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(54) METHOD FOR PROVIDING IMMEDIATE RESULT FOR USER INPUT, AND APPARATUS THEREFOR

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(57) **ABSTRACT**

The present invention relates to a method for providing a processed result following a user input, and more specifically to a method for providing a service allowing a more rapid and immediate result to be provided to a user input by outputting, when a particular input is entered by a user, a predictive response information, previously stored in the client terminal, before the particular input is transmitted to a service apparatus, and a system and an apparatus therefor.

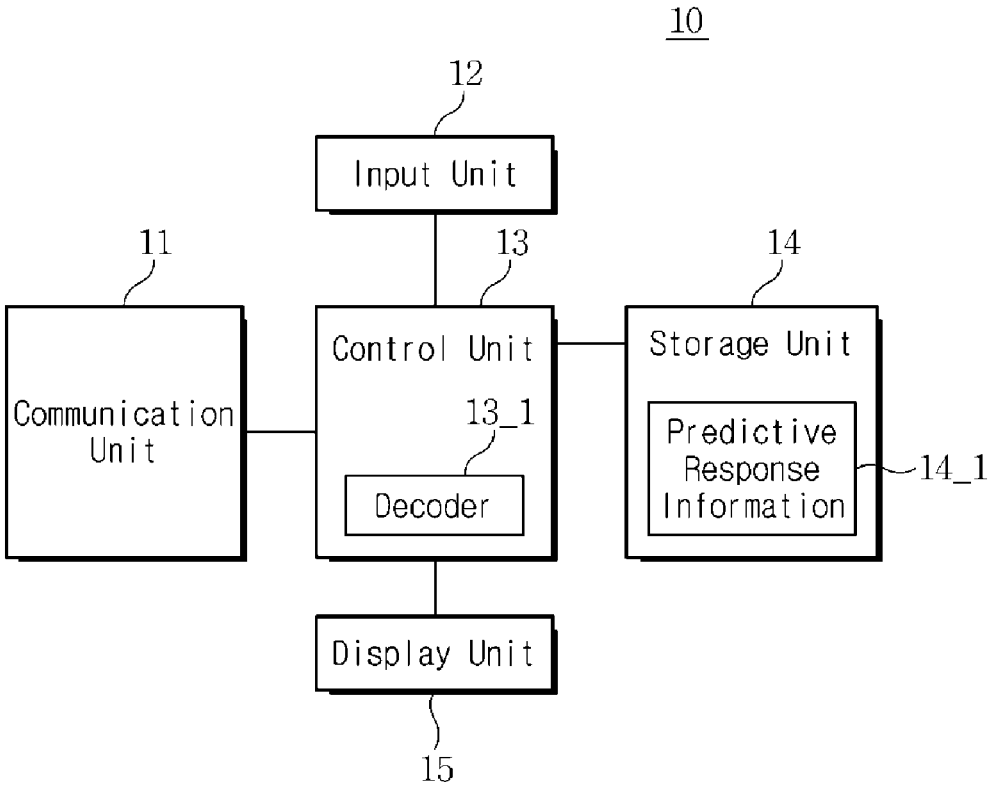


FIG. 1

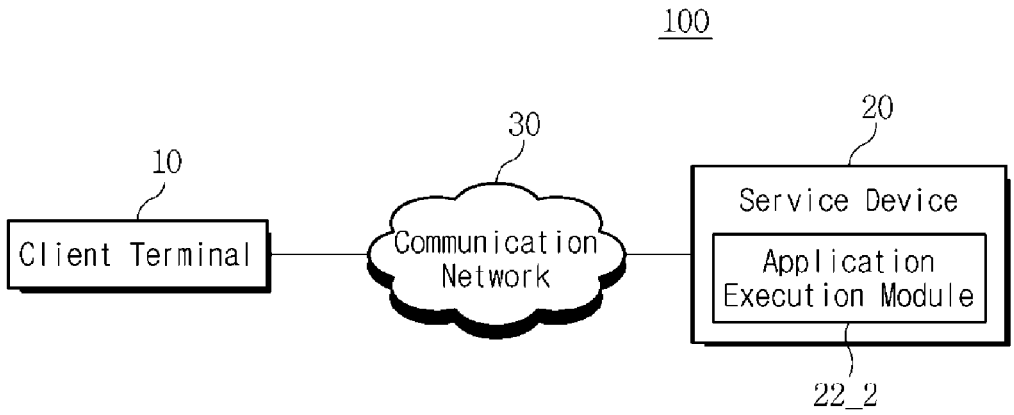

100
10
Client Terminal
30
Communication Network
20
Service Device
Application Execution Module
22_2

FIG. 2

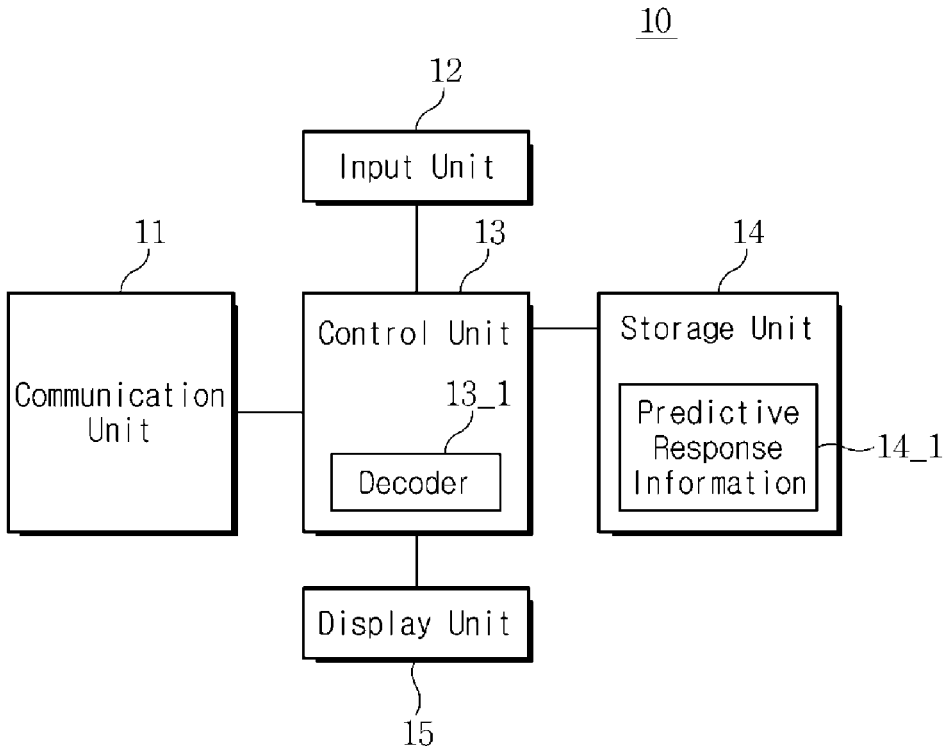

10
12
Input Unit
11
Communication Unit
13
Control Unit
13_1
Decoder
14
Storage Unit
Predictive Response Information
14_1
Display Unit
15

FIG. 3

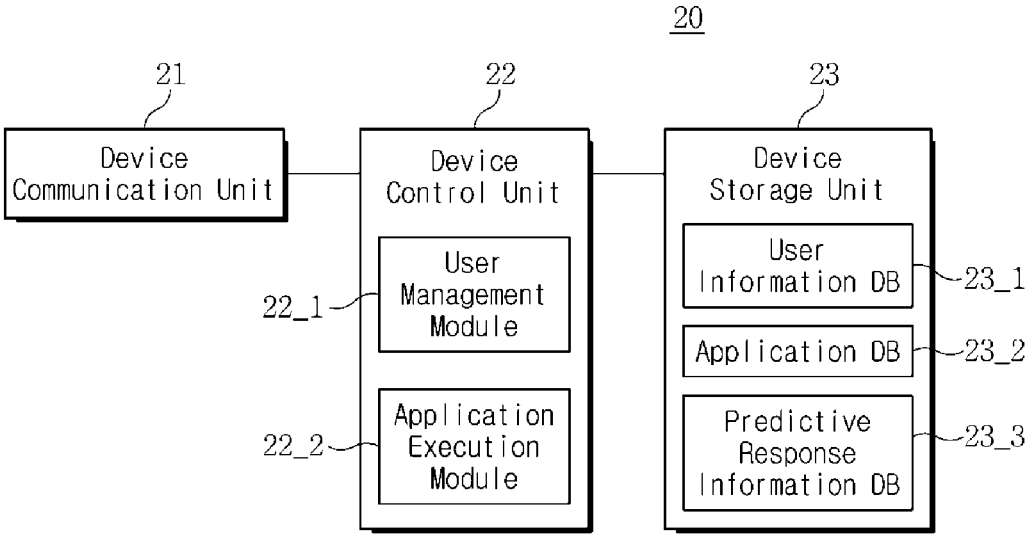

20
21
22
23
Device Communication Unit
Device Control Unit
User Management Module
22_1
Application Execution Module
22_2
Device Storage Unit
User Information DB
23_1
Application DB
23_2
Predictive Response Information DB
23_3

FIG. 4

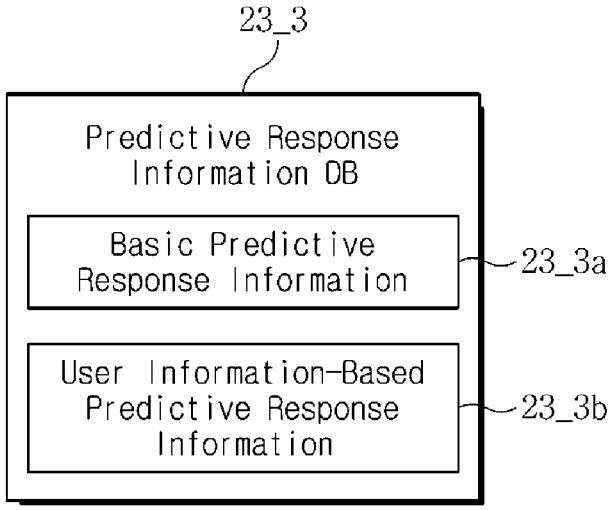

23_3
Predictive Response Information DB
Basic Predictive Response Information
23_3a
User Information-Based Predictive Response Information
23_3b

