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(54) **Title:**
INFORMATION PROVIDING SERVER, INFORMATION PROVIDING SYSTEM

(57) **Abstract:**
ABSTRACT The purpose is to provide a technology that enables the provision of information to a passenger on a ticket gate machine at a station within a time period such that the smooth passing of the user through the ticket gate machine is not interrupted. An information providing server apparatus according to the present invention holds a content correspondence list describing the correspondence relationship between information that the ticket gate machine presents and a passenger to whom the ticket gate machine is to present the information, and transmits, in each predetermined time slot, the content correspondence list up to the next time slot to the ticket gate machine (see Figure 1).

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ABSTRACT

The purpose is to provide a technology that enables the provision of information to a passenger on a ticket gate machine at a station within a time period such that the smooth passing of the user through the ticket gate machine is not interrupted. An information providing server apparatus according to the present invention holds a content correspondence list describing the correspondence relationship between information that the ticket gate machine presents and a passenger to whom the ticket gate machine is to present the information, and transmits, in each predetermined time slot, the content correspondence list up to the next time slot to the ticket gate machine (see Figure 1).

DESCRIPTION

Title of Invention: INFORMATION PROVIDING SERVER, INFORMATION PROVIDING SYSTEM

TECHNICAL FIELD

[0001]

The present invention relates to information providing server apparatus for providing a ticket gate machine at a station with information that the ticket gate machine presents to a passenger, and an information providing system.

BACKGROUND ART

[0002]

The apparatuses that railroad companies use to provide information to passengers include an LED-type destination guide display apparatus (timetable) or a liquid crystal display-type guide display apparatus installed in the station platform or concourse (Non-Patent Literature 1), and a liquid crystal display-type in-car guide display apparatus installed in the train cars (Non-Patent Literature 2). Because these apparatuses can advantageously provide information to a large number of passengers at once, they are becoming increasingly common as a means for providing information in the event of disruption in train service status, such as delays or transportation disruptions.

[0003]

For example, the in-car guide display apparatus includes a liquid crystal display installed above the doors of a local train car, such as a commuter train, which displays service information as well as a next station guidance or a transfer information. In the case of East Japan Railway Company (JR East), the service information is wirelessly delivered and displayed simultaneously with the LED-type destination guide display apparatus installed in the station. Thus, the users can know the latest information in the car. However, because the service information includes the service

status of all lines including the private railroads and subways in the Tokyo metropolitan area, in addition to the entire JR East area and Shinkansen, information that is not useful to the passenger, such as information about a line not related to the destination of the passenger, may be displayed. In the event of disruption in the service status of a large area caused by heavy snow or typhoon, for example, the amount of displayed information is particularly increased, forcing the passenger to spend a lot of time in making sure if the displayed information includes information relevant to the passenger.

[0004]

Meanwhile, a technology for providing information of interest to individual passengers utilizes electronic mail for information distribution, or provides service information on a Web site. The technology described in Patent Literature 1 relates to a technology for delivering service information to cellular phones by utilizing electronic mail in the event of disruption in train service. Specifically, passengers who purchased a commuter pass register information necessary for information distribution in an information distribution server in advance. In the event of transportation disruption, the information distribution server extracts passengers who take the route on which the disruption has occurred as their commuter pass route, and delivers the service information to their cellular phones by electronic mail.

[0005]

When the information is delivered by electronic mail, as described in Patent Literature 1, the electronic mail may not necessarily be delivered at the timing of utilizing the railroad. Specifically, there is no need to deliver service information when the information user is not using the commuter pass, such as when the user is on holiday and not utilizing the railroad, or when the user has already arrived at the destination by using the commuter pass. Further, the user may not necessarily travel only along the route registered on the commuter pass. For example, when the user is on a business trip and utilizes a station outside the commuter pass section, it would be convenient if the service information about the lines of the station at the trip destination, rather than the commuter pass route, could be delivered by mail in the event of disruption.

However, no such scheme is described in Patent Literature 1. Thus, the scheme described in Patent Literature 1 may be considered inadequate as a means for obtaining train service information from the viewpoint of users who use the railroad daily for commuting to work, school, or for business trips.

[0006]

The passengers also receive a large number of electronic mails besides the railroad service information, and the burden of checking the mails, writing replies, and so on is not negligible. Under such circumstances, the railroad service information delivered at the wrong timing increases the unwanted electronic mail, forcing the user to take the trouble of deleting the mail and the like.

[0007]

As a scheme for providing service information to the user at an appropriate timing, a method of providing the information by using the automatic ticket gate machine, through which the user passes without fail whenever they utilize the railroad, may be considered. Specifically, as the user passes through the automatic ticket gate machine, the ticket gate machine transmits information about the user to an information distribution server. The information distribution server then delivers electronic mail to the user's cellular phone. In this method, the user can obtain the service information at an appropriate timing. However, the existing automatic ticket gate machine transmits the information about the user who has passed through the ticket gate machine at regular time intervals (such as every other day) (Non-Patent Literature 3). While to implement the method requires the ticket gate machine to transmit the user information to the information distribution server in real-time, this would put a large burden on the network.

