METHOD, SERVER, AND SYSTEM FOR INFORMATION PUSH

obtaining the click information on a information push list by client to form a user click log

analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result

selecting the corresponding recommended items from said information push list according to said analysis result to issue

FIG 1

The disclosure relates to a method, a server and a system for information push. The method includes: obtaining the click information on an information push list to form an user click log; analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; selecting the corresponding recommended items from said information push list according to said analysis result to issue. The disclosure forms a user click log through acquiring the click information on an information push list by client, and analyzes the distribution of user's click behavior based on said user click log, specifically analyzes the distribution of click location, and combine the distribution in different times, so as to issue different items in different times. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.
METHOD, SERVER, AND SYSTEM FOR INFORMATION PUSH

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority to Chinese Patent Application No. 201310656869.7, filed on December 6, 2013, which is hereby incorporated by reference in its entirety.

FIELD

[002] The present disclosure generally relates to internet technology, particularly to a method, a server, and a system for information push.

BACKGROUND

[003] At present, the explosive growth of Internet information makes the problem of information overload more and more serious. It is very difficult for users to find out the content what they are interested in from vast amounts of information source such as news sites, BBS, blog and so on. Hence, a personalized recommendation system is produced. Usually, the personalized recommendation system calculates the content what users might be interested in according to the user's browsing history, and then shows the content to users preferentially.

[004] However, the personalized recommendation system is faced with a very important problem of how to determine the amount of issued recommended results for every user request. If the amount is insufficient, every demand for browsing of user will not be completely satisfied, thus user needs to request again; if the amount is too much, the user will not consume completely one time, which will lead to an unnecessary waste of traffic.

[005] Generally, the existing strategy for issuing recommended results adopts a fixed artificial experience value combining with business. Its defect is: not considering that the usage of product might be different in different times, which makes the issue recommendation not to be an optimal issue scheme. Therefore, the existing strategy for issuing recommended results cannot achieve a flexible control.
SUMMARY

[006] In view of it, the present disclosure provides a method, a server and a system for information push, to improve the flexibility of strategy for issuing information push results, which both meets the demand of most users browsing at a different time, and avoids a waste of traffic caused by redundant issue.

[007] In order to achieve said purpose, the present disclosure provides a method for information push, comprising the steps of: obtaining the click information on an information push list by client to form an user click log; analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; selecting the corresponding recommended items from said information push list according to said analysis result to issue.

[008] The present disclosure also provides a server for information push, comprising: an obtaining module, programmed to obtain the click information on an information push list by client to form an user click log; an analyzing module, programmed to analyze the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; an issuing module, programmed to select the corresponding recommended items from said information push list according to said analysis result to issue.

[009] The present disclosure also provides a system for information push, comprising a client and a server which is connected to said client for communication; wherein, said server is a server as mentioned above; said client is programmed to respond to a click operation on the information push list by user and reporting click information to the server, as well as receiving issued recommended items from the server.

[010] Present disclosure refers to a method, a server and a system for information push, wherein the method comprises the steps of: obtaining the click information on an information push list by client to form an user click log; analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; selecting the corresponding recommended items from said information push list according to said analysis result to issue. Present disclosure forms a user click log through obtaining the click information on an information push list by client,
and analyzes the distribution of user's click behavior based on said user click log — specifically, can analyze the distribution of click location, even combine the distribution in different times, so as to issue different items in different times. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand of most users browsing at a different time, and avoid a waste of traffic caused by redundant issue.

BRIEF DESCRIPTION OF THE DRAWINGS

[01 1] To describe the technical solutions in the embodiments of the present disclosure more clearly, the following briefly introduces the accompanying drawings needed for describing the embodiments or the prior art. Apparently, the accompanying drawings in the following description show some embodiments of the present disclosure, and persons of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

[01 2] FIG. 1 is a flowchart of a method for information push according to embodiments of the present disclosure.

[01 3] FIG. 2a is a flowchart of one implement way of analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result according to embodiments of the present disclosure.

[01 4] FIG. 2b is a flowchart of one implement way of selecting the corresponding recommended items from said information push list according to said analysis result to issue according to embodiments of the present disclosure.

[01 5] FIG. 3 is a statistical map of a analysis strategy based on the distribution of click location by user;

[01 6] FIG. 4a is a flowchart of another implement way of analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result according to embodiments of the present disclosure.

[01 7] FIG.4b is a flowchart of another implement way of selecting the corresponding recommended items from said information push list according to said analysis result to issue according to embodiments of the present disclosure.
FIG. 5 is a statistical map of an analysis strategy based on the distribution of click location by user in different times;

FIG. 6 shows the function structure of a server for information push according to embodiments of the present disclosure.

FIG. 7 shows the structure of the analyzing module according to embodiments of the present disclosure.

FIG. 8 shows the structure of a system for information push according to embodiments of the present disclosure.

FIG. 9 is a block diagram of a partial device according to embodiments of the present disclosure.

DETAILED DESCRIPTION OF THE DRAWINGS

Reference throughout this specification to "one embodiment," "an embodiment," "example embodiment," or the like in the singular or plural means that one or more particular features, structures, or characteristics described in connection with an embodiment is included in at least one embodiment of the present disclosure. Thus, the appearances of the phrases "in one embodiment" or "in an embodiment," "in an example embodiment," or the like in the singular or plural in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments.