FIG. 5

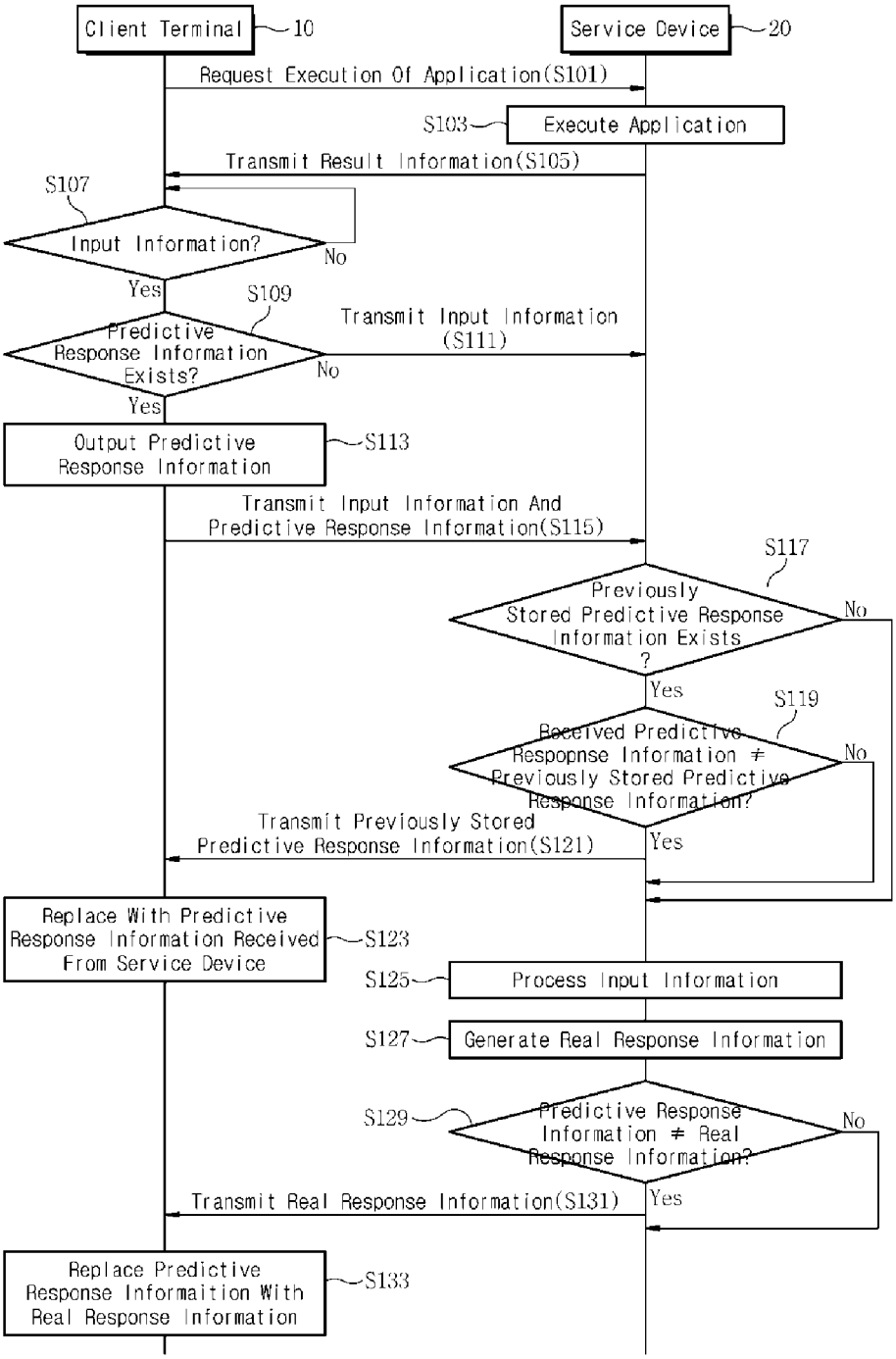

Client Terminal
10
Service Device
20
Request Execution Of Application(S101)
S103
Execute Application
Transmit Result Information(S105)
S107
Input Information?
No
Yes
S109
Predictive Response Information Exists?
Transmit Input Information (S111)
No
Yes
Output Predictive Response Information
S113
Transmit Input Information And Predictive Response Information(S115)
S117
Previously Stored Predictive Response Information Exists ?
No
Yes
S119
Received Predictive Respopnse Information ≠ Previously Stored Predictive Response Information?
No
Yes
Transmit Previously Stored Predictive Response Information(S121)
Replace With Predictive Response Information Received From Service Device
S123
S125
Process Input Information
S127
Generate Real Response Information
S129
Predictive Response Information ≠ Real Response Information?
No
Yes
Transmit Real Response Information(S131)
Replace Predictive Response Informaition With Real Response Information
S133

FIG. 6a

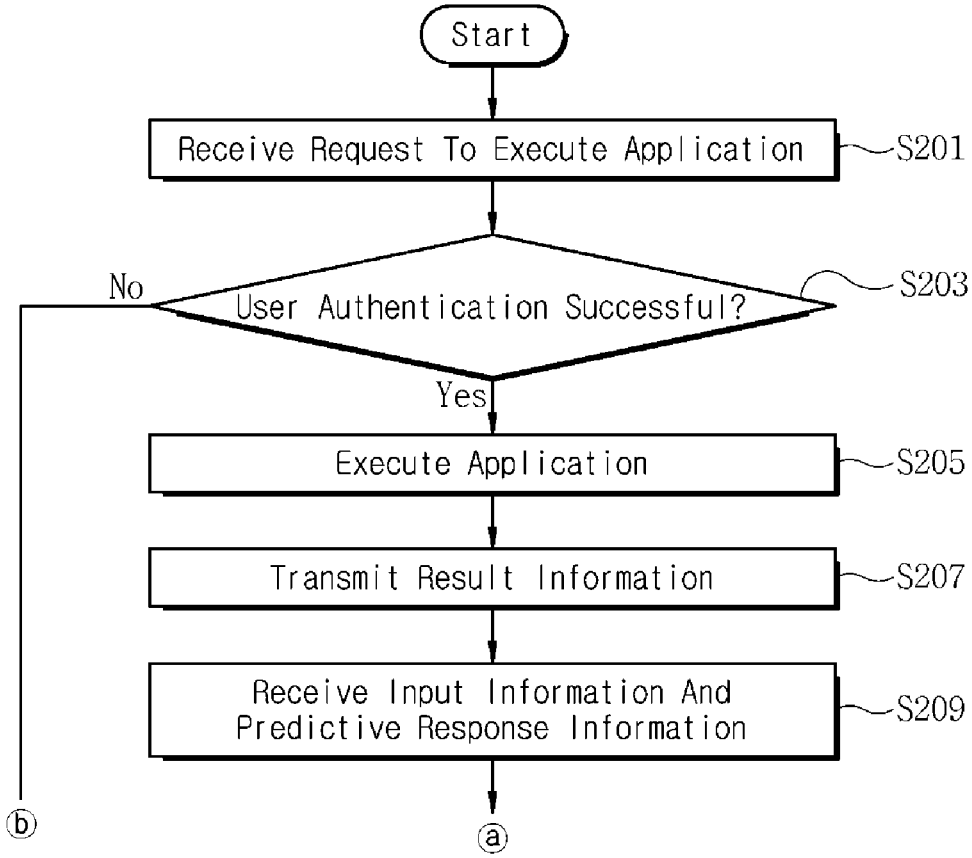

Start
Receive Request To Execute Application
S201
No
User Authentication Successful?
S203
Yes
Execute Application
S205
Transmit Result Information
S207
Receive Input Information And Predictive Response Information
S209
ⓑ
ⓐ

FIG. 6b

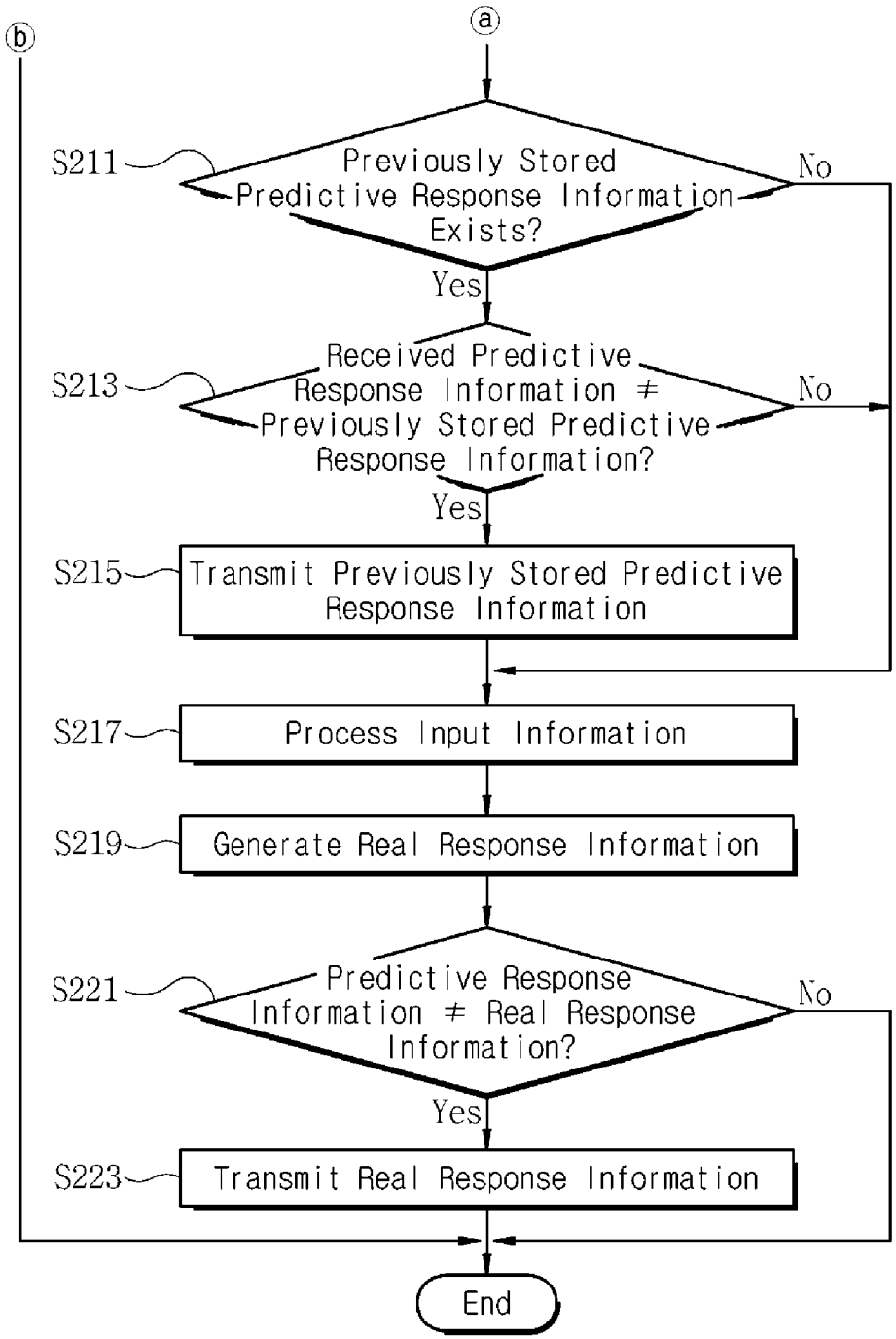

ⓐ
ⓑ
S211
Previously Stored Predictive Response Information Exists?
No
Yes
S213
Received Predictive Response Information ≠ Previously Stored Predictive Response Information?
No
Yes
S215
Transmit Previously Stored Predictive Response Information
S217
Process Input Information
S219
Generate Real Response Information
S221
Predictive Response Information ≠ Real Response Information?
No
Yes
S223
Transmit Real Response Information
End

FIG. 7

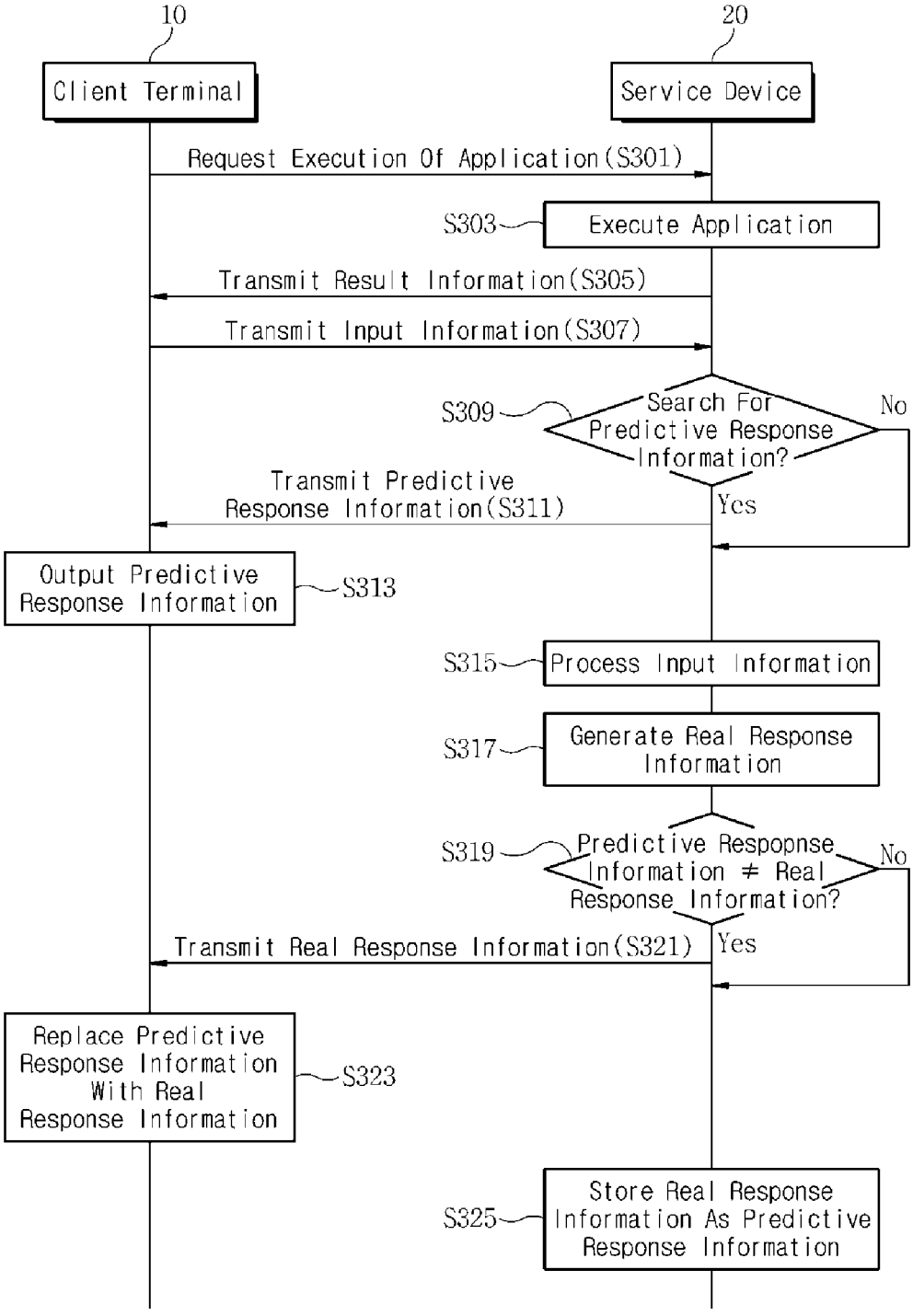

10
20
Client Terminal
Service Device
Request Execution Of Application(S301)
S303
Execute Application
Transmit Result Information(S305)
Transmit Input Information(S307)
S309
Search For Predictive Response Information?
No
Yes
Transmit Predictive Response Information(S311)
Output Predictive Response Information
S313
S315
Process Input Information
S317
Generate Real Response Information
S319
Predictive Respopnse Information ≠ Real Response Information?
No
Yes
Transmit Real Response Information(S321)
Replace Predictive Response Information With Real Response Information
S323
S325
Store Real Response Information As Predictive Response Information

