

METHOD AND SYSTEM FOR DISPLAYING SERVICE IN MULTI-SCREEN INTERACTION SCENARIO ON CLIENT

TECHNICAL FIELD

[0001] The present invention relates to the field of multi-screen interaction, and in particular to a method and system for displaying service in multi-screen interaction scenario on client.

BACKGROUND

[0002] With the development of terminal technologies, particularly rapid popularization of mobile terminals such as smart phones, tablet computers, and smart TVs, the multi-screen interaction technology has been applied more and more broadly, which makes it true to perform media content sharing and interoperation between different screens through a network connection. Current multi-screen interaction protocols include DLNA, AirPlay, Miracast, some private protocols for implementing multi-screen interaction etc.

[0003] In multi-screen application scenarios of various protocols, there will be a variety of services such as media resource services, media play services, and there will also be a client to discover and acquire services. The current multi-screen interaction protocols per se and dominant multi-screen applications in the market do not consider how to present services at a client, which involves whether a user can find his/her desired service more accurately and quickly when there are too many media services, because a mobile phone and a tablet have limited screen spaces, while a smart TV is not appropriate to present too many contents once due to the requirement of viewing in a long distance.

[0004] In view of the above, it is a main problem to be solved regarding how to develop a method and system for presenting services at a client in a multi-screen interaction scenario, which causes the client to intelligently sort the services obtained in a local area network without changing the multi-screen interaction protocol per se, so as to achieve a better user experience especially when a relatively large number of services are acquired by the client.

SUMMARY

[0004a] The invention is defined in the independent claim. Some optional features of the invention are defined in the dependent claims.

[0005] The method and system disclosed herein introduce a mechanism of analysis on user's behavior in a multi-screen interaction scenario, such that the client performs an intelligent sorting on the obtained services in the local area network without changing the original multi-screen interaction protocol per se, so as to achieve a better user experience especially when a relatively large number of services are obtained by the client.

[0006] In one aspect, the present invention provides a method for displaying service in multi-screen interaction scenario on client, the method comprises steps of:

[0007] monitoring operational behaviors of a multi-screen interaction client;

[0008] performing analysis according to the monitored operational behaviors of the multi-screen interaction client to obtain preference degrees of the multi-screen interaction client with respect to different services;

[0009] updating a list of service preference degrees based on the obtained preference degrees of the multi-screen interaction client with respect to different services;

[0010] sorting service information in the list of service preference degrees and presenting to a user.

[0011] In another aspect, the present invention provides a system for displaying service in multi-screen interaction scenario on client, the system comprises:

[0012] an acquiring module configured to monitor operational behaviors of the multi-screen interaction client;

[0013] an analyzing module configured to perform analysis according to the monitored operational behaviors of the multi-screen interaction client to obtain preference degrees of the multi-screen interaction client with respect to different services;

[0014] a storage module configured to update a list of service preference degrees based on the obtained preference degrees of the multi-screen interaction client

with respect to different services;

[0015] a presenting module configured to sort service information in the list of service preference degrees and presenting to the user.

[0016] As compared with the prior art, the present method and system have the following advantages:

[0017] 1. By introducing a mechanism of the analysis on user's behavior, the embodiments of the present invention enable the client to perform an intelligent sorting on the obtained services in the local area network, so as to achieve a better user experience especially when a relatively large number of services are obtained by the client;

[0018] 2. The system and method do not change the standard multi-screen interaction protocol per se, such that it may flexibly expand various kinds of multi-screen protocols;

[0019] 3. Simple structure, easy implementation, modularized design and easy expansion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Fig. 1 illustrates a frame diagram of a system for presenting services at a client in a multi-screen interaction scenario according to an embodiment of the present invention;

[0021] Fig. 2 illustrates a flow diagram of generating preference degree data of services in a method for presenting the services at a client in a multi-screen interaction scenario according to an embodiment of the present invention;

[0022] Fig. 3 illustrates a flow diagram of sorting the preference degree data of services in a method for presenting the services at a client in a multi-screen interaction scenario according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0023] Hereinafter, the technical solutions of the method and system will be described in further detail through the accompanying drawings and embodiments.

[0024] Fig. 1 illustrates a frame diagram of a system for displaying service in multi-screen interaction scenario on client according to an embodiment of the present invention. As illustrated in Fig. 1, the system comprises a multi-screen interaction client 11, a service 12 in the multi-screen interaction scenario, an acquiring module 13, an analyzing module 14, a data storage module 15, and a presenting module 16.

[0025] The multi-screen interaction client 11 refers to those functional roles for performing to discover service operations within a network range, wherein the multi-screen interaction refers to performing multimedia sharing and interoperation between different terminal devices through a network connection. The protocols included in the multi-screen interaction include, but not limited to, DLNA (Digital Living Network Alliance), AirPlay, Miracast, etc.

[0026] The service 12 in the multi-screen interaction scenario refers to a role for providing a certain service in the multi-screen interaction scenario, e.g., a media play service, a media resource service, etc.