The terminology used in the description of the disclosure herein is for the purpose of describing particular examples only and is not intended to be limiting of the disclosure. As used in the description of the disclosure and the appended claims, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. Also, as used in the description herein and throughout the claims that follow, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise. It will also be understood that the term "and/or" as used herein refers to and encompasses any and all possible combinations of one or more of the associated listed items. It will be further understood that the terms "may include," "including," "comprises," and/or "comprising," when used in this specification, specify the presence of stated features, operations, elements, and/or
components, but do not preclude the presence or addition of one or more other features, operations, elements, components, and/or groups thereof.

As used herein, the term "module" or "unit" may refer to, be part of, or include 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 or unit may include memory (shared, dedicated, or group) that stores code executed by the processor.

The exemplary environment may include a server, a client, and a communication network. The server and the client may be coupled through the communication network for information exchange, such as sending/receiving identification information, sending/receiving data files such as splash screen images, etc. Although only one client and one server are displayed in the environment, any number of terminals or servers may be included, and other devices may also be included.

The communication network may include any appropriate type of communication network for providing network connections to the server and client or among multiple servers or clients. For example, communication network may include the Internet or other types of computer networks or telecommunication networks, either wired or wireless. In a certain embodiment, the disclosed methods and apparatus may be implemented, for example, in a wireless network that includes at least one client.

In some cases, the client may refer to any appropriate user terminal with certain computing capabilities, such as a personal computer (PC), a work station computer, a server computer, a hand-held computing device (tablet), a smart phone or mobile phone, or any other user-side computing device. In various embodiments, the client may include a network access device. The client may be stationary or mobile.

A server, as used herein, may refer to one or more server computers configured to provide certain server functionalities, such as database management and
search engines. A server may also include one or more processors to execute computer programs in parallel.

[030] A user, as used herein, may refer to one or more persons or things that control a client. The user may control more than one clients or other devices.

[031] The technical solutions in the embodiments of the present disclosure are clearly and completely described in the following with reference to the accompanying drawings in the embodiments of the present disclosure. Apparently, the embodiments to be described are merely a part rather than all of the embodiments of the present disclosure. All other embodiments obtained by persons of ordinary skill in the art based on the embodiments of the present disclosure without creative efforts shall fall within the protection scope of the present disclosure.

[032] As shown in FIG. 1, the embodiments of the present disclosure provide a method for information push, comprising the steps of:

[033] step 101: obtaining the click information on an information push list by client to form an user click log.

[034] Wherein, the information push list might be some recommended items including the content what user might be interested in, calculated by the backend server of personalized recommendation system according to the user's browsing history. Wherein, the recommended items included in the information push list could come from various news websites, BBS, blog, etc. In addition, the information included in the information push list could also be the customized information such as microblog, data from public platform and so on.

[035] In order to determine the amount of issued push results for every user request more accurately, this embodiment determine the optimal issue amount of push results through analyzing the information of user's click on personalized push results, which satisfies the demands for every browsing of most users and avoids a waste of traffic. Thereby implements a flexible control of strategy for issuing information push results.

[036] Specifically, after the personalized information push list was presented to the user, the user can click on the recommended items in web page what he want to browse from the personalized information push list according to his own demand.
Then the client will respond to the click operation on the information push list, record the information of click by user, and report the information of click to a backend server. Wherein, the click information can include the time of click by user, the location of click in the information push list, user ID, etc.

[037] The backend server forms a user click log after obtaining the click information on an information push list reported by client, so that analyzes the distribution of user's click behavior based on said user click log.

[038] Step 102: analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result.

[039] Wherein, user's click behavior can include the selection behavior of location where the user clicks on the information push list, the selection behavior of time when the user clicks on the information push list and so on.

[040] The backend server analyzes the distribution of user's click behavior based on said user click log, even combining the distribution in different times. Then calculates the percentages of clicks of the accumulation from the first item to current location in the total clicks of said information push list, thus obtains an analysis result. So that issues different items in different times depending on said analysis result. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand of most users browsing at a different time, and avoid a waste of traffic caused by redundant issue.

[041] Step 103: selecting the corresponding recommended items from said information push list according to said analysis result to issue.

[042] The backend server selects and issues all the recommended items before the recommended item's location which meets a preset condition in said information push list to the corresponding client, according to said analysis result.

[043] Present embodiment forms a user click log through obtaining the click information on an information push list by client, and analyzes the distribution of user's click behavior based on said user click log — specifically, can analyze the distribution of click location, even combine the distribution in different times, so as to issue different items in different times. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet
the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

[044] The following elaborates on the technical solution of present embodiment using two analysis strategy, which are respectively based on the distribution of user click location and based on the distribution of user click location in different times:

[045] As an analysis strategy based on the distribution of user click location, as shown in FIG. 2a, said step 102: analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result can comprise the steps of:

[046] step 1021: extracting the click location information on the information push list by client from said user click log;

[047] step 1022: counting the clicks of each recommended item's location according to the extracted click location information;

[048] step 1023: respectively calculating the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list, depending on the counted clicks of each recommended item's location, wherein n is an integer which is greater than or equal to 1.

[049] As shown in FIG. 2b, said step 103: selecting the corresponding recommended items from said information push list to issue can comprise the steps of:

[050] step 1031: selecting a recommended item's location which is corresponding to the percentage meeting preset condition from all the calculated percentages of clicks;

[051] step 1032: issuing all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition in said information push list to client.