FIG. 8a

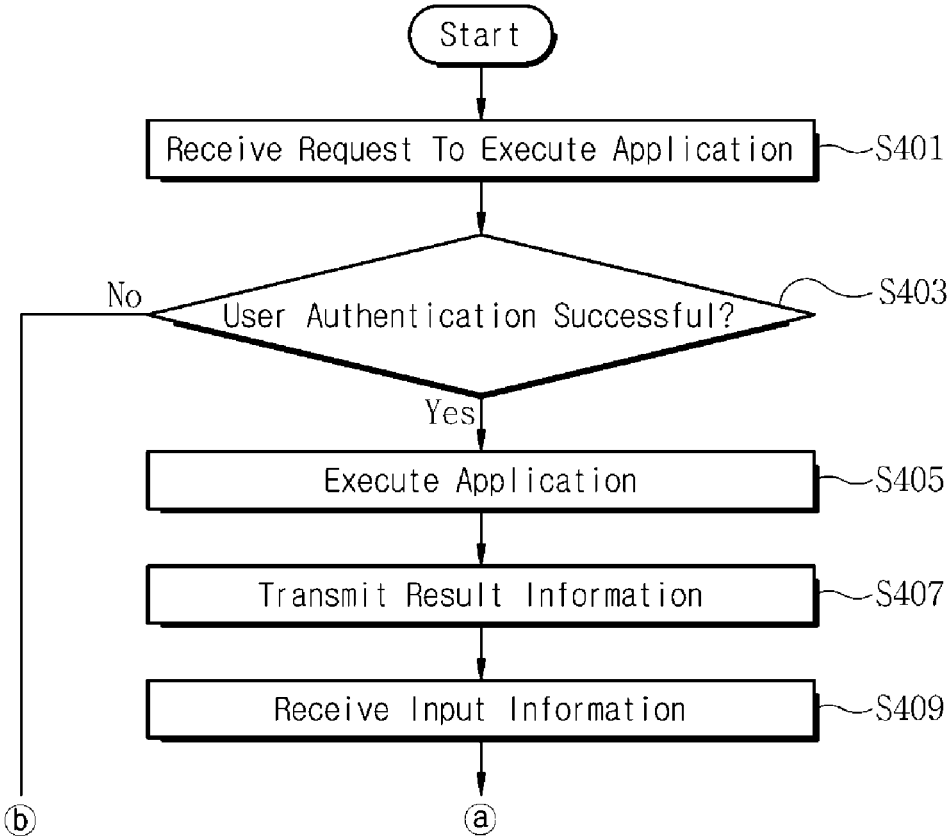
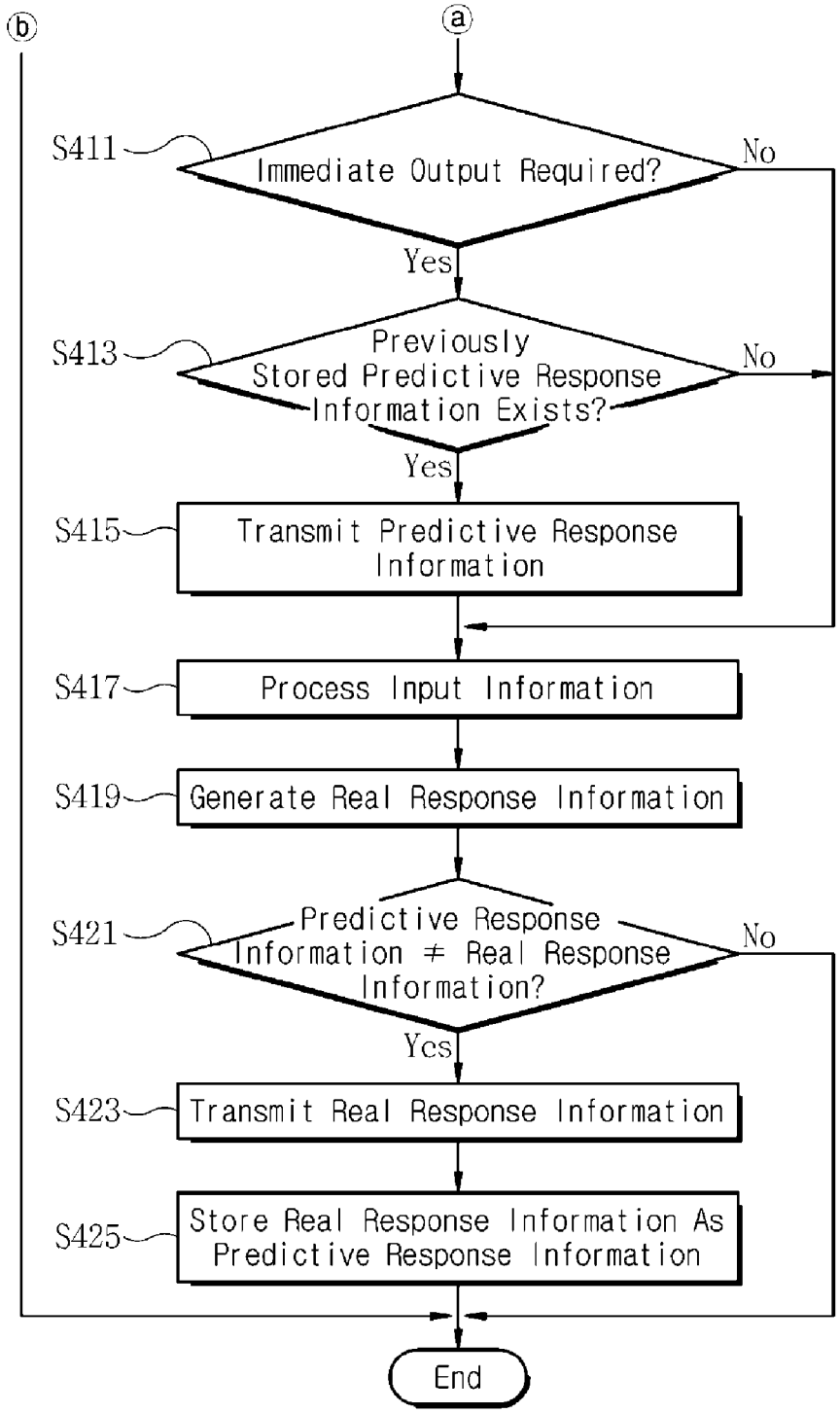

Start
Receive Request To Execute Application
S401
User Authentication Successful?
S403
No
Yes
Execute Application
S405
Transmit Result Information
S407
Receive Input Information
S409
ⓑ
ⓐ

FIG. 8b


ⓑ
ⓐ
S411
Immediate Output Required?
No
Yes
S413
Previously Stored Predictive Response Information Exists?
No
Yes
S415
Transmit Predictive Response Information
S417
Process Input Information
S419
Generate Real Response Information
S421
Predictive Response Information ≠ Real Response Information?
No
Yes
S423
Transmit Real Response Information
S425
Store Real Response Information As Predictive Response Information
End

METHOD FOR PROVIDING IMMEDIATE RESULT FOR USER INPUT, AND APPARATUS THEREFOR

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2012-0144191 and 10-2012-0144192 filed in the Korean Intellectual Property Office on Dec. 12, 2012 respectively, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to a method for providing a processing result based on a user input, and more particularly, to a service providing method, and a system and apparatus therefore that may rapidly provide an immediate result for a user input by first outputting predictive response information that is previously stored in a client terminal before transmitting a specific input to a service device when the specific input is input by a user.

BACKGROUND

[0003] As technologies are being developed, the number of applications that can run on user terminals has increased, and specifications of the terminals required to run the applications also has been dramatically developed.

[0004] However, inconveniently, in order to run a high-end application such as a 3-dimensional (3D) game, users should check in advance whether their terminals are appropriate to run the high-end application. If the terminals do not have a specification sufficient to run a high-end application, users cannot use the application itself.

[0005] Accordingly, a cloud service, in which users can access a service provided by a service provider through a network and use an application, regardless of a specification of the user's terminal, has received much attention.

[0006] Recently, a screen virtualization-based cloud service has been developed. The screen virtualization-based cloud service denotes a service that transmits a result screen of an application executed on a server to a terminal of a user upon the user's request to enable the user to easily use the application despite not having the application provided in his/her terminal.

[0007] In the screen virtualization-based cloud service, above all, a technology for providing an immediate output result based on a user input needs to be developed.

SUMMARY

[0008] The present invention is directed to providing a service providing method, and a system and apparatus therefore that may provide an immediate result for a user input, which may rapidly provide a processing result for a user input by first outputting predictive response information that is previously stored in a client terminal before transmitting a specific input to a service device when the specific input is input by a user.

[0009] The present invention is also directed to providing a service providing method, and a system and apparatus therefore that may provide an immediate result for a user input, which may accurately provide a processing result for a user input to a client terminal by establishing statistics of input response for each client terminal and generating predictive response information based on the statistics.

[0010] One aspect of the present invention provides a system for providing an immediate result for a user input, the system including: a client terminal configured to output a previously stored predictive response information corresponding to input information input from a user, transmit the input information and the predictive response information to a service device, and when predictive response information is received from the service device, output the predictive response information received from the service device in replacement of the previously output predictive response information, and when actual response information is received from the service device, output the actual response information in replacement of the predictive response information; and a service device configured to execute a specific application according to a request of any one client terminal, transmit result information obtained by executing the application to the client terminal in real time, and when the input information and the predictive information are received from the client terminal, compare the predictive response information received from the client terminal with previously stored predictive response information corresponding to the input information, and when the predictive response information is different, transmit the previously stored predictive response information to the client terminal, generate actual response information for the input information, compare the actual response information with the predictive response information previously transmitted to the client terminal, and when the actual response information and the predictive response information are different, transmit the actual response information to the client terminal.

[0011] Another aspect of the present invention provides a service device including: a device storage unit configured to store predictive response information for one or more pieces of input information; and a device control unit configured to perform control to execute a specific application according to a request of any one client terminal, transmit result information obtained by executing the application to the client terminal in real time, and when input information and predictive information are received from the client terminal, compare the predictive response information received from the client terminal with predictive response information previously stored in the device storage unit corresponding to the input information, and when the predictive response information is different, transmit the previously stored predictive response information to the client terminal, generate actual response information for the input information, compare the actual response information with the predictive response information previously transmitted to the client terminal, and when the actual response information and the predictive response information are different, transmit the actual response information to the client terminal.

[0012] The device storage unit may further include basic predictive response information calculated according to a pattern of the received input information and user information-based predictive response information calculated according to a pattern of input information received from a specific client terminal.

[0013] When the input information and the predictive response information are received from the client terminal, the device control unit may check whether user information-based predictive response information generated corresponding to the client terminal exists, and when the user informa-

tion-based predictive response information exists, compare the user information-based predictive response information with the predictive response information received from the client terminal, and when the user information-based predictive response information and the predictive response information are different, transmit the user information-based predictive response information to the client terminal.