[0008]

Typically, as the user uses an IC card ticket, the existing automatic ticket gate machine displays the adjusted amount and the like on a display installed on the exit side. Instead of delivering information to the user's cellular phone as in the case of the information distribution server described in Patent Literature 1, the

information may be presented on the display of the automatic ticket gate machine, whereby the user can refer to the service information at the timing of utilizing the railroad.

[0009]

It is considered that, in order to ensure smooth passage of the user through the automatic ticket gate machine, processing should be completed within 0.2 seconds (Non-Patent Literature 3). However, it is difficult to complete the process of the automatic ticket gate machine accessing the information distribution server to see if there is service information to be presented to the user, and if there is, acquiring and displaying the information content, in that time period.

CITATION LIST

PATENT LITERATURE

[0010]

Patent Literature 1: JP Patent Publication (Kokai) No. 2010-266907 A

NON PATENT LITERATURE

[0011]

Non-Patent Literature 1: T. Nakagawa, F. Tsunoda, and M. Matsunaga, "Research and Development on Providing Easy-to-Understand Service Information", JR East Technical Review, No.24-Summer, pp51-54, 2008

Non-Patent Literature 2: A. Koizumi, and K. Yonenaga, "On Provision of Information to Customers by JR East", Railway and Electrical Engineering, vol.20, No.11, pp20-25, Japan Railway Electrical Engineering Association, 2009

Non-Patent Literature 3: A. Shiibashi, "Development From Traffic Infrastructure To Social Infrastructure – Development and Introduction of Autonomous Distributed IC Card Ticket System "Suica" and Its Social Infrastructurization", Information Processing Society of Japan, Digital Practice, Vol.1, No.3, pp114-120, 2010

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0012]

The present invention has been made to solve the above problems, and an object of the present invention is to provide a technology by which information matching the purpose of a user can be provided on a ticket gate machine within a time such that smooth passing of the user through the station ticket gate machine is not interrupted.

SOLUTION TO PROBLEM

[0013]

An information providing server apparatus according to the present invention holds a content correspondence list describing the correspondence relationship between information presented by the ticket gate machine and a passenger to whom the ticket gate machine is to present the information, and transmits, in each predetermined time slot, the content correspondence list up to the next time slot to the ticket gate machine.

ADVANTAGEOUS EFFECTS OF INVENTION

[0014]

The information providing server apparatus according to the present invention transmits the required content correspondence list to the ticket gate machine in each time slot, so that the ticket gate machine can identify the information to be presented to the passenger by simply searching for the list in each time slot. Thus, the information can be provided to each passenger at an appropriate timing without interrupting the smooth passage of the passenger through the ticket gate machine.

BRIEF DESCRIPTION OF DRAWINGS

[0015]

[Figure 1] Figure 1 illustrates an overall configuration of an information providing

system 1 according to a first embodiment.

[Figure 2] Figure 2 illustrates a hardware configuration of an IC card ticket 100.

[Figure 3] Figure 3 illustrates a hardware configuration of a ticket gate machine 200.

[Figure 4] Figure 4 illustrates a hardware configuration of servers of a center server group 400 and a station server group 300.

[Figure 5] Figure 5 illustrates a data configuration of ticket gate machine utilization history data 201.

[Figure 6] Figure 6 illustrates a data configuration of a time slot-based content correspondence list 202.

[Figure 7] Figure 7 illustrates a data configuration of station utilization history data 311.

[Figure 8] Figure 8 illustrates a data configuration of a station-based content correspondence list 321.

[Figure 9] Figure 9 illustrates a data configuration of a station-based information content 322.

[Figure 10] Figure 10 illustrates a data configuration of entire utilization history data 411.

[Figure 11] Figure 11 illustrates a data configuration of a content correspondence list 421.

[Figure 12] Figure 12 illustrates a data configuration of information content 422.

[Figure 13] Figure 13 illustrates a data configuration of the user behavior pattern data 423.

[Figure 14] Figure 14 is a flowchart of an overall processing procedure of the information providing system 1.

[Figure 15] Figure 15 is a flowchart of a detailed processing procedure of step S1402 of Figure 14.

[Figure 16] Figure 16 is a flowchart of a detailed processing procedure of step S428011 of Figure 15.

[Figure 17] Figure 17 is a flowchart of a detailed processing procedure of step S1403 of Figure 14.

[Figure 18] Figure 18 is a flowchart of a detailed processing procedure of step S1405 of Figure 14.

[Figure 19] Figure 19 is a flowchart of a detailed processing procedure of step S1406 of Figure 14.