[052] Specifically, considering that there is a head effect for the user's click trend on the information push list, which means that the rate of click on the head of information push list is significantly higher than that of the tail, so present embodiment counts the clicks of each recommended item's location according to the user click log, and respectively calculates the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push
list. For example, calculates the percentages of clicks of the first 10 items, 20 items, 30 items... in the total clicks, in order to determine the finally issue amount.

[053] The backend server records every click behavior of user and the location of present click in the information push list, which is similar to the search engines. For example, if the user clicks the first item, as a result, the record will be 1; if the user clicks the 10th item, as a result, the record will be 10. Then calculates the distribution of each recommended item's location, and calculates the percentages of clicks of the accumulation from the first item to current location in the total clicks of said information push list.

[054] For example, respectively calculating the percentages of clicks of the first 1, 5, 9, 13...69, 73, 77 items in the total clicks, as shown in FIG. 3. In the FIG. 3, the abscissa shows location of 1, 5, 9, 13...69, 73, 77 recommended item. The ordinate shows the percentage of the cumulative clicks which correspond to each recommended item from the total clicks.

[055] It can be seen from FIG. 3 that, the clicks of the first 15 items accounted for 50% of the total clicks, and the head effect is obvious. The clicks of the first 60 items accounted for 85% of the total clicks.

[056] So it can be seen from FIG. 3 that, the ideal amount is the first 60-70, items of the information push list, so that it can cover more than 90% of user clicks. If continue to increase the issue amount, the cost performance will be more and more low, which causes an unnecessary waste of traffic.

[057] Thus, through the above scheme, the embodiments form a user click log through obtaining the click information on an information push list by client, and analyze the distribution of user's click behavior based on said user click log. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

[058] In addition, as an analysis strategy based on the distribution of user click location in different times, as shown in FIG. 4a, said step 102: analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result can comprise the steps of:
Step 10210: extracting click location information on the information push list by client from said user click log;

step 10220: respectively counting the clicks of each recommended item's location in each set period according to the extracted click location information;

step 10230: respectively calculating the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1.

As shown in FIG. 4b, said step 103: selecting the corresponding recommended items from said information push list to issue comprises the steps of:

step 10310: selecting a recommended item's location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks;

step 10320: issuing all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition from said information push list in corresponding period to client.

Compared to the embodiment shown in FIG. 2a and 2b, present embodiment increases a time analysis dimension in the issue strategy of push results. Present embodiment determines the optimal amount of push results through analysis of the click information on the personalized push results in different times.

In particular, the embodiment introduces a time context scenario, considering that the mood of user may be different in different periods or scenario, which may influence the click distribution.

First of all, the embodiment extracts click location information on the information push list by client from said user click log; then respectively counts the clicks of each recommended item's location in each set period according to the extracted click location information. Wherein, each set period can be set according to the actual situation. For example, one day can be divided into two periods—after 12 o'clock and before 12 o'clock, or more periods.
Next, respectively calculates the percentages of clicks of the first 1 item, (1+n), (l+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1. For example, respectively calculating the percentages of clicks of the first 10 item, 20, ... 60 items in the total clicks of said information push list in each period.

Finally, determines the optimal amount of push results according to the analysis result. Specifically, selects a recommended item's location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks, and issues all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition from said information push list in corresponding period to client. For example, selects the period of after 12 o'clock, and issues all the recommended items before the selected recommended item's location which is corresponding to the percentage of 85% to client.

Thereby the embodiment implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

As shown in FIG. 5, the click distribution of the period after 12 o'clock is more decentralized compared to the click distribution of the period before 12 o'clock, so the issue amount of that can be more. The reason is that the users' desire to explore is stronger and they have more time in the afternoon or evening rest time. To be more flexible, the time can be divided into more periods.

This scheme of present embodiment provides a flexible strategy for issuing push result, combining the click feedback of user and the time context. Present embodiment meets the demand for browsing of most users and avoids the issue of invalid results, which takes control of data traffic to some extent.

As shown in FIG. 6, embodiments of the present disclosure provides a server for information push, comprising an obtaining module 201, an analyzing module 202 and an issuing module 203.
Wherein, the obtaining module 201 is programmed to obtain the click information on an information push list by client to form a user click log.

The analyzing module 202 is programmed to analyze the distribution of user's click behavior based on said user click log, thus obtaining an analysis result.

The issuing module 203 is programmed to select the corresponding recommended items from said information push list according to said analysis result to issue.

Wherein, the information push list might be some calculated recommended items including the content what user might be interested in by the backend server of personalized recommendation system according to the user's browsing history. Wherein, the recommended items included in the information push list could come from various news websites, BBS, blog, etc. In addition, the information included in the information push list could also be the customized information such as microblog, data from public platform and so on.

In order to determine the amount of issued push results for every user request more accurately, this embodiment determine the optimal issue amount of push results through analyzing the information of user's click on personalized push results, which satisfies the demands for every browsing of most users and avoids a waste of traffic. Thereby implements a flexible control of strategy for issuing information push results.

Specifically, after the personalized information push list was presented to the user, the user can click on the recommended items of web page what he want to browse from the personalized information push list according to his own demand. Then the client will respond to the click operation on the information push list, record the information of click by user, and report the information of click to a backend server. Wherein, the information of click can include the time of click by user, the location of click in the information push list, user ID, etc.