[0014] When the user information-based predictive response information generated corresponding to the client terminal does not exist in the device storage unit, the device control unit may compare the basic predictive response information corresponding to the input information with the predictive response information received from the client terminal, and when the basic predictive response information and the received predictive response information are different, transmit the basic predictive response information to the client terminal.

[0015] When the predictive response information corresponding to the input information does not exist in the device storage unit, the device control unit may perform control to compare the actual response information for the input information with the predictive response information received from the client terminal and when the actual response information and the predictive response information are different, transmit the actual response information to the client terminal.

[0016] Still another aspect of the present invention provides a system for providing an immediate result for a user input, the system including: a client terminal configured to transmit input information input from a user, and when predictive response information is received from the service device, output the predictive response information, and when actual response information is received from the service device, output the actual response information in replacement of the predictive response information; and a service device configured to execute a specific application according to a request of any one client terminal, transmit result information obtained by executing the application to the client terminal in real time, and when the input information is received from the client terminal, transmit a previously stored predictive response information to the client terminal corresponding to the input information, generate actual response information for the input information, compare the predictive response information with the actual response information, and when the predictive response information and the actual response information are different, transmit the actual response information to the client terminal.

[0017] Still another aspect of the present invention provides a service device including: a device storage unit configured to store predictive response information for one or more pieces of input information; and a device control unit configured to execute a specific application according to a request of any one client terminal, transmit result information obtained by executing the application to the client terminal in real time, and when input information is received from the client terminal while transmitting result information obtained by executing the application to the client terminal in real time, transmit predictive response information for the input information that is previously stored in the device storage unit, generate actual response information for the input information, compare the predictive response information with the actual response information, and when the predictive response information and the actual response information are different, transmit the actual response information to the client terminal.

[0018] The device storage unit may further include basic predictive response information calculated according to a pattern of the received input information and user information-based predictive response information calculated according to a pattern of input information received from a specific client terminal.

[0019] When the input information is received from the client terminal, the device control unit may check whether user information-based predictive response information generated corresponding to the client terminal exists, and when the user information-based predictive response information exists, transmit the user information-based predictive response information to the client terminal.

[0020] When the user information-based predictive response information generated corresponding to the client terminal does not exist, the device control unit may transmit the basic predictive response information corresponding to the input information to the client terminal.

[0021] When the predictive response information corresponding to the input information does not exist in the device storage unit, the device control unit may transmit actual response information for the input information to the client terminal.

[0022] The device control unit may determine whether the input information received from the client terminal is input information requiring an immediate result, and only when the input information is input information requiring an immediate result, transmit the predictive response information for the input information to the client terminal.

[0023] The device control unit may encode screen data obtained by executing the application in real time to transmit the encoded screen data to the client terminal. Still another aspect of the present invention provides a method of providing a service, the method including: receiving input information and predictive response information from any one client terminal; comparing the predictive response information received from the client terminal with previously stored predictive response information corresponding to the input information; and when the predictive response information is different, as a result of the comparison, transmitting the previously stored predictive response information to the client terminal.

[0024] The method may further comprising, before the receiving: executing a specific application according to a request of the client terminal; and transmitting result information obtained by executing the application to the client terminal in real time.

[0025] The comparing includes: checking whether user information-based predictive response information generated corresponding to the client terminal exists; and when it is checked that the user information-based predictive response information generated corresponding to the client terminal exists, comparing the previously stored user information-based predictive response information with the predictive response information received from the client terminal, and the transmitting includes, when the previously stored user information-based predictive response information and the received predictive response information are different, transmitting the previously stored user information-predictive response information to the client terminal.

[0026] The method may further include, after the transmitting, generating actual response information that is a processing result for the input information; and comparing the actual response information with the predictive response informa-

tion to transmit the actual response information to the client terminal when the comparing the actual response information and the predictive response information are different.

[0027] Still another aspect of the present invention provides a method of providing a service, the method including: receiving input information from any one client terminal; transmitting previously stored response information to the client terminal corresponding to the input information; generating actual response information that is a processing result for the input information; and comparing the actual response information with the predictive response information to transmit the actual response information to the client terminal when the actual response information and the predictive response information are different.

[0028] The method may further comprising, before the receiving of input information: executing a specific application according to a request of the client terminal; and transmitting result information obtained by executing the application to the client terminal in real time.

[0029] The transmitting of the predictive response information to the client terminal may further include: searching for previously stored predictive response information for the input information corresponding to user information of the client terminal; and transmitting the searched predictive response information to the client terminal.

[0030] The searching for the predictive response information may further include: determining whether the output information received from the client terminal is output information requiring an immediate result; and when it is determined that the output information is output information requiring an immediate result, searching for the previously stored predictive response information for the input information corresponding to user information of the client terminal.

[0031] The transmitting of the predictive response information to the client terminal may include, when the previously stored predictive response information corresponding to the input information does not exist, transmitting actual response information that is a processing result for the input information.

[0032] The method may further include, after the transmitting of the actual response information, storing the actual response information for the response information corresponding to the user information; and generating predictive response information based on the actual response information for the response information to store the generated predictive response information.

[0033] Still yet another aspect of the present invention may provide a computer-readable recording medium storing a program for executing the service providing method.

[0034] According to a service providing method, and a system and apparatus therefore that may provide an immediate result for a user input, when a specific input is received from a user, predictive response information based on the input may be output first, thus rapidly providing a processing result for the user input.

[0035] Furthermore, advantageously, the present invention may accurately provide an immediate result for a user input to the client terminal by establishing statistics of input response for each client terminal and generating predictive response information based on the statistics.

BRIEF DESCRIPTION OF DRAWINGS

[0036] FIG. **1** is a block diagram schematically showing a system for providing an immediate result for a user input according to embodiments of the present invention.

[0037] FIG. **2** is a block diagram showing a main configuration of a client terminal according to embodiments of the present invention.

[0038] FIG. **3** is a block diagram showing a main configuration of a service device according to embodiments of the present invention.

[0039] FIG. **4** is a block diagram showing a detailed structure of a predictive response information database (DB) according to embodiments of the present invention.

[0040] FIG. **5** is a data flowchart showing a method for providing an immediate result for a user input according to a first embodiment of the present invention.

[0041] FIGS. **6***a* and **6***b* are a flowchart showing a detailed operation method by a service device according to a first embodiment of the present invention.

[0042] FIG. **7** is a data flowchart showing a method for providing an immediate result for a user input according to a second embodiment of the present invention.

[0043] FIGS. **8***a* and **8***b* are a flowchart showing a detailed operation method by a service device according to a second embodiment of the present invention.

DETAILED DESCRIPTION

[0044] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings such that a person skilled in the art may easily carry out the embodiments of the present invention. In the following description of an operation principle according to preferred embodiments of the present invention, when the detailed description of the relevant known function or configuration is determined to unnecessarily obscure subject matters of the present invention, the detailed description will be omitted. Therefore, the unnecessary redundant description is avoided for the purpose of obviously describing the subject matters of the present invention without unnecessary obscurity. While the terms "first," "second," etc. may be used herein to describe various elements, these terms are used only to differentiate one element from another, and not to limit the elements.

[0045] In addition, like reference numerals refer to like elements throughout the specification.

[0046] A system for providing an immediate result for a user input according to embodiments of the present invention will be described below.

[0047] FIG. **1** is a block diagram schematically showing a system for providing an immediate result for a user input according to embodiments of the present invention.

[0048] Referring to FIG. **1**, a system **100** for providing an immediate result for a user input of the present invention may include one or more client terminals **10**, a service device **20** for executing an application according to a request from the client terminal **10** and transmitting result information obtained by executing the application to the client terminal **10**, and a communication network **30**.

[0049] The client terminal **10** may access the service device **20** via the communication network **30** to use various functions that are provided by the service device **20**. For example, the client terminal **10** may transmit a request for executing a specific application among a plurality of applications that are

provided by the service device **20** and receive result information obtained by executing the application from the service device **20** to output the result information through a screen thereof.

[0050] In particular, when input information for a specific command is input by a user while the client terminal **10** according to embodiments of the present invention receives the result information obtained by executing the application to output the result information through the screen of the client terminal **10**, the client terminal **10** outputs predictive response information that is previously stored in the client terminal **10** on the screen of the client terminal **10** before transmitting the input information to the service device **20**.

[0051] Here, the predictive response information denotes predictive response information generated based on previous real response information, not an actual processing result for input information.

[0052] For example, an apparatus that provides a general cloud service receives character input information of 'T' from a user, generates a processing result (font information that defines a display of 'T' and the like) for the character input information in an application being executed, and then encodes screen data for the processing result to provide the encoded screen data to the client terminal **10** of the user.

[0053] However, in this case, a time delay necessarily occurs while a user's terminal transmits the input information to the cloud service providing apparatus, receives response information in response to the input information, and outputs the received response information through its own screen.

[0054] To solve this problem, in an embodiment of the present invention, the client terminal **10** has predictive information corresponding to input information that is previously stored therein, and upon receiving the input information, for example, character input information of 'T' from the user, checks information on a position in which the character is input, and then maps and outputs a previous processing result for the character, that is, font information (a font size, a font style, and a font color) that has been already generated to display 'T' and the position information.

[0055] Subsequently, the client terminal **10** transmits the input information input from the user and the predictive response information output corresponding to the input information to the service device **20** that provides a cloud service, and upon receiving predictive response information from the service device **20**, outputs the predictive response information received from the service device **20** in replacement of the output predictive response information. Since the predictive response information stored in the service device **20** may be more accurate predictive response information, when real response information obtained by actually processing the input information is received from the service device **20** after the predictive response information stored in the service device **20** is output, the client terminal **10** outputs the received real response information in replacement of the output predictive response information.

[0056] The service device **20** is a device that provides a cloud-based application to a plurality of client terminals **10**. In other words, when a request for a specific application is received from any one of the client terminals **10**, the service device **20** serves to execute the application and transmit only a result of the execution to the client terminal **10**. More accurately, the service device **20** encodes screen data based on the application execution result frame by frame in real time, and transmits the encoded data to the client terminal **10**.

[0057] To this end, the service device **20** includes a number of applications, and may include an application execution module **22_2** that may execute each application and transmit a result of the execution to the client terminal **10**.

[0058] In particular, when the input information and the predictive response information are received from any one of the client terminals **10**, the service device **20** of the present invention checks whether the previously stored predictive response information corresponding to the input information exists, and when the previously stored predictive response information exists, compares the previously stored predictive response information with the predictive response information received from the client terminal **10**.

[0059] As a result of the comparison, if the predictive response information received from the client terminal **10** is different from the previously stored predictive response information, the service device **20** transmits the previously stored predictive response information to the client terminal **10**.

[0060] Subsequently, the service device **20** processes the input information to generate real response information and then compares the real response information with the predictive response information that was previously transmitted to the client terminal **10** one more time. When the real response information is different, the service device **20** transmits the real response information to the client terminal **10**.

[0061] As such, according to an embodiment of the present invention, the predictive response information previously stored in the client terminal **10** is output first corresponding to the input information that is input from the user while the cloud-based service is used. The client terminal **10** may rapidly output response information in response to the user input, and thus the user may use the cloud service without interruption.

[0062] In embodiments of the present invention, an example has been described in which the service device **20** that provides a cloud service compares the previously stored predictive response information with the predictive response information received from the client terminal **10** and transmits the predictive response information to the client terminal **10** only when the previously stored predictive response information is different and compares the transmitted predictive response information with the real response information and transmits the real response information to the client terminal **10** only when the transmitted predictive response information is different. The present invention is not limited thereto. The service device **20** may transmit the previously stored predictive response information to the client terminal **10** in response to the response information. When the previously stored predictive response information is received, the client terminal **10** may compare the output predictive response information with the predictive response information received from the service device **20**. Only when the output predictive response information is different, the client terminal **10** may output the predictive response information received from service device **20** in replacement of the output predictive response information. It is the same with the real response information.

[0063] A more detailed operating method by the client terminal **10** and the service device **20** of the present invention will be described below. As described above, the client terminal **10** and the service device **20** of the present invention transmit and receive a variety of related information over the communication network **30**. In this case, the communication network **30** may include various forms of communication networks.

[0064] For example, the communication network **30** may include a wireless communication type, such as wireless LAN (WLAN), Wi-Fi, Wibro, Wimax, and high speed downlink packet access (HSDPA), and a wired communication type, such as Ethernet, xDSL (ADSL, VDSL), hybrid fiber coaxial cable (HFC), fiber to the curb (FTTC), and fiber to the home (FTTH).