DETAILED DESCRIPTION OF EMBODIMENTS

[0016]

<First embodiment>

Figure 1 illustrates an overall configuration of an information providing system 1 according to a first embodiment of the present invention. FIGS. 2 to 4 illustrate a hardware configuration of each of units of the information providing system 1. FIGS. 5 to 13 illustrate configurations of data in the information providing system 1. FIGS. 14 to 19 illustrate processing procedures of the information providing system 1.

[0017]

<Overall configuration of system>

Figure 1 illustrates the overall configuration of the information providing system 1. The information providing system 1 includes an IC card ticket 100; a ticket gate machine 200; a station server group 300; a center server group 400; a cellular phone 500; an information terminal 600; and a digital signage 700.

[0018]

<Overall configuration of system: IC card ticket 100>

The IC card ticket 100 is a contactless IC card that can be utilized as a train ticket. The IC card ticket 100 is recorded with a unique card ID (hereafter "user ID"), remaining amount, the station code of a station at which the user has last passed through the ticket gate machine and the like. These information can be read or rewritten by a reader/writer device. The form of the IC card ticket 100 is not limited to the card. For example, the IC card ticket 100 includes a cellular phone with IC card ticket function. The hardware details of the IC card ticket 100 will be described later with reference to Figure 2.

[0019]

<Overall configuration of system: ticket gate machine 200>

The ticket gate machine 200 is an apparatus which includes a contactless IC card reader/writer device and which performs ticket gate operations, such as ticket confirmation and fare adjustment, automatically. The hardware details of the ticket gate machine 200 will be described later with reference to Figure 3. While Figure 1 shows only one ticket gate machine 200, usually more than one ticket gate machine 200 is installed at one station in practice.

[0020]

The ticket gate machine 200 is provided with ticket gate machine utilization history data 201, a time slot-based content correspondence list 202, a ticket gate process unit 203, and a content display unit 204. The ticket gate machine utilization history data 201 and the time slot-based content correspondence list 202 are stored in a storage apparatus, such as a hard disk apparatus.

[0021]

The ticket gate machine utilization history data 201 is a storage apparatus for storing the history of a user who passed through the ticket gate machine 200. Specifically, the storage apparatus stores the user ID stored in the IC card ticket 100 of the user who passed through the ticket gate machine 200, the type and time of entry/exit, and so on. The details of the ticket gate machine utilization history data 201 will be described later with reference to Figure 5.

[0022]

The time slot-based content correspondence list 202 includes data describing the correspondence relationship between the user ID and the ID of content displayed to the user on a predetermined time slot basis. The details of the time slot-based content correspondence list 202 will be described later with reference to Figure 6.

[0023]

The ticket gate process unit 203 reads the user ID, the remaining

amount, and the station code from the IC card ticket 100, and implements an entry/exit process. Specifically, in the case of entry, the ticket gate process unit 203 writes the station code of the station at which the ticket gate machine 200 is installed to the IC card ticket 100. In the case of exit, the ticket gate process unit 203 calculates the fare, assuming that the station code read from the IC card ticket 100 corresponds to the entry station and the code of the station at which the ticket gate machine 200 is installed corresponds to the exit station, subtracts the fare from the remaining amount that has been read, and rewrites the remaining amount recorded in the IC card ticket 100. Further, the ticket gate process unit 203 initializes the station code recorded in the IC card ticket 100.

[0024]

The content display unit 204, using the user ID read from the IC card ticket 100 of the user who passes through the ticket gate machine 200 as a key, searches the time slot-based content correspondence list 202, acquires the ID of the content associated with the user, and displays the content. The processing procedure of the content display unit 204 will be described later with reference to Figure 18.

[0025]

<Overall configuration of system: station server group 300>

The station server group 300 is a group of servers that manage the utilization history of the ticket gate machine 200 installed at the station, the information content provided to the ticket gate machine 200, the schedule of the trains that pass through the station, and so on. While Figure 1 shows only one station server group 300, in practice the station server group 300 is installed at each station. The station server group 300 includes an ID management station server 310, an information providing station server 320, and a service management station server 330. The hardware details of these servers will be described later with reference to Figure 4.

[0026]

<Overall configuration of system: station server group 300: ID management station server 310>

The ID management station server 310 is a server that manages the utilization history of the ticket gate machine 200 at the station. The ID management station server 310 is provided with station utilization history data 311, a utilization history collection unit 312, and a utilization history transmission unit 313. The station utilization history data 311 is stored in a storage apparatus such as a hard disk apparatus.

[0027]

The station utilization history data 311 is an accumulation of the utilization history of the ticket gate machine 200 of the station. The details of the station utilization history data 311 will be described later with reference to Figure 7. The utilization history collection unit 312 collects the utilization history of the station ticket gate machine 200 periodically, such as every hour. The utilization history transmission unit 313 transmits the utilization history collected by the ticket gate machine 200 to an ID management center server 410, which will be described later, periodically, such as at the end of the day's operation.