The obtaining module 201 of backend server obtains the click information on an information push list reported by client and forms a user click log, so that analyzes the distribution of user's click behavior based on said user click log.
In the disclosure, user's click behavior can include the selection behavior of location where the user clicks on the information push list, and the selection behavior of time when the user clicks on the information push list and so on.

The analyzing module 202 of backend server analyzes the distribution of user's click behavior based on said user click log, even combining the distribution in different times. Then calculates the percentages of clicks of the accumulation from the first item to current location in the total clicks of said information push list, thus obtains an analysis result. So that the issuing module 203 issues different items in different times depending on said analysis result. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand of most users browsing at a different time, and avoid a waste of traffic caused by redundant issue.

The backend server selects and issues all the recommended items before the recommended item's location which meets a preset condition in said information push list to the corresponding client, according to said analysis result.

The present embodiment forms a user click log through obtaining the click information on an information push list by client, and analyzes the distribution of user's click behavior based on said user click log, specifically analyze the distribution of click location, and combine the distribution in different times, so as to issue different items in different times. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

As shown in FIG. 7, said analyzing module 202 comprises an extracting unit of information 2021, a counting unit 2022 and a calculating unit2023.

In the disclosure, as an implement way, the extracting unit 2021 of information is programmed to extract the click location information on an information push list by client from said user click log.

The counting unit 2022 is programmed to count the clicks of each recommended item's location according to the extracted click location information;
The calculating unit 2023 is programmed to respectively calculate the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list, depending on the counted clicks of each recommended item's location, wherein n is an integer which is greater than or equal to 1.

Said issuing module 203 is also programmed to select a recommended item's location which is corresponding to the percentage meeting preset condition from all the calculated percentages of clicks, and issue all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition in said information push list to client.

As another implement way, said counting unit 2022 is also programmed to respectively count the clicks of each recommended item's location in each set period according to the extracted click location information.

Said calculating unit 2023 is also programmed to respectively calculate the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1.

Said issuing module 203 is also programmed to select a recommended item's location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks, and issuing all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition from said information push list in corresponding period to client.

The following elaborates on the technical solution of present embodiment using two analysis strategy, which are respectively based on the distribution of user click location and based on the distribution of user click location in different times:

As an analysis strategy based on the distribution of user click location, considering that there is a head effect for the user's click trend on the information push list, which means that the rate of click on the head of information push list is
significantly higher than that of the tail, so present embodiment counts the clicks of each recommended item's location according to the user click log, and respectively calculates the percentages of clicks of the first 1 item, (1+n), (1+2n)… to all recommended items in the total clicks of said information push list. For example, calculates the percentages of clicks of the first 10 items, 20 items, 30 items… in the total clicks, in order to determine the finally issue amount.

[095] The backend server records every click behavior of user and the location of present click in the information push list, which is similar to the search engines. For example, if the user clicks the first item, as a result, the record will be 1; if the user clicks the 10th item, as a result, the record will be 10. Then calculates the distribution of each recommended item's location, and calculates the percentages of clicks of the accumulation from the first item to current location in the total clicks of said information push list.

[096] For example, respectively calculating the percentages of clicks of the first 1, 5, 9, 13…69, 73, 77 items in the total clicks, as shown in FIG. 3. In the FIG. 3, the abscissa shows location of 1, 5, 9, 13…69, 73, 77 recommended item, the ordinate shows the percentage of the cumulative clicks which is corresponding to each recommended item from the total clicks.

[097] It can be seen from FIG. 3 that, the clicks of the first 15 items accounted for 50% of the total clicks, and the head effect is obvious. The clicks of the first 60 items accounted for 85% of the total clicks.

[098] So it can be seen from FIG. 3 that, the ideal amount is the first 60-70, items of the information push list, so that it can cover more than 90% of user clicks. If continue to increase the issue amount, the cost performance will be more and more low, which causes an unnecessary waste of traffic.

[099] Thus, through the above scheme, present embodiment forms a user click log through obtaining the click information on an information push list by client, and analyzes the distribution of user's click behavior based on said user click log. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.
In addition, as an analysis strategy based on the distribution of user click location in different times, present embodiment increases a time analysis dimension in the issue strategy of push results compared to the above embodiment. Present embodiment determines the optimal amount of push results through analysis of the click information on the personalized push results in different times.

In particular, the embodiment introduces a time context scenario, considering that the mood of user may be different in different periods or scenario, which may influence the click distribution.

First of all, the embodiment extracts click location information on the information push list by client from said user click log; then respectively counts the clicks of each recommended item's location in each set period according to the extracted click location information. Wherein, each set period can be set according to the actual situation. For example, one day can be divided into two periods—after 12 o'clock and before 12 o'clock, or more periods.

Next, respectively calculates the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1. For example, respectively calculating the percentages of clicks of the first 10 item,20, ... 60 items in the total clicks of said information push list in each period.

Finally, determines the optimal amount of push results according to the analysis result. Specifically, selects a recommended item's location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks, and issues all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition from said information push list in corresponding period to client. For example, selects the period of after 12 o'clock, and issues all the recommended items before the selected recommended item's location which is corresponding to the percentage of 85% to client.

Thereby the embodiment implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand
for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

[01 06] Combined with FIG. 5, one day can be divided into two periods—after 12 o'clock and before 12 o'clock. The embodiment respectively counts the cumulative click ratio of each location in two periods, to determine the corresponding issue amount.

