parameter a from the step 306 or step 308 may be based on the following:

For maximum marketing cost per order target T based on Rule 1, the adjustment of advertisement bid is set as

$$adjustedbid = T(1 - a) \quad (6)$$

For minimum ratio of the net sales attributed to the campaign to marketing cost target R based on Rule 2, the adjustment of advertisement bid is set as

$$adjustedbid = \frac{R}{(1-a)} \quad (7)$$

[0089] Step 312: Adjusting the associated promotion parameters of the advertisement costs bid. Associate the ad candidate with promo that corresponds to the parameter a , i.e. calculate Ta and $\frac{a}{(a+R)}$.

[0090] In some embodiments, steps 310 and 312 may be combined.

[0091] Step 314: Send adjusted eligible candidate to ranking and pricing module 244. The ad candidate is then submitted to the ranking and pricing service 244 to compete against other eligible candidates. If this eligible candidate wins the auction with the highest rank score, the clearing price will be determined by a generalized second-price action (GSP) pricing mechanism.

[0092] Step 316: Select candidate with highest rank score to consumer. The creative associated with the selected candidate (with the optimized a^*) with the highest rank score is retrieved from the dynamic creative store 228, and a reply data packet 232 containing the optimized recommendation of offerings is sent to the client device 290 for rendering to a consumer.

[0093] If the consumer wishes to respond to the data packet 232 served by the service requestor module 230, the client device 290 may be used to place an order 292 for the specific goods and/or services. The order 292 is then sent to a fulfillment module 250. The fulfillment module 250 may comprises the necessary financial and accounting algorithmic logic to perform fulfillment and settlement of the order.

[0094] The fulfillment module 250 may be configured to send a data packet 251 indicative of a spending of marketing budget, i.e. an “ad spend” event will be triggered. The data packet 251 will then be processed by an event tracking module 246 which may cause a deduction 247 of a promotion amount from the overall marketing budget, which is maintained in a marketing statistics module 234. The marketing statistics module 234 keeps track of the amount of budget for various marketing activities. The service requestor module 230 may send a query data packet 233 for the retrieval of remaining budget from the marketing statistics module 234.

[0095] The fulfillment module 250 may also be configured to send a promotion redemption data 252 to a promotion service module 260. If a promotion associated with the service

requestor module 230 is redeemed, the promotion service module 260 is configured to generate a promo spend event data packet to the event tracking module 246. The promo amount will then be deducted from the marketing budget in the market statistics module 234. In other words, all the spending across advertisements and promotions can be tracked by the event tracking module 246. The budget for the promotion in the promotion creation module 226 is just for tracking the spending attributed to promotions only.

[0096] In some embodiments, the combined costs spent across both advertisements and promotions can be displayed to the marketer via a UMP report generated to the universal marketing platform 222. The UMP report may provide a breakdown between advertisements and promotions. In some embodiments, the marketer may be charged for both the spending attributed to advertisement (the clearing price from the auction) as well as the promotions given to the consumer based on the selected candidate(s) by the consumer.

[0097] It is contemplated that every time a eligible candidate is sent to the optimization module 240, an optimal α^* in the range $[0,1]$ (or $[0,1)$ for sales to marketing cost ratio target) that will maximize its rank score, is chosen. It follows therefore that the performance target of the campaign will be met for each selected optimal solution for the user, hence guaranteeing performance. The guaranteed performance may be illustrated based on two cases below.

[0098] For campaigns with marketing cost per order performance target T , suppose there are n orders during the campaign.

Let the total marketing cost incurred for order i be denoted by C_i .

Based on Rule 1 above, it follows that $C_i \leq T$.

Hence the average total marketing cost per order may be mathematically expressed as

$$\frac{1}{n} \sum_{i=1}^n C_i \leq \frac{1}{n} \sum_{i=1}^n T = T$$

In other words, the performance target is achieved.

[0099] For campaigns with ratio of the sales attributed to the campaign to marketing cost performance target R , suppose there are n orders during the campaign.

Let the total marketing cost incurred for order i be denoted by C_i and the net sales is S_i

Based on Rule 2 above, it follows $\frac{S_i}{C_i} \geq R$, or $S_i \geq RC_i$.

Hence the average ratio of total net sales to total marketing cost may be mathematically expressed as:

$$\frac{\sum_{i=1}^n S_i}{\sum_{i=1}^n C_i} \geq \frac{\sum_{i=1}^n R C_i}{\sum_{i=1}^n C_i} = \frac{R \sum_{i=1}^n C_i}{\sum_{i=1}^n C_i} = R$$

In other words, the performance target is achieved.

[00100] In summary, with the recommendation platform of the present disclosure, the campaign performance will always meet the target provided by the marketer when the campaign is set up.

[00101] In some embodiments, wherein the user interface module 102 is part of a user communications device, say, a smart phone or tablet device, the user interface 102 may have a touch panel display as is prevalent in many smart phone and other handheld devices. Alternatively, if the user communications device is, say, a desktop or laptop computer, the user interface may have, for example, one or more computing peripheral devices such as display monitors, computer keyboards and the like. User communications device may also include satnav components, which allow user communications device to conduct a measurement or at

least approximate the geolocation of user communications device by receiving, for example, timing signals from global navigation satellite system (GNSS) satellites through GNSS network using communications channels, as is known.

[00102] One or more of the described modules may be equipped to communicate with cellular network base stations through cellular telecommunications network using communications channels.