[0028]

<Overall configuration of system: station server group 300: information providing station server 320>

The information providing station server 320 is a server that manages the information content displayed on the ticket gate machine 200 at the station. The information providing station server 320 is provided with a station-based content correspondence list 321, the station-based information content 322, a content list transmission unit 323, and a content list reception unit 324. The station-based content correspondence list 321 and the station-based information content 322 are stored in a storage apparatus, such as a hard disk apparatus.

[0029]

The station-based content correspondence list 321 includes data describing the correspondence relationship between the user ID and the ID of the content presented to the user. The details of the station-based content correspondence list 321 will be described later with reference to Figure 8. The station-based

information content 322 is the information content presented to the user. The details of the station-based information content 322 will be described later with reference to Figure 9. The content list transmission unit 323 transmits a list of the correspondence relationship between the user ID and the content ID described in the station-based content correspondence list 321 to the ticket gate machine 200 in each predetermined time slot. The details of the processing procedure of the content list transmission unit 323 will be described later with reference to Figure 17. The content list reception unit 324 receives the content correspondence list transmitted by an information providing center server 420, which will be described later, in the station-based content correspondence list 321.

[0030]

<Overall configuration of system: station server group 300: service management station server 330>

The service management station server 330 is a server that manages the service of trains that run through the station. The service management station server 330 is provided with station schedule information 331 and a disruption notification unit 332. The station schedule information 331 is stored in a storage apparatus such as a hard disk apparatus.

[0031]

The station schedule information 331 includes data holding the schedule information for the trains at the station. The details of the station schedule information 331 are omitted as it is not directly related to the first embodiment. The disruption notification unit 332 has the function of notifying the information providing station server 320 when information regarding service interruption, such as a delay or suspension, is written in the station schedule information 331. While a server for station service management in practice includes the function of managing the train position information, for example, the server is not directly related to the first embodiment and is therefore omitted.

[0032]

<Overall configuration of system: center server group 400>

The center server group 400 is a group of servers in which the information of the station servers of all stations under the management of a railroad company is consolidated. The center server group 400 includes an ID management center server 410, the information providing center server 420, and a service management center server 430. The hardware details of these servers will be described later with reference to Figure 4.

[0033]

<Overall configuration of system: center server group 400: ID management center server 410>

The ID management center server 410 is a server that accumulates and manages the utilization history of the ticket gate machines 200 installed at all stations. The ID management center server 410 is provided with entire utilization history data 411 and a utilization history reception unit 412. The entire utilization history data 411 are stored in a storage apparatus such as a hard disk apparatus.

[0034]

The entire utilization history data 411 are data holding the utilization history of the ticket gate machines 200 of all stations. The details of the entire utilization history data 411 will be described later with reference to Figure 10. The utilization history reception unit 412 receives the utilization history of the ticket gate machine 200 at each station that has been transmitted by the ID management station server 310 and stores the utilization history in the entire utilization history data 411.

[0035]

<Overall configuration of system: center server group 400: information providing center server 420>

The information providing center server 420 extracts a behavior pattern of a user from the utilization history, and delivers the information content to be presented to the user to the information providing station server 320 in association with the behavior pattern. The information providing center server 420 is provided with a

content correspondence list 421, information content 422, behavior pattern data 423, temporary behavior pattern data 424, monthly behavior pattern data 425, a content list delivery unit 426, an information content correspondence unit 427, and a behavior pattern extraction unit 428. The content correspondence list 421, the information content 422, the behavior pattern data 423, the temporary behavior pattern data 424, and the monthly behavior pattern data 425 are stored in a storage apparatus, such as a hard disk apparatus.

[0036]

The content correspondence list 421 includes data describing the correspondence relationship between the user ID and the ID of the content presented to the user. The details of the content correspondence list 421 will be described later with reference to Figure 11. The information content 422 includes information content displayed to the user. The details of the information content 422 will be described later with reference to Figure 12.

[0037]

The behavior pattern data 423 are data holding the behavior pattern of users of all stations. The behavior pattern of the user includes data extracted from the utilization history of the IC card ticket 100, indicating which station the user usually uses and in what time slot, for example. The details of the behavior pattern data 423 will be described later with reference to Figure 13.

[0038]

The temporary behavior pattern data 424 is a temporary storage or accumulation of a short-term behavior pattern of the user. The information providing center server 420 subjects the utilization history of the IC card ticket 100 that is accumulated daily in the entire utilization history data 411 to a process of extracting the user behavior pattern every day, and accumulates the pattern as the temporary behavior pattern 424. A process of consolidating the daily behavior patterns is separately executed. By accumulating the behavior pattern daily, a great amount of utilization history can be processed in a relatively short period of time. The details of the

temporary behavior pattern data 424 are similar to those of the behavior pattern data 423 and therefore their description will be omitted.