[01 07] As shown in FIG. 5, the click distribution of the period after 12 o'clock is more decentralized compared to the click distribution of the period before 12 o'clock, so the issue amount of that can be more. The reason is that the users' desire to explore is stronger and they have more time in the afternoon or evening rest time. To be more flexible, the time can be divided into more periods.

[01 08] This scheme of present embodiment provides a flexible strategy for issuing push result, combining the click feedback of user and the time context. Present embodiment meets the demand for browsing of most users and avoids the issue of invalid results, which takes control of data traffic to some extent.

[01 09] As shown in FIG. 8, embodiments of the present disclosure provide a system for information push, comprising a client 301 and a server 302 which is connected to said client 301 for communication.

[01 10] In the disclosure, said server 302 can be any one of servers mentioned in the above embodiments. The server 302 is programmed to obtain the click information on an information push list by client to form a user click log, analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result, selecting the corresponding recommended items from said information push list according to said analysis result to issue.

[01 11] Said client 301 is programmed to respond to a click operation on the information push list by user and reporting click information to the server, as well as receiving issued recommended items from the server 302.

[01 12] Wherein, the information push list might be some calculated recommended items including the content what user might be interested in by the backend server of personalized recommendation system according to the user's browsing history. Wherein, the recommended items included in the information push list could come
from various news websites, BBS, blog, etc. In addition, the information included in the information push list could also be the customized information such as microblog, data from public platform and so on.

[01 13] In order to determine the amount of issued push results for every user request more accurately, this embodiment determine the optimal issue amount of push results through analyzing the information of user's click on personalized push results, which satisfies the demands for every browsing of most users and avoids a waste of traffic. Thereby implements a flexible control of strategy for issuing information push results.

[01 14] Specifically, after the personalized information push list was presented to the user, the user can click on the recommended items of web page what he want to browse from the personalized information push list according to his own demand. Then the client 301 will respond to the click operation on the information push list, record the information of click by user, and report the information of click to a backend server 302. Wherein, the information of click can include the time of click by user, the location of click in the information push list, user ID, etc.

[01 15] The backend server 302 forms a user click log after obtaining the click information on an information push list reported by client 301, so that analyzes the distribution of user's click behavior based on said user click log.

[01 16] Wherein, user's click behavior can include the selection behavior of location where the user clicks on the information push list, the selection behavior of time when the user clicks on the information push list and so on.

[01 17] The backend server 302 analyzes the distribution of user's click behavior based on said user click log, even combining the distribution in different times. Then calculates the percentages of clicks of the accumulation from the first item to current location in the total clicks of said information push list, thus obtains an analysis result. So that issues different items in different times depending on said analysis result. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand of most users browsing at a different time, and avoid a waste of traffic caused by redundant issue.
[01 18] The backend server 302 selects and issues all the recommended items before the recommended item's location which meets a preset condition in said information push list to the corresponding client 301, according to said analysis result.

[01 19] Present embodiment forms a user click log through obtaining the click information on an information push list by client 301, and analyzes the distribution of user's click behavior based on said user click log — specifically, can analyze the distribution of click location, even combine the distribution in different times, so as to issue different items in different times. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

[01 20] The following elaborates on the technical solution of present embodiment using two analysis strategy, which are respectively based on the distribution of user click location and based on the distribution of user click location in different times:

[01 21] As an analysis strategy based on the distribution of user click location, considering that there is a head effect for the user's click trend on the information push list, which means that the rate of click on the head of information push list is significantly higher than that of the tail, so present embodiment counts the clicks of each recommended item's location according to the user click log, and respectively calculates the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list. For example, calculates the percentages of clicks of the first 10 items, 20 items, 30 items... in the total clicks, in order to determine the finally issue amount.

[01 22] The backend server 302 records every click behavior of user and the location of present click in the information push list, which is similar to the search engines. For example, if the user clicks the first item, as a result, the record will be 1; if the user clicks the 10th item, as a result, the record will be 10. Then calculates the distribution of each recommended item's location, and calculates the percentages of clicks of the accumulation from the first item to current location in the total clicks of said information push list.
For example, respectively calculating the percentages of clicks of the first 1, 5, 9, 13...69, 73, 77 items in the total clicks, as shown in FIG. 3. In the FIG. 3, the abscissa shows location of 1, 5, 9, 13...69, 73, 77 recommended item. the ordinate shows the percentage of the cumulative clicks which is corresponding to each recommended item from the total clicks.

It can be seen from FIG. 3 that, the clicks of the first 15 items accounted for 50% of the total clicks, and the head effect is obvious. The clicks of the first 60 items accounted for 85% of the total clicks.

So, it can be seen from FIG. 3 that, the ideal amount is the first 60-70, items of the information push list, so that it can cover more than 90% of user clicks. If continue to increase the issue amount, the cost performance will be more and more low, which causes an unnecessary waste of traffic.

Thus, through the above scheme, present embodiment forms a user click log through obtaining the click information on an information push list by client 301, and analyzes the distribution of user's click behavior based on said user click log. Thereby implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

In addition, as an analysis strategy based on the distribution of user click location in different times, present embodiment increases a time analysis dimension in the issue strategy of push results compared to the above embodiment. Present embodiment determines the optimal amount of push results through analysis of the click information on the personalized push results in different times.

In particular, the embodiment introduces a time context scenario, considering that the mood of user may be different in different periods or scenario, which may influence the click distribution.

First of all, the embodiment extracts click location information on the information push list by client from said user click log; then respectively counts the clicks of each recommended item's location in each set period according to the extracted click location information. Wherein, each set period can be set according to
the actual situation. For example, one day can be divided into two periods—after 12 o'clock and before 12 o'clock, or more periods.