[0065] In addition to the above communication types, the communication network **30** may also include other communication types that are widely known or will be developed in the future.

[0066] A main configuration and an operation method of the client terminal **10** according to a first embodiment of the present invention will be described below.

[0067] FIG. **2** is a block diagram showing the main configuration of the client terminal according to embodiments of the present invention.

[0068] Referring to FIGS. **1** and **2**, the client terminal **10** according to the first embodiment of the present invention may include a communication unit **11**, an input unit **12**, a control unit **13**, a storage unit **14**, and a display unit **15**.

[0069] For more detailed description of each element, first, the communication unit **11** transmits and receives a variety of information associated with the service device **20** over the communication network **30**. In particular, the communication unit **11** of the present invention may transmit execution request information for a specific application to the service device **20** according to the user's request and receive result information based on the application execution result from the service device **20**. In this case, the communication unit **11** of the present invention may receive screen data in the form of real-time streaming according to the application execution result of the application executed in the service device **20**. In addition, the communication unit **11** of the present invention may transmit input information input from the user and predictive response information corresponding to the input information to the service device **20** and receive the predictive response information and real response information from the service device **20**.

[0070] The input unit **12** receives a variety of information such as number and character information from the user and delivers, to the control unit **13**, a signal that is received in relation to setting of various functions and controlling of functions of the client terminal **10**. In particular, the input unit **12** of the present invention serves to receive execution request information for a specific application among a plurality of applications that are provided by the service device **20** and supports an input of the user for performing various functions and operations that are generated while the application is executed.

[0071] In particular, the input information that is input through the input unit **12** while the application that is requested by the user is executed may be transmitted to the service device **20** through the communication unit **11** under control of the control unit **13**.

[0072] The input unit **12** may include at least one of a keypad and a touchpad, which generates an input signal according to a touch or manipulation of a user. In this case, the input unit **12** may be configured as a touch panel (or touch screen) on the display unit **15** to be described below and perform an input function and also a display function. In addition, the input unit **12** may include one or more of a key input means such as a keyboard or keypad, a touch input means such as a touch sensor or touch pad, and a gesture input means or voice input means including one or more of a gyro sensor, a geomagnetic sensor, an acceleration sensor, a proximity sensor, and a camera. Furthermore, the input unit **12** may include all types of input means that are currently developed or will be developed in the future.

[0073] The control unit **13** performs overall control of the client terminal **10**, and for example, controls a flow of signals for supplying power to and performing a function of each element constituting the client terminal **10**. In this case, the control unit **13** may be a processor device that executes an operating system (OS) and drives each element, for example, a central processing unit (CPU).

[0074] In particular, the control unit according to an embodiment of the present invention supports the overall procedure that includes: requesting the service device **20** for executing a plurality of applications to execute a specific application according to the user's request, receiving a result of executing the application that is received from the service device **20** in real time, and outputting the received result. To this end, the control unit **13** of the present invention may include a stream data decoder **13_1** such as an H.264 decoder. Here, the stream data decoder **13_1** may support receiving screen data based on the application execution result provided by the service device **20** in real time, decoding the received screen data in real time, and outputting the decoded screen data through the display unit **15**.

[0075] In addition, when specific input information is input from the user through the input unit **12**, the control unit **13** checks whether predictive response information **14_1** corresponding to the input information is stored in the storage unit **14** to be described below. As a result of the check, when the predictive response information **14_1** is stored in the storage unit **14**, the control unit **13** performs control such that the predictive response information **14_1** may be output through the display unit **15**.

[0076] Subsequently, the control unit **13** transmits the input information and the predictive response information to the service device **20**, and upon receiving predictive response information for the input information from the service device **20**, outputs the predictive response information received from the service device **20** in replacement of the output predictive response information.

[0077] In this case, the control unit **13** may compare the predictive response information received from the service device **20** with the output predictive response information and output the predictive response information received from the service device **20** in replacement of the output predictive response information when the predictive response information is different.

[0078] Subsequently, when the real response information is received from the service device **20**, the control unit **13** outputs the real response information in replacement of the predictive response information. Thus, a process of outputting the predictive response information that is previously stored in the client terminal **10** and then outputting the predictive response information received from the service device **20** in replacement of the output predictive response information and a process of outputting real response information in replacement of the predictive response information may be achieved in real time.

[0079] In addition, preferably, when the input information is input from the user, the control unit **13** may check whether the input information is input information requiring provision of an immediate result and then output the predictive response

information **14_1** that is previously stored in the storage unit **14** first. This is intended to selectively output the predictive response information because there may be a case in which real response information should be provided slowly, but accurately, rather than a case in which the previously predictive response information is provided immediately in response to the input information.

[0080] For example, it is assumed that the service device **20** services a 3D role playing game application to the client terminal **10**. In a situation in which several characters collect a number of items at the same time, although input information that is input by a user of the client terminal **10** is a collection command for item A, but collection of item B has progressed, the user will not feel inconvenience. Rather, the user will need an immediate processing result when a number of characters compete with each other.

[0081] However, there may be a situation in which the user desires to provide an accurate result rather than the immediate processing result. For example, if the input information of the user is a storage command for storing a current state, but a command other than the storage command is performed, the user may feel inconvenience.

[0082] As such, the control unit **13** may perform control to determine whether the input information input from the user is input information requiring an immediate output and then output the previously stored predictive response information corresponding to the input information only when the immediate output is required.

[0083] In addition, the control unit **13** of the present invention may perform control to generate predictive response information **14_1** on the basis of the real response information received from the service device **20** and store the generated predictive response information **14_1** in the storage unit **14**. In this case, the control unit **13** may generate the predictive response information corresponding to the response information by type of application.

[0084] For example, if a user inputs a character 'T' having font information of Batangche and 12 points through a document editing application and receives a processing result from the service device **20** in response to the input, the control unit **13** may store the processing result corresponding to 'T' as the predictive response information.

[0085] In addition, when the user clicks [Insert] menu through the document editing application, various lower menus such as [Divide Page], [Insert Picture], [Insert Figure], and the like may be displayed. When the processing result is received from the service device **20** corresponding to the input information 'click [Insert] menu,' the control unit **13** may store the processing result, that is, information on the lower menu as the predictive response information.

[0086] In addition, when a user repeatedly inputs a word 'session' through the document editing application, the control unit **13** may perform control to generate 'session' as the predictive response information for input information 'se' corresponding to the document editing application identification information and store 'session' in the storage unit **14**.

[0087] In addition, when the user inputs 'A' while using a game application A, if real response information corresponding to the 'A' is an attack behavior of a player, the control unit **13** may store 'attack in front of a player' as predictive response information for the input information 'A' corresponding to identification information for the game application A, calculate a motion vector on the basis of movement of a player in the last frame received from the service device **20**, and then predict and output movement for the attack behavior.

[0088] In addition, when the real response information is received from the service device **20**, the control unit **13** of the present invention may delete the previously stored predictive response information corresponding to the input information and then store the real response information as the predictive response information.

[0089] As such, when specific input information is input by the user, the client terminal **10** according to an embodiment of the present invention may output the predictive response information previously stored in the client terminal **10** corresponding to the input information before transmitting the specific input information to the service device **20**, thus rapidly providing a result according to the user input.

[0090] The storage unit **14** may temporarily store an application program necessary for functional operations according to an embodiment of the present invention and various data that is generated during execution of the application program. In particular, when application-related information that is requested by the user is received from the service device **20**, the storage unit **14** of the present invention may serve to temporarily store the application-related information. When execution of the application is stopped and related information is not received from the service device **20**, the temporarily stored data may be deleted. In addition, the storage unit **14** according to an embodiment of the present invention may store the predictive response information and the real response information that are received from the service device **20** corresponding to input information of a user that is generated during execution of the application. Furthermore, the storage unit **14** of the present invention may store the predictive response information **14_1** that is generated corresponding to the response information under control of the control unit **13**, corresponding to the application identification information.

[0091] The storage unit **14** may largely include a program area and a data area. The program area may store related information for driving the client terminal **10**, such as an operating system (OS) that boots the client terminal **10**, and the data area is an area for storing data generated according to the use of the client terminal **10** in which information received from the service device **20** may be temporarily stored as described above. The storage unit **14** may include a storage medium such as a flash memory, a hard disk, a multimedia card micro type memory (for example, an SD or XD memory), a random access memory (RAM), and a read only memory (ROM).

[0092] The display unit **15** displays information on a series of operation states and operation results that are generated while the client terminal **10** performs functions. In particular, the display unit **15** of the present invention may receive and display a processing result from an application provided by the service device **20** and may display the received predictive response information and real response information corresponding to input information input by the user through the input unit **12**.

[0093] The display unit **15** may include a liquid crystal display (LCD), a thin film transistor LCD (TFT-LCD), an organic light emitting diode (OLED), a light emitting diode (LED), an active matrix organic LED (AMOLED), a flexible display, and a three-dimensional display.

[0094] As such, the main elements of the client terminal **10** have been described with reference to FIG. **2**. However, not

all of these elements shown in FIG. **2** are essential. The client terminal **10** may be implemented by more or fewer elements than those shown in the drawings.

[0095] That is, the client terminal **10** of the present invention is a device that may request the service device **20** to execute a specific application by various elements, output information received from the service device **20**, and when predictive response information is stored corresponding to the input information input from the user, preferentially output the predictive response information.

[0096] The client terminal **10** of the present invention may be implemented in various forms. For example, the client terminal according to an embodiment of the present invention may be a stationary terminal such as a smart TV, a desktop computer, and the like as well as a mobile terminal such as a smart phone, a tablet PC, a personal digital assistant (PDA), a portable multimedia player (PMP), and an MP3 player.

[0097] A main configuration and an operation method of the service device **20** according to a first embodiment of the present invention will be described below.

[0098] FIG. **3** is a block diagram showing a main configuration of a service device according to embodiments of the present invention.

[0099] Referring to FIGS. **1** and **3**, the service device **20** according to the first embodiment of the present invention may include a device communication unit **21**, a device control unit **22**, and a device storage unit **23**.

[0100] First, the device communication unit **21** transmits and receives related information to and from a number of client terminals **10** over the communication network **30**. In particular, the device communication unit **21** receives execution request information for a specific application from any one of the client terminals **10** and transmits result information obtained by executing the application to the client terminal **10**. In addition, the device communication unit **21** receives input information and predictive response information from the client terminal **10**, and transmits the predictive response information or real response information corresponding thereto to the client terminal **10**.

[0101] The device control unit **22** controls an overall operation of the service device **20** of the present invention. In particular, when the execution request information for the specific application is received from any one of the client terminals **10**, the device control unit **22** of the present invention transmits result information based on the application execution result to the client terminal **10** in real time.

[0102] In this case, the device control unit **22** encodes screen data based on the application execution result frame by frame in real time, and delivers the encoded data to the client terminal **10** through the device communication unit **21**.

[0103] In addition, preferably, the device control unit **22** may receive user identification information from the client terminal **10** and perform user authentication on the basis of the user identification information. Thus, the device control unit **22** checks whether the client terminal **10** that has transmitted the execution request information for the application is a client terminal **10** of a user who has subscribed to a service provided by the service device **20** and then provides an application requested by the client terminal **10** only when the client terminal **10** is a client terminal of the subscribed user.

[0104] Here, an application that may be used by the client terminal **10** may include various types of applications. For example, a game-related application such as a 2D game and a 3D game, a document editing application such as a word processor, and the like may be used as the various types of applications.

[0105] The device control unit **22** performs user authentication on the client terminal **10** first and executes an application requested by the client terminal **10** when the authentication is successful. For example, the device control unit **22** executes a 3D role playing game application, encodes a screen frame being result information thereof in real time, and transmits the encoded screen frame to the client terminal **10**.

[0106] Subsequently, when the input information and predictive response information are received from the client terminal **10** while the result information obtained by the execution is transmitted to the client terminal **10** in real time, the device control unit **22** searches the device storage unit **23** to be described below for the previously stored predictive response information corresponding to the input information.

[0107] Then, when the predictive response information previously stored in the device storage unit **23** corresponding to the input information exists, the device control unit **22** compares the predictive response information received from the client terminal **10** with the previously stored predictive response information and transmits the predictive response information previously stored in the device storage unit **23** to the client terminal **10** when the predictive response information is different, as a result of the comparison.

[0108] Subsequently, after transmitting the previously stored predictive response information to the client terminal **10** corresponding to the input information, the device control unit **22** generates real response information for the input information. Here, the device control unit **22** may store the predictive response information corresponding to the input information based on user information and may transmit the predictive response information to the client terminal **10** on the basis of user information of the client terminal **10**.