[0039]

The monthly behavior pattern data 425 temporarily hold a month's worth of the user behavior pattern. When a month's worth of behavior pattern data is accumulated in the temporary behavior pattern data 424, the information providing center server 420 consolidates the data, stores them in the monthly behavior pattern data 425, and then initializes the temporary behavior pattern data 424. The information providing center server 420 saves the monthly behavior pattern data in the behavior pattern 423 for a certain period, such as for six months; thereafter, the data are deleted, compressed, or moved to a storage medium, such as a tape medium. The details of the monthly behavior pattern 425 are similar to those of the behavior pattern 423 and therefore their description will be omitted.

[0040]

The behavior pattern extracted from the vast amounts of utilization history tends to have a large volume of data. Meanwhile, the behavior pattern extracted from old utilization history does not necessarily represent the actual behavior of the user. Thus, according to the first embodiment, the behavior pattern is extracted daily and stored together on a monthly basis, and a six months' worth of the stored behavior patterns is consolidated into the behavior pattern data 423 for the user. In this way, a behavior pattern representing an actual picture of the user can be identified in an appropriate data size.

[0041]

The content list delivery unit 426 cuts out the data describing the correspondence relationship between the user ID and the content ID held in the content correspondence list 421 on a station by station basis, and transmits the data to the information providing station server 320 of each station.

[0042]

The information content correspondence unit 427 acquires the content

matching the behavior pattern of the user from the information content 422 with reference to the behavior pattern of the user held in the behavior pattern data 423, and stores it's ID in the content correspondence list 421. The details of the processing procedure of the information content correspondence unit 427 will be described later with reference to Figure 17.

[0043]

The behavior pattern extraction unit 428 extracts the behavior pattern of the user from the utilization history of the IC card ticket 100 and stores the pattern in the behavior pattern 423. The details of the processing procedure of the behavior pattern extraction unit 428 will be described later with reference to Figure 15.

[0044]

<Overall configuration of system: center server group 400: service management center server 430>

The service management center server 430 is a server that performs service management for all stations. The service management center server 430 is provided with schedule information 431 and a disruption notification unit 432. The schedule information 431 is stored in a storage apparatus, such as a hard disk apparatus.

[0045]

The schedule information 431 includes data holding the train schedule information at all stations. The details of the schedule information 431 will be omitted as they are not directly related to the first embodiment. The disruption notification unit 432 notifies the service management station server 330 when information regarding service interruption, such as a delay or suspension, is written in the schedule information 431. While a server that manages train service is in practice includes the function of managing train position information and the like, the server is omitted as it is not directly related to the first embodiment.

[0046]

<Cellular phone 500, information terminal 600, digital signage 700>

The cellular phone 500, the information terminal 600, and the digital

signage 700 are apparatuses that provide detailed information to the user. A carrier 501 is a carrier of the cellular phone 500. A network 502 includes a network line, such as the Internet.

[0047]

<Cellular phone 500>

The cellular phone 500 is provided with a contactless IC card, an application for utilizing the contactless IC card as an IC card ticket (ticket application), and a display. When the user demands detailed information via the ticket application, the ticket application transmits the user ID to the information providing center server 420 via the carrier 501 and the network 502. The information providing center server 420 searches the content correspondence list 421 by using the received user ID as a key, and transmits the content associated with the reception date (or the time slot on the reception date) (ticket gate machine display content and detailed display content) to the cellular phone 500. Upon reception of the content from the information providing center server 420, the cellular phone 500 initially displays the ticket gate machine display content of the received content on the display. When the user further demands detailed information, the cellular phone 500 displays the detailed display content on the display.

[0048]

<Information terminal 600, digital signage 700>

The information terminal 600 and the digital signage 700 are provided with a contactless IC card reader/writer device and a display. The information terminal 600 or the digital signage 700, upon the user contacting the IC card ticket 100 with the reader/writer device, reads the user ID from the IC card ticket 100 and transmits the user ID to the information providing center server 420 via the network 502. The information providing center server 420 searches the content correspondence list 421 by using the received user ID as a key, and transmits the content associated with the reception date (or the time slot on the reception date) (ticket gate machine display content and detailed display content) to the information terminal 600 or the digital

signage 700. Upon reception of the content from the information providing center server 420, the information terminal 600 or the digital signage 700 initially displays the ticket gate machine display content of the received content on the display. When the user further demands detailed information, the information terminal 600 or the digital signage 700 displays the detailed display content on the display.

[0049]

<Hardware configuration>

With reference to FIGS. 2 to 4, the hardware configuration of various units of the information providing system 1 will be described.

[0050]

<Hardware configuration: IC card ticket 100>

Figure 2 illustrates a hardware configuration of the IC card ticket 100. The IC card ticket 100 is provided with a CPU (Central Processing Unit) 1001; a nonvolatile memory 1002; a wireless communication unit 1003; and an antenna 1004. The CPU 1001 controls the function of the contactless IC card and processes data. The nonvolatile memory 1002 records data. The wireless communication unit 1003 performs wireless communications by using the antenna 1004 and is supplied with power by utilizing radio wave energy.