[0130] Next, respectively calculates the percentages of clicks of the first 1 item, (1+n), (l+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1. For example, respectively calculating the percentages of clicks of the first 10 item, 20,... 60 items in the total clicks of said information push list in each period.

[0131] Finally, determines the optimal amount of push results according to the analysis result. Specifically, selects a recommended item's location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks, and issues all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition from said information push list in corresponding period to client. For example, selects the period of after 12 o'clock, and issues all the recommended items before the selected recommended item's location which is corresponding to the percentage of 85% to client 301.

[0132] Thereby the embodiment implements a flexible control of strategy for issuing information push results, which makes the push items both meet the demand for browsing of most users at a different time, and avoid a waste of traffic caused by redundant issue.

[0133] Combined with FIG. 5, one day can be divided into two periods—after 12 o'clock and before 12 o'clock. Present embodiment respectively counts the cumulative click ratio of each location in two periods, to determine the corresponding issue amount.

[0134] As shown in FIG. 5, the click distribution of the period after 12 o'clock is more decentralized compared to the click distribution of the period before 12 o'clock, so the issue amount of that can be more. The reason is that the users' desire to explore is stronger and they have more time in the afternoon or evening rest time. To be more flexible, the time can be divided into more periods.
[0135] This scheme of present embodiment provides a flexible strategy for issuing push result, combining the click feedback of user and the time context. Present embodiment meets the demand for browsing of most users and avoids the issue of invalid results, which takes control of data traffic to some extent.

[0136] FIG. 9 is a block diagram of a server according to the above embodiments. The server may communicate with a client device such as a mobile phone. For example, the server may include a radio frequency (RF) circuit 510, a memory 520, an input unit 530, a display unit 540, a sensor 550, an audio circuit 560, a wireless fidelity (WiFi) module 570, a processor 580, and a power 590, etc. It's understood for persons skilled in the art that, the structure of the server illustrated in FIG. 9 is not limited, some components can be added or omitted, or some combinations or arrangement can be included.

[0137] Following is a detailed description of the structure of the device in FIG. 9.

[0138] The RF circuit 510 is configured to receive and sending signals during calling or process of receiving and sending message. Specially, the RF circuit 510 will receive downlink information from the base station and send it to the processor 580; or send uplink data to the base station. Generally, the RF circuit 510 includes, but is not limited to, an antenna, at least one amplifier, a transceiver, a coupler, a low noise amplifier (LNA), a diplexer, and the like. In addition, the RF circuit 40 can communicate with network or other devices by wireless communication. Such wireless communication can use any one communication standard or protocol, which includes, but is not limited to, Global System of Mobile communication (GSM), (General Packet Radio Service, GPRS), (Code Division Multiple Access, CDMA), (Wideband Code Division Multiple Access, WCDMA), (Long Term Evolution, LTE), email, or (Short Messaging Service, SMS).

[0139] The memory 520 is configured to store software program and module which will be run by the processor 580, so as to perform multiple functional applications of the server and data processing. The memory 530 mainly includes storing program area and storing data area. For example, the storing program area can store the operating system, at least one application program with required function (such as sound playing function, image playing function, etc.). The storing data area
can store data established by server according to actual using demand (such as audio data, phonebook, etc.) Furthermore, the memory 520 can be high-speed random access memory, or nonvolatile memory, such as disk storage, flash memory device, or other volatile solid-state memory devices.

[01 40] The input unit 530 is configured to receive the entered number or character information, and the entered key signal related to user setting and function control of the server 500. For example, the input unit 530 includes a touch panel 531 or other input devices 532. The touch panel 531 is called as touch screen, which can collect user's touch operations thereon or nearby (for example the operations generated by fingers of user or stylus pen, and the like, touching on the touch panel 531 or touching near the touch panel 531), and drive the corresponding connection device according to the preset program. Optionally, the touch panel 531 includes two portions including a touch detection device and a touch controller. Specifically, the touch detection device is configured to detect touch position of the user and detecting signals accordingly, and then sending the signals to the touch controller. Subsequently, the touch controller receives touch information from the touch detection device, and converts it to contact coordinates which are to be sent to the processor 580, and then receives command sent by the processor 580 to perform. In addition, the touch panel 531 can be implemented is forms of resistive type, capacitive type, infrared type and surface acoustic wave type. Besides the touch panel 531, the input unit 530 can include, but is not limited to other input devices 532, such as one or more selected from physical keyboard, function keys (such as volume control keys, switch key-press, etc.), a trackball, a mouse, and an operating lever, etc.

[01 41] The display unit 540 is configured to display information entered by the user or information supplied to the user, and menus of the server. For example, the display unit 540 includes a display panel 541, such as a Liquid Crystal Display (LCD), or an Organic Light-Emitting Diode (OLED). Furthermore, the display panel 541 can be covered by the touch panel 531, after touch operations are detected on or near the touch panel 531, they will be sent to the processor 580 to determine the type of the touching event. Subsequently, the processor 580 supplies the corresponding visual output to the display panel 541 according to the type of the touching event. As shown
in FIG. 9, the touch panel 531 and the display panel 541 are two individual components to implement input and output of the server, but they can be integrated together to implement the input and output in some embodiments.