[0027] The acquiring module 13 is configured to monitor operational behaviors of the multi-screen interaction client 11, including acquiring a selection of a service and operational information of the multi-screen interaction client 11.

[0028] Specifically, the analyzing module 13 implements analysis of the operational behaviors of the multi-screen interaction client by defining weights of the operational behaviors of a user.

[0029] The analyzing module 14 is configured to perform analysis processing according to the monitored operational behaviors of the multi-screen interaction client 11 to obtain preference degrees of the multi-screen interaction client 11 with respect to different services.

[0030] Specifically, the analyzing module 14 performs analysis on the operational behaviors of the multi-screen interaction client 11 based on the monitored information and then makes evaluation of importance on the services selected by the multi-screen interaction client 11.

[0031] The storage module 15 is configured to update a list of service preference degrees based on the obtained preference degrees of the multi-screen interaction client

11 with respect to different services.

[0032] Specifically, the storage module 15 integrates preference degree data of the multi-screen interaction client with respect to different services within one work period with data in a data storage.

[0033] The presenting module 16 is configured to sort the service information in the list of service preference degrees and present it to the user.

[0034] Fig. 2 illustrates a flow diagram of generating preference degree data of services in a method for displaying service in multi-screen interaction scenario on client according to an embodiment of the present invention. As illustrated in Fig. 2, the flow diagram comprises steps 201-209.

[0035] At step 201, starting a multi-screen interaction client, through which an interface of the multi-screen interaction client is invoked..

[0036] A time period from start to stop of the multi-screen interaction client is referred to as a user data acquisition period. A user behavior analysis module will analyze the data acquired within this period.

[0037] At step 202, zero clearing data in a user behavior acquiring module. Each time the multi-screen interaction client starts, which represents a beginning of a new user data acquisition period, thus it is needed to zero clear the data in the module, which may also be understood as an initialization operation.

[0038] At step 203, the multi-screen interaction client interacts with the services in the multi-screen interaction scenario. The multi-screen interaction client after starting, will search the services in the multi-screen interaction scenario within the local area network, and then select a certain service and perform operations such as browsing resources and playing media files on the certain service.

[0039] At step 204, monitoring the operations in step 203 by the user behavior acquiring module. For example, if the user behavior acquiring module is interested in three operations of selecting services, browsing resources and playing media, a monitor interface of the user behavior acquiring module may be embedded in places where the three functions are invoked.

[0040] Here, the following three behaviors will be taken as examples:

[0041] (1) selecting services;

[0042] (2) browsing resources;

[0043] (3) playing media.

[0044] The following steps use them as examples, but in specific implementations, an action behavior that needs to be monitored can be freely selected.

[0045] At step 205, updating the user behavior acquiring module. The times of user behaviors is counted and the data is updated based on the operational behaviors of the user acquired by the user behavior acquiring module. The user behavior acquisition module will maintain a table as follows:

operational condition with respect to S01 service	
operational behavior of a user	times of user's behavior
selecting services	1
browsing resources	2
playing media files	0

operational condition with respect to S02 service	
operational behavior of a user	times of user's behavior
selecting services	1
browsing resources	0
playing media files	1

operational condition with respect to S03 service	
operational behavior of a user	times of user's behavior
selecting services	2
browsing resources	0
playing media files	0

[0046] At step 206, judging whether the multi-screen interaction client stops. If the

multi-screen interaction client stops, turn to step 207; otherwise, turn to step 203.

[0047] At step 207, the multi-screen interaction client stops, which represents the end of this user behavior acquisition period; the obtained user preference data will be transmitted to the user behavior analyzing module. The user behavior analyzing module will analyze these data.

[0048] The user behavior analyzing module may adopt different user behavior analyzing method. One of implementations is provided below.

[0049] Weights of user behaviors are defined, which represents the contribution of the user's certain behavior to the user preference degree, as illustrated in the table below:

operational behavior of a user	weight of user's behavior
selecting services	1
browsing resources	2
playing media files	2

[0050] Then, if the service S01 is selected once, the resources are browsed twice, the service S02 is selected once and played once, and the service S03 is selected twice, the contribution degree data of these operations to the obtained preference of services are as follows:

service name	obtained user preference degree data
S01	$1 \times 1 + 2 \times 2 = 5$
S02	$1 \times 1 + 1 \times 2 = 3$
S03	$1 \times 2 = 2$

[0051] Further, the user's preference data with respect to the services within the present period are normalized as follows:

service name	normalization of the obtained user
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	preference degree data
S01	$5/(5+3+2) = 0.5$
S02	$3/(5+3+2) = 0.3$
S03	$2/(5+3+2) = 0.2$

[0052] At step 208, integrating the preference degree data of the client with respect to different services within one period with the data in a data storage. The specific integration manner may be freely selected. An implementation is provided below:

[0053] As for the service S, the data preference degree of S in the present period $\times k$ + (1 - k) $\times$ the original preference degree; wherein k is a numerical value greater than 0 but less than or equal to 1. Here, k is 0.1.