[0051]

<Hardware configuration: ticket gate machine 200>

Figure 3 illustrates a hardware configuration of the ticket gate machine 200. The ticket gate machine 200 is provided with a CPU 2001; a hard disk 2002; a memory 2003; a display 2004; a display control unit 2005; a wireless communication unit 2006; and an antenna 2007.

[0052]

The CPU 2001 controls the function of the ticket gate machine 200, processes data, and performs communications via a network. The hard disk 2002 stores data used by the ticket gate machine 200. The nonvolatile memory 2003 holds data read from the IC card and data written to the IC card. The display 2004 displays

information to the user of the ticket gate machine 200 on a screen. The display control unit 2005 controls the display 2004. The wireless communication unit 2006 communicates with the IC card by using the antenna 2007. Functions that are not directly related to the description of the first embodiment (such as a gate control mechanism of the ticket gate machine 200) are omitted.

[0053]

<Hardware configuration: server>

Figure 4 illustrates a hardware configuration of the servers of the center server group 400 and the station server group 300. The servers have the same configuration; thus, the following description is made with reference to the hardware configuration of the information providing center server 420 illustrated in Figure 1.

[0054]

The information providing center server 420 is provided with a CPU 4201; a hard disk 4202; a memory 4203; a display 4204; a display control unit 4205; a keyboard 4206; a keyboard control unit 4207; a mouse 4208; and a mouse control unit 4209.

[0055]

The CPU 4201 performs the input/output, reading, and storing of data and various processes. The hard disk 4202 is an apparatus for storing data. The memory 4203 is an apparatus for temporarily storing programs and data. The display 4204 is an apparatus for presenting data on a screen for the user. The display control unit 4205 controls the display 4204. The keyboard 4206 and the mouse 4207 are apparatuses for receiving an operation input from the user. The keyboard control unit 4207 and the mouse control unit 4208 control the keyboard 4206 and the mouse 4207, respectively.

[0056]

The functional units of the servers may be provided by hardware for implementing their operations, such as circuit devices, or by the CPU executing software for implementing the functions of the functional units.

[0057]

<Data configuration>

A configuration of the data in Figure 1 will be described with reference to FIGS. 5 to 13.

[0058]

<Data configuration: ticket gate machine 200>

FIGS. 5 and 6 illustrate a configuration of the data in the ticket gate machine 200. Figure 5 illustrates a data configuration of the ticket gate machine utilization history data 201. Figure 6 illustrates a data configuration of the time slot-based content correspondence list 202.

[0059]

<Data configuration: ticket gate machine 200: ticket gate machine utilization history data 201>

The ticket gate machine utilization history data 201 includes a user ID field 20101, a process field 20102, a time field 20103, an entry station field 20104, and an exit station field 20105.

[0060]

The user ID field 20101 is a data field for storing the ID of the user who passed through the ticket gate machine. The value in the user ID field 20101 may be acquired by the reader/writer apparatus of the ticket gate machine 200 reading the user ID stored in the IC card ticket 100.

[0061]

The process field 20102 is a data field for storing a flag indicating a process classification of the ticket gate machine 200. The process field 20102 stores the flag indicating whether the user entered or exited the ticket gate machine 200.

[0062]

The time field 20103 is a data field for storing the time at which the user passed through the ticket gate machine 200. In the time field 20103, any of time slots in which the user can utilize the ticket gate machine 200 is stored.

[0063]

The entry station field 20104 and the exit station field 20105 are data fields for storing the names of stations that the user entered and exited, respectively. With regard to the record with "entry" in the process field 20102, the name of the station at which the user passed through the ticket gate machine 200 is stored in the entry station field 20104, with the exit station field 20105 left blank. With regard to the record with "exit" in the process field 20102, the name of the entry station recorded in the IC card ticket 100 is stored in the entry station field 20104, while the name of the station at which the ticket gate machine 200 that the user passed through is installed is stored in the exit station 20105.

[0064]

<Data configuration: ticket gate machine 200: time slot-based content correspondence list 202>

The time slot-based content correspondence list 202 includes a user ID field 20201 and a content ID field 20202. The user ID field 20201 is a data field for storing the user ID. The content ID field 20202 is a data field for storing the ID of the content presented to the user identified by the value in the user ID field 20201. The content to be presented to the user can be identified by searching the content correspondence list 202 by using the user ID field 20201 as a key and obtaining the content ID field 20202.

[0065]

The time slot-based content list 202 per se does not describe information about the time slot because the ticket gate machine 200 receives the time slot-based content list 202 from the information providing station server 320 in each predetermined time slot.

[0066]

Figure 6(a) is a content list of the content for regular time, and Figure 6(b) is a content list of the content for irregular time. The contents may be distinguished by the way in which the content ID field 20202 is represented. By the

process in steps S204003 to S204005 of Figure 19 which will be described later, the irregular time content is preferentially presented to the user.