Furthermore, the server 500 includes at least one sensor 550, such as light sensors, motion sensors, or other sensors. Specifically, the light sensors includes ambient light sensors for adjusting brightness of the display panel 541 according to the ambient light. Accelerometer sensor as one of the motion sensors can detect the magnitude of accelerations in every direction (Triaxial, generally), and detect the magnitude and direction of gravity in an immobile status, which is applicable to applications of identifying attitudes of the mobile (such as switching between horizontal and vertical screens, related games, magnetometer attitude calibration, etc.), vibration recognition related functions (such as pedometer, percussion, etc.). And the server 500 also can configure other sensors (such as gyroscopes, barometers, hygrometers, thermometers, infrared sensors, etc.) whose detailed descriptions are omitted here.

The audio circuit 560, the speaker 561 and the microphone 562 supply an audio interface between the user and the server. Specifically, the audio data is received and converted to electrical signals by audio circuit 560, and then transmitted to the speaker 561, which are converted to sound signal to output. On the other hand, the sound signal collected by the speaker is then converted to electrical signals which will be received and converted to audio data. Subsequently, the audio data are output to the processor 580 to process, and then sent to client devices via the RF circuit 510, or sent to the memory 520 to process further.

WiFi pertains to short-range wireless transmission technology providing a wireless broadband Internet. Although the WiFi module 570 is illustrated in FIG. 9, it should be understood that, WiFi module 570 is not a necessary for the server, which can be omitted according the actual demand without changing the essence of the present disclosure.

The processor 580 is a control center of the server, which connects with every part of the server by various interfaces or circuits, and performs various functions and processes data by running or performing software program/module
stored in the memory 520 or calling data stored in the memory 520, so as to monitor the server. Optionally, the processor 580 may include one or more processing units. Preferably, the processor 580 can integrate with application processors and modem processors, for example, the application processors include processing operating system, user interface and applications, etc.; the modern processors are used for performing wireless communication. It can be understood that, it's an option to integrate the modern processors to the processor 580.

[0146] Furthermore, the server 500 may include a power supply (such as battery) supplying power for each component, preferably, the power supply can connect with the processor 580 by power management system, so as to manage charging, discharging and power consuming.

[0147] In addition, the server 500 may include a camera, and a Bluetooth module, etc., which are not illustrated.

[0148] The number of said embodiments of present disclosure is just for describing, which does not represent the merits of the embodiments.

[0149] Through the above description of the embodiments, technical personnel of the field can clearly understand that the above method can use software and necessary general hardware platform to implement. Based on this understanding, the essence of technical scheme of the disclosure or the contributing part to existing technology can be incarnate in form of a software product. Said software product is stored in a storage medium (such as ROM/RAM, disk, cd-rom). Said storage medium can be a terminal (such as mobile, computer, server, or network device) implementing the described method of present disclosure.

[0150] The foregoing descriptions are merely specific embodiments of the present disclosure, but are not intended to limit the protection scope of the present disclosure. Any variation or replacement readily figured out by persons skilled in the art within the technical scope disclosed in the present disclosure shall all fall within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure shall be subject to the protection scope of the claims.
Claims

What is claimed is:

1. A method for information push, comprising:
   obtaining, by a server comprising a processor, the click information on an information push list to form a user click log;
   analyzing, by the server, the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; and
   selecting, by the server, the corresponding recommended items from said information push list according to said analysis result to issue.

2. The method according to claim 1, wherein analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result comprises:
   extracting the click location information on the information push list from said user click log;
   counting the clicks of each recommended item's location according to the extracted click location information; and
   respectively calculating the percentages of clicks of the first 1 item, \((1+n)\), \((1+2n)\)... to all recommended items in the total clicks of said information push list, depending on the counted clicks of each recommended item's location, wherein \(n\) is an integer which is greater than or equal to 1.

3. The method according to claim 2, wherein selecting the corresponding recommended items from said information push list according to said analysis result to issue comprises:
   selecting a recommended item's location corresponding to the percentage meeting preset condition from all the calculated percentages of clicks;
   issuing all the recommended items between the first and the selected recommended item's location that correspond to the percentage meeting preset condition in said information push list to a client device.

4. The method according to claim 1, wherein said analyzing the distribution of
user's click behavior based on said user click log, thus obtaining an analysis result comprises:

extracting click location information on the information push list from said user click log;

respectively counting the clicks of each recommended item's location in each set period according to the extracted click location information;

respectively calculating the percentages of clicks of the first l item, (1+n), (l+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1.

5. The method according to any one of claims 1-4, wherein said selecting the corresponding recommended items from said information push list according to said analysis result to issue comprises:

selecting a recommended item's location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks; and

issuing all the recommended items between the first and the selected recommended item's location that correspond to the percentage meeting preset condition from said information push list in corresponding period to a client device.

6. A server for information push, comprising a hardware processor and a non-transitory storage medium accessible to the hardware processor, the non-transitory storage medium configured to store modules comprising:

an obtaining module, programmed to obtain the click information on an information push list to form an user click log;

an analyzing module, programmed to analyze the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; and

an issuing module, programmed to select the corresponding recommended items from said information push list according to said analysis result to issue.
7. The server according to claim 6, wherein said analyzing module comprises:
   an extracting unit of information, programmed to extract the click location
   information on an information push list from said user click log;
   a counting unit, programmed to count the clicks of each recommended item's
   location according to the extracted the click location information; and
   a calculating unit, programmed to respectively calculate the percentages of clicks
   of the first 1 item, (1+n), (l+2n)... to all recommended items in the total clicks of said
   information push list, depending on the counted clicks of each recommended item's
   location, wherein n is an integer which is greater than or equal to 1.