[0109] To provide a description through an example of a document editing application, when the first client terminal and the second client terminal are using the document editing application that is executed by the service device **20**, input information input by the first client terminal may be different from input information input by the second client terminal.

[0110] For example, if a user of the first client terminal is a user having a great interest in brain structure and a user of the second client terminal is a user having a great interest in communication technologies, the input information transmitted from the first client terminal may be 'brain,' 'ischemic,' 'stroke,' 'intracerebral,' 'hemorrhage' and the like. The input information transmitted from the second client terminal may be 'broadband,' 'internet,' 'session,' 'intranet,' 'http' and the like.

[0111] As such, in a case of analyzing the predictive response information corresponding to the input information received from the client terminal **10** on the basis of user information, when the input information received from the client terminal **10** is 'intra' and the predictive response information is 'intractable,' first, the device control unit **22** checks user information of the client terminal **10**.

[0112] When it is checked that the user of the client terminal **10** is a user who inputs 'intranet' more frequently than 'intracerebral,' the device control unit **22** selects 'intranet' as the predictive response information for the input information.

[0113] Subsequently, the device control unit **22** compares 'intractable' that is the predictive response information received from the client terminal **10** with 'intranet' that is the

selected predictive response information and transmits 'intranet' that is the predictive response information selected by the device control unit **22** to the client terminal **10** because 'intractable' and 'intranet' are different.

[0114] Upon receiving this, the client terminal **10** may select or immediately output 'intranet.'

[0115] In this case, when the predictive response information for the previously stored input information corresponding to the user information does not exist, the device control unit **22** may check and transmit general basic predictive response information to the client terminal **10**.

[0116] Subsequently, after transmitting the predictive response information to the client terminal **10**, the device control unit **22** may perform control to process an operation corresponding to the input information received from the client terminal **10**, compare the real response information with the predictive response information previously transmitted to the client terminal **10**, and transmit the real response information to the client terminal **10** when the real response information and the predictive response information are different.

[0117] To perform such an operation, the device control unit **22** of the present invention may include a user management module **22_1** that performs user authentication of the client terminal **10** when application execution request information is received from the client terminal **10**, calculates statistics of input information received from the client terminal **10**, and controls, for example, analysis of the calculated statistics and an application execution module **22_2** that controls application execution according to a request of the client terminal **10**, and when input information is received from the client terminal **10** while the application is executed, transmits predictive response information corresponding to the input information to the client terminal **10**, generates real response information to compare the real response information with the predictive response information, and when the real response information and the predictive response information are different, controls, for example, transmission of the real response information.

[0118] As described above, the device storage unit **23** stores a variety of information for providing an immediate result for a user input of the present invention. Accordingly, the device storage unit **23** may include a user information database (DB) **23_1** that stores user information for performing user authentication, an application DB **23_2** that stores and manages one or more applications, and a predictive response information DB **23_3** that stores predictive response information corresponding to input information.

[0119] Here, as described above, the predictive response information DB **23_3** contains predictive response information that may have been calculated based on statistics of the real response information that is an actual processing result for past input information. In this case, as described in FIG. **4**, basic predictive response information **23_3***a* calculated based on the statistics of the real response information for the input information and user information-based predictive response information **23_3***b* may be stored regardless of users.

[0120] The main configuration and the operation method of the service device **20** according to a first embodiment of the present invention have been described above.

[0121] The service device **20** according to a first embodiment of the present invention has been described as operating in a cloud scheme, but may be easily applied to a general server-based computing scheme.

[0122] A method for providing an immediate result for a user input according to a first embodiment of the present invention will be described below.

[0123] FIG. **5** is a data flowchart showing a method for providing an immediate result for a user input according to a first embodiment of the present invention.

[0124] Referring to FIG. **5**, first, the client terminal **10** requests the service device **20** that provides a cloud-based application service to execute a specific application (S**101**). When the request is received, the service device **20** executes a corresponding application according to the request of the client terminal **10** (S**103**) and transmits a result of the execution to the client terminal **10** in real time (S**105**).

[0125] In this case, the client terminal **10** determines whether the input information is input from the user (S**107**) and checks whether previously stored predictive response information corresponding to the input information exists when the input information is input by the user (S**109**).

[0126] When it is checked that the previously stored predictive response information does not exist, the client terminal **10** transmits the input information to the service device **20** (S**111**), and when the previously stored predictive response information exists, the client terminal **10** outputs the predictive response information (S**113**).

[0127] Subsequently, the client terminal **10** transmits the input information and the predictive response information to the service device **20** (S**115**), and the service device **20** checks whether the previously stored predictive response information corresponding to the input information exists (S**117**).

[0128] When it is checked that the previously stored predictive response information exists, the service device **20** compares the predictive response information received from the client terminal **10** with the previously stored predictive response information (S**119**) and transmits the previously stored predictive response information to the client terminal **10** when the predictive response information is different (S**121**).

[0129] Subsequently, the client terminal **10** outputs the predictive response information received from the service device **20** in replacement of the previously output predictive response information (S**123**).

[0130] Subsequently, the service device **20** actually processes the input information received from the client terminal **10** (S**125**) to generate real response information (S**127**). Next, the service device **20** compares the real response information with the predictive response information previously transmitted to the client terminal **10** (S**129**) and transmits the real response information to the client terminal **10** when the predictive response information and the real response information are different (S**131**).

[0131] When the real response information is received, the client terminal **10** may display the real response information in replacement of the predictive response information (S**133**). Although not shown in the drawings, the client terminal **10** may generate and store predictive response information corresponding to the response information on the basis of the real response information. In this case, existing predictive response information may be deleted.

[0132] Here, upon generating the predictive response information on the basis of the real response information, the client terminal **10** may delete unnecessary information and then generate the predictive response information using only necessary information. For example, when the input information input from the user is 'click while a mouse pointer is posi-

tioned on [Insert] menu' on the document editing application, and the real response information thereof is information on a screen in a state in which a lower menu is dropped down, the client terminal **10** may delete information on a document editing application screen that is a background and then store as the predictive response information only a state in which a lower menu is dropped down.

[0133] Since the above-described process may be performed in real time, the user may use an application provided by the service device **20** without particular perception and receive an immediate result for a user input. In addition, in step S**117**, the service device **20** may perform user authentication on the client terminal **10** and check whether the previously stored predictive response information corresponding to the user information exists.

[0134] An operation method of the above-described service device **20** will be described in detail below.

[0135] FIGS. **6***a* and **6***b* are a flowchart showing a detailed operation method by a service device according to a first embodiment of the present invention.

[0136] Referring to FIGS. **1**, **6***a* and **6***b*, the service device **20** receives a request to execute a specific application from the client terminal **10** (S**201**) and performs user authentication based on the user information of the client terminal **10** that is received together with the request (S**203**).

[0137] If the user authentication is successful, the service device **20** executes the application (S**205**) and transmits result information obtained by the execution to the client terminal **10** in real time (S**207**). Subsequently, when input information and predictive response information are received from the client terminal (S**209**), the service device **20** determines whether previously stored predictive response information exists (S**211**) and compares the received predictive response information with the previously stored predictive response information when the previously stored predictive response information exists (S**213**).

[0138] In step S**211**, the service device **20** may determine whether the previously stored predictive response information corresponding to the user information exists and also determine whether predictive response information that is basically generated exists when the previously stored predictive response information corresponding to the user information does not exist.

[0139] In addition, before determining whether the previously stored predictive response information exists, the service device **20** may determine whether the input information is input information requiring an immediate output and then determine whether the previously stored predictive response information exists only when the input information is input information requiring an immediate output.

[0140] After step S**213**, the service device **20** actually processes an operation for the input information to generate real response information (S**219**) and compares the generated real response information with the predictive response information that was previously transmitted to the client terminal **10** (S**221**).

[0141] As a result of the comparison, when the previously transmitted predictive response information and the real response information are different, the service device **20** transmits the real response information to the client terminal **10** (S**223**).

[0142] As such, the present invention may provide an immediate result for a user input by first transmitting the previously stored predictive response information to the client terminal **10** corresponding to the input information received from the client terminal **10**.

[0143] In addition, the present invention may also enhance reliability upon transmitting the predictive response information by transmitting the predictive response information to the client terminal **10** only when the input information requires an immediate output for the user input, processing the input information after transmitting the predictive response information, and when the real response information and the previously transmitted predictive response information are different, transmitting the real response information.

[0144] The method of providing an immediate result for a user input according to a first embodiment of the present invention has been described above.

[0145] Next, a configuration and method for providing an immediate result for a user input according to a second embodiment of the present invention will be described in detail with reference to the accompanying drawings.

[0146] First a main configuration and an operation method of the client terminal **10** according to a second embodiment of the present invention will be described with reference to FIG. **2**.

[0147] Referring to FIG. **2**, the client terminal **10** according to a second embodiment of the present invention may include a communication unit **11**, an input unit **12**, a control unit **13**, a storage unit **14**, and a display unit **15**.

[0148] For detailed description of each element, first, the communication unit **11** transmits and receives a variety of related information with the service device **20** over the communication network **30**. In particular, the communication unit **11** of the present invention may transmit execution request information for a specific application to the service device **20** according to a user's request and receive result information according to the application execution result from the service device **20**.

[0149] In this case, the communication unit **11** of the present invention may receive screen data in the form of real-time streaming according to a result of executing an application executed by the service device **20**. In addition, the communication unit **11** of the present invention may transmit the input information input from the user to the service device **20**, receive the predictive response information from the service device **20**, and then receive the real response information from the service device **20**.

[0150] The input unit **12** receives a variety of information such as number and character information input from the user and delivers, to the control unit **13**, a signal that is input in relation to setting of various functions and controlling of functions of the client terminal **10**. In particular, the input unit **12** of the present invention serves to receive execution request information for a specific application among a number of applications and supports the user input for performing a variety of functions and operations that are generated while the application is executed.

[0151] In particular, the input information input through the input unit **12** while an application requested by the user is executed may be transmitted to the service device **20** through the communication unit **11** under control of the control unit **13**.

[0152] The input unit **12** may include at least one of a keypad and a touchpad, which generates an input signal according to a touch or manipulation of a user. In this case, the input unit **12** may be configured as a touch panel (or touch screen) on the display unit **15** to be described below and

perform an input function and also a display function. In addition, the input unit **12** may include one or more of a key input means such as a keyboard or keypad, a touch input means such as a touch sensor or touch pad, and a gesture input means or voice input means including one or more of a gyro sensor, a geomagnetic sensor, an acceleration sensor, a proximity sensor, and a camera. Furthermore, the input unit **12** may include all types of input means that are currently developed or will be developed in the future.

[0153] The control unit **13** performs overall control of the client terminal **10**, and for example, controls a flow of signals for supplying power to and performing a function of each element that constitutes the client terminal **10**. In this case, the control unit **13** may be a processing device, for example, a central processing unit (CPU) for driving an operating system (OS) and each element.

[0154] In particular, the control unit **13** according to an embodiment of the present invention supports an overall procedure that includes: requesting the service device **20** for executing a number of applications to execute a specific application according to a user's request, receiving a result of executing the application that is received from the service device **20** in real time, and outputting the received result. To this end, the control unit **13** of the present invention may include a stream data decoder **13_1** such as a H.264 decoder. Here, the stream data decoder **13_1** may support receiving screen data based on the application execution result provided by the service device **20** in real time, decoding the received screen data in real time, and outputting the decoded screen data through the display unit **15**.

[0155] In addition, the control unit **13** may perform control to display the predictive response information through the display unit **15** when the predictive response information is received from the service device **20** after the input information input from the user is transmitted to the service device **20**.

[0156] In addition, when the real response information is received from the service device **20** after the control unit **13** displays the predictive response information received from the service device **20**, the control unit **13** may output the real response information in replacement of the predictive response information. When the real response information is received after the client terminal **10** outputs the predictive response information, the above-described process of outputting the real response information instead is performed in real time.

[0157] The storage unit **14** may temporarily store an application program necessary for functional operations according to an embodiment of the present invention and various data that is generated during execution of the application program. In particular, when application-related information that is requested by the user is received from the service device **20**, the storage unit **14** of the present invention may serve to temporarily store the application-related information. When execution of the application is stopped and related information is not received from the service device **20**, the temporarily stored data may be deleted. In addition, the storage unit **14** may temporarily store the predictive response information and the real response information that are received corresponding to the input information from the service device **20**. The above-description is merely illustrative, and related data may be permanently stored in the storage unit **14**.