[0054] It is assumed that the previous period in the data storage module ends, and the stored list of service preference degrees is:

service name	list of preference degrees
S01	0.5
S02	0.5

[0055] Then, updated preference degree data of respective services in the data storage module may be obtained:

service name	preference degree
S01	$0.5 \times 0.1 + 0.9 \times 0.5 = 0.5$
S02	$0.3 \times 0.1 + 0.9 \times 0.5 = 0.48$
S03	$0.2 \times 0.1 + 0.9 \times 0 = 0.02$

[0056] At step 209, the update of the preference degrees of the client with respect to different services in the data storage module completes.

[0057] Fig. 3 illustrates a flow diagram of sorting preference degree data of services in a method for presenting the services at a client in a multi-screen interaction scenario according to an embodiment of the present invention. As illustrated in Fig. 3,

the flow diagram comprises steps 301-304.

[0058] At step 301, starting a multi-screen interaction client. Before invoking the multi-screen interaction client's operation, the client needs to be started.

[0059] At step 302, obtaining a list of services within a local area network. The list obtained here is a list randomly obtained by the client. It is assumed that the at this time obtained services within the local area network are S03, S02, S05, S01 and S04.

[0060] At step 303, sorting the service information according to the service preference degree data stored in the data storage module. If the user preference data in the data storage module at this time are the data as shown by the updated data in step 208, then the result of sorting the services is: S01, S02, S03, S05, S04.

[0061] At step 304, presenting the sorted services to the user by a presenting module serving at the client. The user will see the services he/she frequently uses at the top of the list.

[0062] By introducing a mechanism of the analysis on user's behavior, the embodiments of the present invention enable the client to perform an intelligent sorting on the obtained services in the local area network, so as to achieve a better user experience especially when a relatively large number of services are obtained by the client.

[0063] Finally, it should be explained that the embodiments above are only used for illustrating, rather than limiting, the technical solutions of the present invention. Although the present invention is described in detail with reference to the embodiments, those skilled in the art should understand that a modification or equivalent substitution to the technical solutions of the present invention should be covered within the scope of the claims of the present invention without departing from the spirit and scope of the technical solutions of the present invention.

CLAIMS

1. A method for displaying service in multi-screen interaction scenario on client, comprising steps of:

- monitoring operational behaviors of a multi-screen interaction client;
- performing analysis according to the monitored operational behaviors of the multi-screen interaction client to obtain preference degrees of the multi-screen interaction client with respect to different services;
- updating a list of service preference degrees based on the obtained preference degrees of the multi-screen interaction client with respect to different services;
- sorting service information in the list of service preference degrees and presenting to a user.

2. The method according to claim 1, wherein the step of monitoring operational behaviors of a multi-screen interaction client comprises:

- recording and making statistics on the multi-screen interaction client's selection and operational information with respect to different services within one work period of the multi-screen interaction client.

3. The method according to claim 2, wherein the step of performing analysis according to the monitored operational behaviors of the multi-screen interaction client comprises: distinguishing user's operational behaviors of the multi-screen interaction client within one work period, assigning different weights to different types of user's operational behaviors.

4. The method according to claim 1, wherein the obtaining the preference degrees of the multi-screen interaction client with respect to different services refers to performing analysis on the operational behaviors of the multi-screen interaction client based on the monitored information, and then making evaluation of importance on the services selected by the multi-screen interaction client.

5. The method according to claim 1, wherein the step of updating a list of service preference degrees comprises:

- integrating preference degree data of the multi-screen interaction client with respect to different services within one work period with data in a data storage; after

the integrating, a preference degree of a service = the preference degree of the service in the present period $\times k + (1 - k) \times$ the original preference degree of the service, k is a numerical value greater than 0 but less than or equal to 1.

6. A system for displaying service in multi-screen interaction scenario on client, the system comprising:

an acquiring module configured to monitor operational behaviors of the multi-screen interaction client;

an analyzing module configured to perform analysis according to the monitored operational behaviors of the multi-screen interaction client to obtain preference degrees of the multi-screen interaction client with respect to different services;

a storage module configured to update a list of service preference degrees based on the obtained preference degrees of the multi-screen interaction client with respect to different services;

a presenting module configured to sort service information in the list of service preference degrees and presenting to a user.

7. The system according to claim 6, wherein the acquiring module is specifically configured to:

record and make statistics on the multi-screen interaction client's selection and operational information with respect to different services within one work period of the multi-screen interaction client.

8. The system according to claim 6, wherein the analyzing module is specifically configured to:

implement analysis of operational behaviors of the multi-screen interaction client by defining weights of user's operational behaviors.

9. The system according to claim 6, wherein the analyzing module is specifically configured to:

perform analysis on the operational behaviors of the multi-screen interaction client based on the monitored information, and then make evaluation of importance on the services selected by the multi-screen interaction client based on the monitored operation behaviors of the multi-screen interaction client.

10. The system according to claim 6, wherein the storage module is specifically configured to:
integrate preference degree data of the multi-screen interaction client with respect to different services within one work period with data in the data storage.