[0067]

<Data configuration: station server group 300>

FIGS. 7 to 9 illustrate a configuration of data in the station server group 300, which is installed at each station. Figure 7 illustrates a data configuration of the station utilization history data 311 in the ID management station server 310. Figure 8 illustrates a data configuration of the station-based content correspondence list 321 in the information providing station server 320. Figure 9 is a data configuration of the station-based information content 322.

[0068]

<Data configuration: station server group 300: ID management station server 310: station utilization history data 311>

The station utilization history data 311 are data consolidating the ticket gate machine utilization history data 201 of the ticket gate machine 200 installed at each station. The station utilization history data 311 includes a user ID field 31101; a process field 31102; a time field 31103; an entry station field 31104; and an exit station field 31105. The data configuration of the station utilization history data 311 is similar to that of the ticket gate machine utilization history data 201. Thus, the description of the data configuration will be omitted.

[0069]

<Data configuration: station server group 300: information providing station server 320: station-based content correspondence list 321>

The station-based content correspondence list 321 includes data consolidating the time slot-based content correspondence list 202 of the ticket gate machine 200 installed at the station with respect to all time slots. The station-based content correspondence list 321 includes an entry/exit field 32101; a day-of-week field 32102; a time slot field 32103; a user ID field 32104; a content ID field 32105; a route field 32106; and a departure/destination station field 32107.

[0070]

The entry/exit field 32101 is a data field for storing a flag distinguishing whether the user enters or exits the ticket gate machine 200. "Entry" indicates that the user enters the ticket gate machine 200. "Exit" indicates that the user exits the ticket gate machine 200.

[0071]

The day-of-week field 32102 and the time slot field 32103 respectively hold the day of the week and the time slot in which the user utilizes the ticket gate machine 200. The day of the week and the time slot will be described later with reference to the description of the content correspondence list 421.

[0072]

The user ID field 32104 is a data field for storing the user ID. The content ID field 32105 is a data field for storing the ID of the content presented to the user who is identified by the value in the user ID field 32104. The content ID field 32105 holds the ID of any of the contents stored in the information content 422.

[0073]

The route field 32106 is a data field for storing the line route that the user identified by the value in the user ID field 32104 is thought to have used when travelling from the station at which the station server group 300 is installed and the station stored in the departure/destination station field 32107. Specifically, the name of the line or the up/down type is stored.

[0074]

The departure/destination station field 32107 is a data field for storing the name of the station to which the user identified by the value in the user ID field 32103 headed from the station at which the station server group 300 is installed, or the name of the station departed when heading to the station at which the station server group 300 is installed. Specifically, regarding the record with "entry" in the entry/exit field 32101, since the station at which the station server group 300 is installed is the departure station, the name of the destination station is stored. Regarding the record

with "exit" in the entry/exit field 32101, since the station at which the station server group 300 is installed is the destination station, the name of the departure station is stored.

[0075]

<Data configuration: station server group 300: information providing station server 320: station-based information content 322>

The station-based information content 322 includes data holding the entire contents for all time slots that the ticket gate machine 200 installed at the station presents to the users. The station-based information content 322 includes a content ID field 32201 and a ticket gate machine display content field 32202.

[0076]

The content ID field 32201 is a data field for storing the ID uniquely identifying the content. The content ID field 32201 holds the value in a content ID field 42201 of any of the contents stored in the information content 422.

[0077]

The ticket gate machine display content field 32202 is a data field for storing the content presented to the user by the ticket gate machine 200 installed at the station. This field holds, of the content held in a ticket gate machine display content field 42203 of the information content 422 which will be described later, the content whose value in the content ID field 42201 matches the value in the content ID field 32201.

[0078]

<Data configuration: center server group 400>

FIGS. 10 to 13 illustrate a configuration of data in the center server group 400. Figure 10 illustrates a data configuration of the entire utilization history data 411 in the ID management center server 410. Figure 11 illustrates a data configuration of the content correspondence list 421 in the information providing center server 420. Figure 12 illustrates a data configuration of the information content 422. Figure 13 illustrates a data configuration of the user behavior pattern data 423.

[0079]

<Data configuration: center server group 400: ID management center server 410: entire utilization history 411>

The entire utilization history data 411 are data consolidating the station utilization history data 311 at all stations. The entire utilization history data 411 includes a user ID field 41101; a process field 41102; a time field 41103; an entry station field 41104; and an exit station field 41105. The data configuration of the entire utilization history data 411 is similar to that of the ticket gate machine utilization history data 201. Thus, the description of the data configuration will be omitted.

[0080]

<Data configuration: center server group 400: information providing center server 420: content correspondence list 421>

The content correspondence list 421 includes data consolidating the station-based content correspondence list 321 at all stations. The content correspondence list 421 includes a station name field 42101; an entry/exit field 42102; a day-of-week field 42103; a time slot field 42104; a user ID field 42105; a content ID field 42106; a route field 42107; and a departure/destination station field 42108.