[00103] In another aspect of the disclosure, the system 100 or system 200 may be arranged to access or interact with an online platform hosting offerings for sale, where users may request for recommendation for a product or service.

[00104] According to another aspect, there is a method 400 for generating a recommendation of an offering as shown in FIG. 4. The method 400 may be a computer implemented method and may comprise executable codes stored in non-transitory computer readable medium, such that when executed by a processor, causes a data processing apparatus to execute the steps of:

[00105] Step 402: receiving an input dataset, the input dataset comprises an performance target value, a performance type, and a budget of the recommendation of offerings;

[00106] Step 404: determining a performance target inequality equation performance target value based on the input dataset; and

[00107] Step 406: generating a plurality of eligible candidates, each of the plurality of eligible candidate comprises a minimum purchase value of the offering and a corresponding discount value; wherein each of the plurality of eligible candidates satisfies the performance target inequality equation.

[00108] FIG. 5 shows a server computer 500 according to an embodiment.

[00109] The server computer 500 includes a communication interface 502 (e.g. configured to receive interaction data, i.e. information about interactions). The server computer 500 further

includes a processing unit 504 and a memory 506. The memory 506 may be used by the processing unit 504 to store, for example, data to be processed, such as the input dataset 104 in FIG. 1. The server computer may be configured to perform the method of FIG. 4.

[00110] The methods described herein may be performed and the various processing or computation units and the devices and computing entities described herein may be implemented by one or more circuits. In an embodiment, a "circuit" may be understood as any kind of a logic implementing entity, which may be hardware, software, firmware, or any combination thereof. Thus, in an embodiment, a "circuit" may be a hard-wired logic circuit or a programmable logic circuit such as a programmable processor, e.g. a microprocessor. A "circuit" may also be software being implemented or executed by a processor, e.g. any kind of computer program, e.g. a computer program using a virtual machine code. Any other kind of implementation of the respective functions which are described herein may also be understood as a "circuit" in accordance with an alternative embodiment.

[00111] While the disclosure has been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the disclosure as defined by the appended claims. The scope of the disclosure is thus indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

1. A system for generating a recommendation of an offering to a user, the system comprises:

a user-interface module configured to receive an input dataset, the input dataset comprises a performance type and a performance target value based on the performance type;

a recommendation of offerings generation module configured to receive the input dataset to determine a performance target inequality equation and generate a plurality of eligible candidates, each of the plurality of eligible candidate comprising a minimum purchase value of the offering and a corresponding discount parameter;

wherein each of the plurality of eligible candidates satisfies the performance target inequality equation.

2. The system of claim 1, wherein the performance type is a marketing cost per order and the performance target value is a maximum allowable marketing cost.

3. The system of claim 2, wherein the performance target inequality equation is determined such that the marketing cost per order is less than or equal to the maximum allowable marketing cost.

4. The system of claim 3, wherein the discount parameter is a discount value.

5. The system of claim 1, wherein the performance type is a ratio of sales attributed to the marketing campaign to the marketing cost and the performance target value is a minimum allowable ratio of the net sales attributed to the marketing cost.
6. The system of claim 5, wherein the performance target inequality equation is determined such that the ratio of sales attributed to the marketing campaign to the marketing cost is less than or equal to the minimum allowable ratio.
7. The system of claim 6, wherein the discount parameter comprises a maximum allowable discount value and a corresponding discount percentage.
8. The system of any of the preceding claims, further comprises a database for storing the plurality of eligible candidates and a requestor module configured to receive requests for marketing service, and access the database to retrieve at least one of the plurality of eligible candidates.
9. The system of any one of the preceding claims, further comprises an optimization module configured to receive the plurality of eligible candidates to determine a rank score of each of the eligible candidates based on a probability of an acceptance of the offering, and a bid value derived from the performance target value.
10. The system of claim 9, wherein the optimization module is further configured to determine the best ranked eligible candidate.

11. The system of claims 9 or 10, wherein the optimization module is configured to use generalized second price (GSP) auction mechanism to determine the rank score of each eligible candidate.

12. The system of any one of claims 8 to 11, further comprises a fulfilment module configured to receive an order for a good and/or service, and provides a settlement data to the requestor module.

13. The system of any one of claims 8 to 11, further comprises a fulfilment module configured to receive an order for a good and/or service, and provides a settlement data to the requestor module.

14. A computer implemented method for generating a recommendation of an offering, the method comprising

receiving an input dataset, the input dataset comprises an performance type and a performance target value based on the performance type;

determining a performance target inequality equation performance target value based on the input dataset; and

generating a plurality of eligible candidates, each of the plurality of eligible candidate comprises a minimum purchase value of the offering and a corresponding discount value;

wherein each of the plurality of eligible candidates satisfies the performance target inequality equation.

15. The method of claim 14, wherein the performance type is a marketing cost per order and the performance target value is a maximum allowable marketing cost.
16. The method of claim 15, wherein the performance target inequality equation is determined such that the marketing cost per order is less than or equal to the maximum allowable marketing cost.
17. The method of claim 16, wherein the discount parameter is a discount value.
18. The method of claim 14, wherein the performance type is a ratio of sales attributed to the marketing campaign to the marketing cost and the performance target value is a minimum allowable ratio of the net sales attributed to marketing cost.
19. The method of claim 18, wherein the performance target inequality equation is determined such that the ratio of the sales attributed to the marketing campaign to the marketing cost is less than or equal to the minimum allowable ratio.
20. The method of claim 19, wherein the discount parameter comprises a maximum allowable discount value and a corresponding discount percentage.