[0158] The storage unit **14** may largely include a program area and a data area. The program area may store related information for driving the client terminal **10**, such as an operating system (OS) that boots the client terminal **10**, and the data area is an area for storing data generated according to the use of the client terminal **10** in which information received from the service device **20** may be temporarily stored as described above. The storage unit **14** may include a storage medium such as a flash memory, a hard disk, a multimedia card micro type memory (for example, an SD or XD memory), a random access memory (RAM), and a read only memory (ROM).

[0159] The display unit **15** displays information on a series of operation states and operation results that are generated while the client terminal **10** performs functions. In particular, the display unit **15** of the present invention may receive and display a processing result from an application provided by the service device **20** and may display the received predictive response information and real response information corresponding to input information input by the user through the input unit **12**.

[0160] The display unit **15** may include a liquid crystal display (LCD), a thin film transistor LCD (TFT-LCD), an organic light emitting diode (OLED), a light emitting diode (LED), an active matrix organic LED (AMOLED), a flexible display, and a three-dimensional display.

[0161] As such, the main elements of the client terminal **10** have been described with reference to FIG. **2**. However, not all of these elements shown in FIG. **2** are essential. The client terminal **10** may be implemented by more or fewer elements than those shown in the drawings.

[0162] That is, the client terminal **10** of the present invention is a device that may request the service device **20** to execute a specific application by various elements, output information received from the service device **20**, transmit the input information input from the user to the service device **20**, and then receive and output any one of the predictive response information and the real response information corresponding thereto.

[0163] The client terminal **10** according to an embodiment of the present invention may be implemented in various forms. For example, the client terminal according to an embodiment of the present invention may be a stationary terminal such as a smart TV, a desktop computer, and the like as well as a mobile terminal such as a smart phone, a tablet PC, a personal digital assistant (PDA), a portable multimedia player (PMP), and an MP3 player.

[0164] A main configuration and an operation method of the service device **20** according to a second embodiment of the present invention will be described below with reference to FIG. **3**.

[0165] Referring to FIGS. **1** and **3**, the service device **20** according to the second embodiment of the present invention may include a device communication unit **21**, a device control unit **22**, and a device storage unit **23**.

[0166] First, the device communication unit **21** transmits and receives related information to and from a number of client terminals **10** over the communication network **30**. In particular, the device communication unit **21** receives execution request information for a specific application from any one of the client terminals **10** and transmits result information obtained by executing the application to the client terminal **10**. In addition, the device communication unit **21** receives input information from the client terminal **10** and transmits the predictive response information or real response information corresponding thereto to the client terminal **10**.

[0167] The device control unit **22** controls an overall operation of the service device **20** of the present invention. In particular, when the execution request information for the specific application is received from any one of the client terminals **10**, the device control unit **22** of the present invention transmits result information based on the application execution result to the client terminal **10**.

[0168] In this case, the device control unit **22** encodes screen data based on the application execution result frame by frame in real time, and delivers the encoded data to the client terminal **10** through the device communication unit **21**.

[0169] In addition, preferably, the device control unit **22** may receive user identification information from the client terminal **10** and perform user authentication on the basis of the user identification information. Thus, the device control unit **22** checks whether the client terminal **10** that has transmitted the execution request information for the application is a client terminal **10** of a user who has subscribed to a service provided by the service device **20** and then provides an application requested by the client terminal **10** only when the client terminal **10** is a client terminal of the subscribed user.

[0170] Here, an application that may be used by the client terminal **10** may include various types of applications. For example, a game-related application such as a 2D game and a 3D game, a document editing application such as a word processor, and the like may be used as the various types of applications.

[0171] As such, the device control unit **22** performs user authentication on the client terminal **10** first and executes an application requested by the client terminal **10** when the authentication is successful. For example, the device control unit **22** may execute a 3D role playing game application, encode a screen frame being result information thereof in real time, and transmit the encoded screen frame to the client terminal **10**.

[0172] Subsequently, when the input information is received from the client terminal **10** while the result information obtained by the execution is transmitted to the client terminal **10** in real time, the device control unit **22** searches the device storage unit **23** to be described below for the previously stored predictive response information corresponding to the input information.

[0173] In this case, preferably, the device control unit **22** may search for the previously stored predictive response information after checking whether the input information received from the client terminal **10** is input information requiring provision of an immediate result.

[0174] This is intended to selectively transmit the predictive response information because there may be a case in which real response information should be provided accurately, but slowly, rather than a case in which the previously predictive response information corresponding to the input information received from the client terminal **10** is provided immediately.

[0175] For example, it is assumed that the service device **20** services a 3D role playing game application to the client terminal **10**. In a situation in which several characters collect a number of items at the same time, although input information that is received from the client terminal **10** is a collection command for item A, but the service device **20** transmits a processing result for collection of item B to the client terminal **10**, the user will not feel inconvenience. Rather, the user will need an immediate processing result when a number of characters compete with each other.

[0176] However, there may be a situation in which the user desires to provide an accurate result rather than the immediate processing result. For example, if the input information of the user is a storage command for storing a current state, but a command other than the storage command is performed, the user may feel inconvenience.

[0177] As such, the device control unit **22** of the service device **20** may determine whether the input information received from the client terminal **10** is input information requiring an immediate output and then provide the previously stored predictive response information to the client terminal **10** corresponding to the input information only when the immediate output is required.

[0178] Subsequently, the device control unit **22** transmits the previously stored predictive response information to the client terminal **10** corresponding to the input information and then generates real response information for the input information. Here, the device control unit **22** may store the predictive response information corresponding to the input information based on user information and may transmit the predictive response information to the client terminal **10** on the basis of user information of the client terminal **10**.

[0179] To provide a description through an example of a document editing application, when the first client terminal and the second client terminal are using the document editing application that is executed by the service device **20**, input information input by the first client terminal may be different from input information input by the second client terminal.

[0180] For example, if a user of the first client terminal is a user having a great interest in brain structure and a user of the second client terminal is a user having a great interest in communication technologies, the input information transmitted from the first client terminal may be 'brain,' 'ischemic,' 'stroke,' 'intracerebral,' 'hemorrhage' and the like. The input information transmitted from the second client terminal may be 'broadband,' 'internet,' 'session,' 'intranet,' 'http' and the like.

[0181] As such, in a case of analyzing the predictive response information corresponding to the input information received from the client terminal **10** on the basis of user information, when the input information received from the client terminal **10** is 'intra,' the device control unit **22** checks user information of the client terminal **10**.

[0182] When it is checked that the user of the client terminal **10** is a user who inputs 'intranet' more frequently than 'intracerebral,' the device control unit **22** transmits 'intranet' to the client terminal **10** as the predictive response information for the input information. When 'intranet' is received, the client terminal **10** may immediately output 'intranet' on the document editing application.

[0183] In this case, when the predictive response information for the previously stored input information corresponding to the user information does not exist, the device control unit **22** may check and transmit general basic predictive response information to the client terminal **10**.

[0184] In addition, the control unit **22** of the present invention may perform control to generate predictive response information on the basis of real response information that is actually processed corresponding to the response information and then store the generated predictive response information in the storage unit **23**.

[0185] In this case, the control unit **22** may generate the predictive response information corresponding to the response information by user information and application type.

[0186] For example, if a user inputs a character 'T' having font information of Batangche and 12 points through a document editing application, the device control unit **22** may store the processing result (a screen in which a character 'T' of Batangche and 12 points is input) corresponding to 'T' as the predictive response information.

[0187] In addition, when the user clicks [Insert] menu through the document editing application, various lower menus such as [Divide Page], [Insert Picture], [Insert Figure], and the like may be displayed. The device control unit **22** may store, as the predictive response information, the processing result, that is, information on a screen in a state in which a lower menu is dropped down corresponding to the input information of 'click while a mouse pointer is positioned on [Insert] menu.' In addition, when a user A repeatedly inputs a word 'session' through the document editing application, the control unit **22** may perform control to generate 'session' as the predictive response information for input information 'se' and store the 'session' in the device storage unit **23**.

[0188] In addition, when the user inputs 'A' while using a game application A, if real response information corresponding to the 'A' is an attack behavior of a player, the device control unit **22** may store 'attack in front of a player' as predictive response information for the input information 'A' corresponding to identification information for the game application A, predict movement for the attack behavior on the basis of movement of a player in the last frame of the game application A transmitted to the client terminal **10**, and then transmit the movement to the client terminal **10**.

[0189] Thus, the user of the client terminal **10** may rapidly receive a processing result corresponding to his/her input information and check the processing result.

[0190] In addition, after transmitting the predictive response information to the client terminal **10**, the device control unit **22** performs control to process an operation corresponding to the input information received from the client terminal **10**, compares the real response information with the predictive response information previously transmitted to the client terminal **10**, and transmits the real response information to the client terminal **10** when the real response information and the predictive response information are different.

[0191] As such, the service device **20** according to a second embodiment of the present invention may provide an immediate result for a user input by first transmitting the previously stored predictive response information to the client terminal **10** corresponding to the input information received from the client terminal **10**.

[0192] Moreover, the present invention may also enhance reliability upon transmitting the predictive response information by transmitting the predictive response information to the client terminal **10** only when the input information requires an immediate output for the user input, processing the input information after transmitting the predictive response information, and when the real response information and the previously transmitted predictive response information are different, transmitting the real response information.

[0193] To perform such an operation, the device control unit **22** according to a second embodiment of the present invention may include a user management module **22_1** that performs user authentication of the client terminal **10** when application execution request information is received from the client terminal **10**, calculates statistics of input information received from the client terminal **10**, and controls, for example, analysis of the calculated statistics and an application execution module **22_2** that controls application execution according to a request of the client terminal **10**, and when input information is received from the client terminal **10** while the application is executed, transmits predictive response information corresponding to the input information to the client terminal **10**, generates real response information to compare the real response information with the predictive response information, and when the real response information and the predictive response information are different, controls, for example, transmission of the real response information.

[0194] As described above, the device storage unit **23** stores a variety of information for providing an immediate result for a user input of the present invention. Accordingly, the device storage unit **23** may include a user information database (DB) **23_1** that stores user information for performing user authentication, an application DB **23_2** that stores and manages one or more applications, and a predictive response information DB **23_3** that stores predictive response information corresponding to input information.

[0195] Here, as described above, the predictive response information DB **23_3** contains predictive response information that may have been calculated based on statistics of the real response information that is an actual processing result for past input information. In this case, as described in FIG. **4**, basic predictive response information **23_3***a* calculated based on the statistics of the real response information for the input information and user information-based predictive response information **23_3***b* may be stored regardless of users.

[0196] The main configuration and the operation method of the service device **20** according to a second embodiment of the present invention have been described above.

[0197] The service device **20** according to a second embodiment of the present invention has been described as operating in a cloud scheme, but may be easily applied to a general server-based computing scheme.

[0198] A method for providing an immediate result for a user input according to a second embodiment of the present invention will be described below.

[0199] FIG. **7** is a data flowchart showing a method for providing an immediate result for a user input according to a second embodiment of the present invention.

[0200] Referring to FIG. **7**, first, the client terminal **10** requests the service device **20** that provides a cloud-based application service to execute a specific application (S**301**). When the request is received, the service device **20** executes a corresponding application according to the request of the client terminal **10** (S**303**) and transmits a result of the execution to the client terminal **10** in real time (S**305**).

[0201] In this case, when the client terminal **10** transmits specific input information for using an application to the service device **20** (S**307**), the service device **20** searches for the previously stored predictive response information corresponding to the input information (S**309**).

[0202] As a result of the search, when the previously stored predictive response information exists, the service device **20** transmits the predictive response information to the client terminal **10** (S**311**) and the client terminal **10** outputs the predictive response information (S**313**).

[0203] Subsequently, the service device **20** actually processes the input information received from the client terminal **10** (S**315**) to generate real response information (S**317**). Next, the service device **20** compares the real response information with the predictive response information previously transmitted to the client terminal **10** (S**319**) and transmits the real response information to the client terminal **10** when the predictive response information and the real response information are different (S**321**).

[0204] When the real response information is received, the client terminal **10** may display the real response information in replacement of the predictive response information (S**323**). The service device **20** may store the real response information transmitted to the client terminal **10** corresponding to the user information and then generate and store the predictive response information based on the real response information (S**325**).