8. The server according to claim 7, wherein said issuing module is further
   programmed to select a recommended item's location which is corresponding to the
   percentage meeting preset condition from all the calculated percentages of clicks, and
   issue all the recommended items between the first and the selected recommended
   item's location which is corresponding to the percentage meeting preset condition in
   said information push list to a client device.

9. The server according to claim 7, wherein:
   said counting unit is further programmed to respectively count the clicks of each
   recommended item's location in each set period according to the extracted click
   location information; and
   said calculating unit is further programmed to respectively calculate the
   percentages of clicks of the first 1 item, (1+n), (l+2n)... to all recommended items in
   the total clicks of said information push list in each period, depending on the counted
   clicks of each recommended item's location in each set period, wherein n is an integer
   which is greater than or equal to 1.

10. The server according to any one of claims 6-9, wherein said issuing module
    is further programmed to select a recommended item's location that corresponds to
    the percentage meeting preset condition in corresponding period from all the
    calculated percentages of clicks, and issue all the recommended items between the
first and the selected recommended item's location that corresponds to the percentage meeting preset condition from said information push list in corresponding period to a client device.

11. A system for information push, comprising a client and a server which is connected to said client for communication, wherein:
   said server is a server according to any one of claims 6-10;
   said client is programmed to responding to a click operation on the information push list by user and reporting click information to the server, as well as receiving issued recommended items from the server.

12. A server for information push, comprising a hardware processor and a non-transitory storage medium accessible to the hardware processor, the server programmed to:
   obtain the click information on an information push list to form an user click log;
   analyze the distribution of user's click behavior based on said user click log, thus obtaining an analysis result; and
   select the corresponding recommended items from said information push list according to said analysis result to issue.

13. The server according to claim 12, further programmed to:
   extract the click location information on an information push list from said user click log;
   count the clicks of each recommended item's location according to the extracted the click location information; and
   respectively calculate the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list, depending on the counted clicks of each recommended item's location, wherein n is an integer which is greater than or equal to 1.

14. The server according to claim 13, further programmed to select a
recommended item's location which is corresponding to the percentage meeting preset condition from all the calculated percentages of clicks, and issue all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition in said information push list to a client device.

15. The server according to claim 13, further programmed to
   respectively count the clicks of each recommended item's location in each set period according to the extracted click location information; and
   respectively calculate the percentages of clicks of the first 1 item, (1+n), (1+2n)...
   to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period, wherein n is an integer which is greater than or equal to 1.

16. The server according to any one of claims 12-15, further programmed to select a recommended item's location that corresponds to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks, and issue all the recommended items between the first and the selected recommended item's location that corresponds to the percentage meeting preset condition from said information push list in corresponding period to a client device.
obtaining the click information on a information push list by client to form a user click log

analyzing the distribution of user's click behavior based on said user click log, thus obtaining an analysis result

selecting the corresponding recommended items from said information push list according to said analysis result to issue

FIG. 1

extracting the click location information on the information push list by client from said user click log

counting the clicks of each recommended item's location according to the extracted click location information

respectively calculating the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list, depending on the counted clicks of each recommended item's location

FIG. 2a
selecting a recommended item's location which is corresponding to the percentage meeting preset condition from all the calculated percentages of clicks

issuing all the recommended items between the first and the selected recommended item's location which is corresponding to the percentage meeting preset condition in said information push list to client

FIG. 2b

FIG. 3
extracting click location information on the information push list by client from said user click log

respectively counting the clicks of each recommended item's location in each set period according to the extracted click location information

respectively calculating the percentages of clicks of the first 1 item, (1+n), (1+2n)... to all recommended items in the total clicks of said information push list in each period, depending on the counted clicks of each recommended item's location in each set period

FIG. 4a

selecting a recommended item’s location which is corresponding to the percentage meeting preset condition in corresponding period from all the calculated percentages of clicks

issuing all the recommended items between the first and the selected recommended item’s location which is corresponding to the percentage meeting preset condition from said information push list in corresponding period to client

FIG. 4b
**FIG. 7**

- Analyzing module
  - Extracting unit of information
  - Counting unit
  - Calculating unit

**FIG. 8**

- System for information push
  - Client
  - Server
**INTERNATIONAL SEARCH REPORT**

**PCT/CN2014/092241**

**A. CLASSIFICATION OF SUBJECT MATTER**

G06F 17/30(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

G06F: H04W: H04B: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPLEPODOC, CNKI, IEEE, CNPAT: locat+, list, click, push, user, analyz+, analysis, recommend, interest, extract+, percentage

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
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<td>WO 2012000423 AI (BEIJING SOGOU TECH. DEV. CO., LTD.) 05 January 2012 (2012-01-05) description, paragraphs [0034]-[0039]</td>
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<td>CN 102346899 A (EP BEIJING TECHNOLOGY CO., LTD.) 08 February 2012 (2012-02-08) the whole document</td>
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<td>CN 102065174 A (SHENZHEN WUJU SCI&amp;TECHNOLOGY CO., LTD.) 18 May 2011 (2011-05-18) the whole document</td>
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Date of the actual completion of the international search: 12 February 2015

Date of mailing of the international search report: 04 March 2015

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Form PCT/ISA/210 (second sheet) (July 2009)
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