[0205] Here, upon generating the predictive response information on the basis of the real response information, the service device **20** may delete unnecessary information and then generate the predictive response information using only necessary information. For example, when the input information received from the client terminal **10** is 'click while a mouse pointer is positioned on [Insert] menu' on the document editing application, and the real response information thereof is information on a screen in a state in which a lower menu is dropped down, the service device **20** may delete information on a document editing application screen that is a background and then store as the predictive response information only a state in which a lower menu is dropped down.

[0206] Since the above-described process may be performed in real time, the user may use an application provided by the service device **20** without particular perception and receive an immediate result for a user input.

[0207] An operation method of the above-described service device **20** will be described in detail below.

[0208] FIGS. **8***a* and **8***b* are a flowchart showing a detailed operation method by a service device according to a second embodiment of the present invention.

[0209] Referring to FIGS. **1**, **8***a* and **8***b*, when the service device **20** receives a request to execute a specific application from the client terminal **10** (S**401**), the service device **20** performs user authentication based on the user information of the client terminal **10** that is received together with the request (S**403**).

[0210] If the user authentication is successful, the service device **20** executes the application (S**405**) and transmits result information obtained by the execution to the client terminal **10** in real time (S**407**). Subsequently, when input information is received from the client terminal (S**409**), the service device **20** determines whether the input information is input information requiring an immediate output (S**411**).

[0211] When the input information is input information requiring an immediate output, the service device **20** determines whether the previously stored predictive response information corresponding to the input information exists in order to transmit the predictive response information for the input information to the client terminal **10** (S**413**).

[0212] As a result of the determination, when the previously stored predictive response information exists, first, the service device **20** transmits the predictive response information to the client terminal **10** (S**415**). For example, when the input information received from the client terminal **10** is 'click while a mouse pointer is positioned on [Insert] menu' while a processing result obtained by executing the document editing application is provided to the client terminal **10**, the service device **20** transmits the predictive response information corresponding to the input information, that is, information on a screen in a state in which a lower menu is dropped down to the client terminal **10**.

[0213] As another example, if the input information received from the client terminal **10** is 'se' while a processing result obtained by executing the document editing application is provided to the client terminal **10**, the service device **20** transmits previously stored predictive response information for 'se,' that is, 'session' to the client terminal **10** corresponding to user information of the client terminal **10**.

[0214] After transmitting the predictive response information to the client terminal **10**, the service device **20** actually processes an operation for the input information to generate real response information (S**419**) and compares the generated real response information with the predictive response information that was previously transmitted to the client terminal **10** (S**421**).

[0215] As a result of the comparison, when the previously transmitted predictive response information and the real response information are different, the service device **20** transmits the real response information to the client terminal **10** (S**423**).

[0216] Subsequently, the service device **20** generates predictive response information on the basis of the real response information provided to the client terminal **10** and stores the generated predictive response information (S**425**).

[0217] As such, the present invention may provide an immediate result for a user input by first transmitting the previously stored predictive response information to the client terminal **10** corresponding to the input information received from the client terminal **10**.

[0218] In addition, the present invention may also enhance reliability upon transmitting the predictive response information by transmitting the predictive response information to the client terminal **10** only when the input information requires an immediate output for the user input, processing the input information after transmitting the predictive response information, and when the real response information and the previously transmitted predictive response information are different, transmitting the real response information.

[0219] The method of providing an immediate result for a user input according to a second embodiment of the present invention has been described above.

[0220] The method for providing an immediate result for a user input according to an embodiment of the present invention can also be implemented as computer-readable codes on a computer-readable recording medium. The computer-readable recording medium may include a program command, a data file, a data structure, and the like, which are used alone or in combination thereof, and includes all kinds of recording devices configured to store data that may be read by a computer system. Examples of the computer-readable recording medium include magnetic media such as a hard disk, a floppy disk, and a magnetic tape, optical media such as a compact disk read only memory (CD-ROM) and a digital video disk (DVD), magneto-optical media such as a floptical disk, and a hardware device specially configured to store and perform the program instruction, such as a read only memory (ROM), a random access memory (RAM), a flash memory, etc.

[0221] The computer-readable recording medium may be distributed to computer systems connected over a network.

Thus the computer-readable code may be stored and executed in a distributed fashion. Also, functional programs, codes, and code segments for accomplishing the present invention can be easily construed by programmers skilled in the art to which the present invention pertains.

[0222] While the invention has been shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that such description is for illustrative purposes only and various changes and modifications may be made without departing from the spirit and scope of the invention as defined by the appended claims. Therefore, all such changes and modifications, and the equivalents thereof, will be considered to be within the spirit and scope of the invention.

[0223] While the present invention has been described with reference to exemplary embodiments, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the present invention. For example, the predictive response information for the input information of the client terminal may be generated based on various prediction techniques. The predictive response information may be generated based on statistics of past real response information or through a motion estimation scheme.

[0224] A computer program (also known as a program, software, software application, script, or code) can be written in any form of programming language, including compiled or interpreted languages, or declarative or procedural languages, and it can be deployed in any form, including as a stand-alone program or as a module, component, subroutine, or other unit suitable for use in a computing environment. The computer program does not necessarily correspond to a file of a file system. The program may be stored in a single file provided to a requested program, in interoperating multiple files (for example, files each storing some of one or more modules, lower level programs, or codes) or in a part of a file containing other programs or data (for example, one or more scripts stored in a markup language document). The computer program may be located at a single site or over a plurality of sites in a distributed fashion and developed so as to be executed on multiple computers connected to one another through a communication network or on a single computer.

[0225] The specification includes details of a number of specific implements, but it should be understood that the details do not limit the present invention or what is claimable in the specification but rather describe features of the specific embodiment. Features described in the specification in the context of individual embodiments may be implemented as a combination in a single embodiment. In contrast, features described in the specification in the context of a single embodiment may be implemented in multiple embodiments individually or in an appropriate sub-combination. Furthermore, the features may operate in a certain combination and may be initially described as claimed in the combination, but one or more features may be excluded from the claimed combination in some cases, and the claimed combination may be changed into a sub-combination or a modification of a sub-combination.

[0226] Similarly, even though operations are described in a certain order on the drawings, it should not be understood that the operations be executed in the certain order or in a sequential order to obtain desired results, or that all of the operations be executed. In addition, it should not be understood that the separation of various system components in the above described embodiments is required in all embodiments, and it should be understood that the above described program components and systems may be incorporated into a single software product or may be packaged in multiple software products.

[0227] The present invention relates to a method for providing a processing result based on a user input, and more particularly, to a service providing method, and a system and apparatus therefore, which are capable of first outputting predictive response information that is previously stored in a client terminal before transmitting a specific input to a service device when the specific input is input by a user, thus rapidly providing an immediate result for a user input.

[0228] According to a service providing method, and a system and apparatus therefore that may provide an immediate result for a user input, when a specific input is received from a user, predictive response information based on the input may be first output, thus rapidly providing a processing result for the user input and thereby making a contribution to a broader use of cloud-based service.

[0229] Moreover, the present invention has industrial applicability in that it is obvious to have sufficient possibility of marketability and also actually be carried out.

[0230] In this specification, exemplary embodiments of the present invention have been classified into the first, second and third exemplary embodiments and described for conciseness. However, respective steps or functions of an exemplary embodiment may be combined with those of another exemplary embodiment to implement still another exemplary embodiment of the present invention.

What is claimed is:

1. A method of providing a service, the method comprising:

receiving input information and predictive response information from any one client terminal;

comparing the predictive response information received from the client terminal with previously stored predictive response information corresponding to the input information; and

when the predictive response information is different, as a result of the comparison, transmitting the previously stored predictive response information to the client terminal.

2. The method of claim **1**, further comprising, before the receiving:

executing a specific application according to a request of the client terminal; and

transmitting result information obtained by executing the application to the client terminal in real time.

3. The method of claim **1**, wherein the comparing comprises:

checking whether user information-based predictive response information that is generated corresponding to the client terminal exists; and

when it is checked that the user information-based predictive response information generated corresponding to the client terminal exists, comparing the previously stored user information-based predictive response information with the predictive response information received from the client terminal, and

wherein the transmitting comprises, when the previously stored user information-based predictive response information and the received predictive response information

are different, transmitting the previously stored user information-predictive response information to the client terminal.

4. The method of claim **1**, further comprising, after the transmitting to the client terminal:

generating real response information that is a processing result for the input information; and

comparing the real response information with the predictive response information to transmit the real response information to the client terminal when the real response information and the predictive response information are different.

5. A method of providing a service, the method comprising:

receiving input information from any one client terminal;

transmitting previously stored response information to the client terminal corresponding to the input information;

generating real response information that is a processing result for the input information; and

comparing the real response information with the predictive response information to transmit the real response information to the client terminal when the real response information and the predictive response information are different.

6. The method of claim **5**, further comprising, before the receiving of the input information:

executing a specific application according to a request of the client terminal; and

transmitting result information obtained by executing the application to the client terminal in real time.

7. The method of claim **5**, wherein the transmitting of the predictive response information to the client terminal further comprises:

searching for previously stored predictive response information for the input information corresponding to user information of the client terminal; and

transmitting the searched predictive response information to the client terminal.

8. The method of claim **7**, wherein the searching for the predictive response information further comprises:

determining whether the output information received from the client terminal is output information requiring an immediate result; and

when it is determined that the output information is output information requiring an immediate result, searching for the previously stored predictive response information for the input information corresponding to user information of the client terminal.

9. The method of claim **5**, wherein the transmitting of the predictive response information to the client terminal comprises, when the previously stored predictive response information corresponding to the input information does not exist, transmitting real response information that is a processing result for the input information.

10. The method of claim **5**, further comprising, after the transmitting of the real response information:

storing the real response information for the response information corresponding to the user information; and

generating predictive response information based on the real response information for the response information to store the generated predictive response information.

11. A service device comprising:

a device storage unit configured to store predictive response information for one or more pieces of input information; and

a device control unit configured to execute a specific application according to a request of any one client terminal, transmit result information obtained by executing the application to the client terminal in real time, and when input information is received from the client terminal while transmitting result information obtained by executing the application to the client terminal in real time, transmit predictive response information for the input information that is previously stored in the device storage unit, generate real response information for the input information, compare the predictive response information with the real response information, and when the predictive response information and the real response information are different, transmit the real response information to the client terminal.

12. The service device of claim **11**, wherein the device storage unit further includes basic predictive response information calculated according to a pattern of the received input information and user information-based predictive response information calculated according to a pattern of input information received from a specific client terminal.

13. The service device of claim **12**, wherein when the input information is received from the client terminal, the device control unit checks whether user information-based predictive response information generated corresponding to the client terminal exists, and when the user information-based predictive response information exists, transmits the user information-based predictive response information to the client terminal.

14. The service device of claim **13**, wherein when the user information-based predictive response information generated corresponding to the client terminal does not exist, the device control unit transmits the basic predictive response information corresponding to the input information to the client terminal.

15. The service device of claim **11**, wherein when the predictive response information corresponding to the input information does not exist in the device storage unit, the device control unit transmits real response information for the input information to the client terminal.

16. The service device of claim **11**, wherein if the device control unit receives the input information with predictive information from the client terminal, compare the predictive response information received from the client terminal with predictive response information previously stored in the device storage unit corresponding to the input information, and when the predictive response information is different, transmit the previously stored predictive response information to the client terminal, generate real response information for the input information, compare the real response information with the predictive response information previously transmitted to the client terminal, and when the real response information and the predictive response information are different, transmit the real response information to the client terminal.

17. The service device of claim **16**, wherein the device storage unit further includes basic predictive response information calculated according to a pattern of the received input information and user information-based predictive response information calculated according to a pattern of input information received from a specific client terminal.

18. The service device of claim **17**, wherein when the input information and the predictive response information are received from the client terminal, the device control unit

checks whether user information-based predictive response information generated corresponding to the client terminal exists, and when the user information-based predictive response information exists, compares the user information-based predictive response information with the predictive response information received from the client terminal, and when the user information-based predictive response information and the predictive response information are different, transmits the user information-based predictive response information to the client terminal.

19. The service device of claim **18**, wherein when the user information-based predictive response information generated corresponding to the client terminal does not exist in the device storage unit, the device control unit compares the basic predictive response information corresponding to the input information with the predictive response information received from the client terminal, and when the basic predictive response information and the received predictive response information are different, transmits the basic predictive response information to the client terminal.

20. The service device of claim **16**, wherein when the predictive response information corresponding to the input information does not exist in the device storage unit, the device control unit performs control to compare the real response information for the input information with the predictive response information received from the client terminal, and when the real response information and the predictive response information are different, transmit the real response information to the client terminal.

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