[0081]

The station name field 42101 is a data field for storing name of the station at which the station server group 300 is installed. The entry/exit field 42102 is a data field for storing the entry/exit classification regarding the passage of the user through the ticket gate machine 200.

[0082]

The day-of-week field 42103 is a data field for holding the day of the week on which the ticket gate machine 200 displays the content. According to the first embodiment, for example, the day of the week has two types, i.e., a weekday (Monday through Friday) and a holiday (Saturday and Sunday). However, this is merely an example, and the day of the week may include each day of the week from Monday through Sunday and additionally a nationally designated holiday as types of the day of

the week.

[0083]

The time slot field 42104 is a data field for holding the time slot in which the ticket gate machine 200 displays the content. According to the first embodiment, the time slot includes four types, i.e., "morning" (from first train to 10: 00); "daytime" (10: 00 to 16: 00); "evening" (16: 00 to 20: 00), and "night" (20: 00 to last train). However, this is merely an example. In another example, the time slot may be set more finely, such as for every two hours, or in broader classification, such as "morning" and "afternoon".

[0084]

The user ID field 42105 is a data field for storing the user ID stored in the IC card ticket 100. This field holds the user ID of the user to which the content identified by the value in the content ID field 42106 is presented.

[0085]

The content ID field 42106 is a data field for storing the ID of the content stored in the information content 422. This field holds the ID of the content that is presented when the user identified by the value in the user ID field 42105 passes through the ticket gate machine 200.

[0086]

The route field 42107 is a data field for holding the route that the user identified by the value in the user ID field 42105 took when travelling between the stations identified by the station name field 42101 and the departure/destination station field 42108. The route field 42107 may be utilized to identify the user who is utilizing the line on which disruption has developed in service status.

[0087]

The departure/destination station field 42108 is a data field for holding the name of the departing station or the destination station of the user identified by the value in the user ID field 42105. Regarding the record with "entry" in the entry/exit field 42102, because the station name held in the station name field 42101 is that of the

departure station, the destination station name (name of the station that the user exited) is stored in the departure/destination station field 42108. Regarding the record with "exit" in the entry/exit field 42102, because the station name held in the station name field 42101 is that of the destination station (arriving station), the departure station name (name of the station that the user entered) is stored in the departure/destination station field 42108.

[0088]

<Data configuration: center server group 400: information providing center server 420: information content 422>

The information content 422 is data consolidating the station-based information content 322 of all stations. The information content 422 includes a content ID field 42201; a presentation condition field 42202; a ticket gate machine display content field 42203; and a detailed display content field 42204. The presentation condition field 42202 further includes a station field 422021; an entry/exit field 422022; a type field 422023; a day-of-week field 422024; a time slot field 422025; and a line field 422026.

[0089]

The content ID field 42201 is a data field holding the ID for uniquely identifying the content and is given when the content is registered in the information content 422.

[0090]

The presentation condition field 42202 is an area for storing conditions of presentation of the content to the user by the ticket gate machine 200.

[0091]

The station field 422021 is a data field for holding the name of the station at which the content identified by the value in the content ID field 42201 is presented to the user. When the station name 422021 is not designated, the content is presented to the user at all stations of the line designated in the line field 422026. When the line 422025 is not designated, either, the content is presented to the user at all

stations.

[0092]

The entry/exit field 42202 is a data field for holding the classification as to whether the timing of presentation of the content identified by the value in the content ID field 42201 to the user is at the time of ticket gate entry or exit. According to the first embodiment, the classification includes "entry" and "exit". In the case of "entry", the ticket gate machine 200 presents the content when the user enters the ticket gate machine 200. In the case of "exit", the ticket gate machine 200 presents the content when the user exits the ticket gate machine 200. Examples of the content that may be effectively presented at the time of "entry" include service information pertaining to the route to the user's destination station, and an advertisement for a shop located inside the station premises (within the station) or outside the user's destination station premises. An example of the content that may be effectively presented at the time of "exit" is an advertisement for a shop located outside the station premises (station building). When the entry/exit field 422022 is not designated, the content is presented at the time of both entry and exit.

[0093]

The type field 422023 is a data field for holding the type of the station at which the content identified by the value in the content ID field 42201 is presented to the user. The type of station refers to the classification of the type of the station according to purpose of utilization of the station by the user. According to the first embodiment, as the station types, "home", "work", and "private" are set. "Home" indicates the station which is estimated to be in the vicinity of the user's home; "work" indicates the station which is estimated to be in the vicinity of the user's work; and "private" indicates the station which is estimated to be in the vicinity of a location where the user goes for private purposes (namely, the station that the user utilizes for pleasure purpose). The type of the same station may vary depending on the user. Namely, a station which is considered the nearest station to home by a user may be considered the nearest station to work by another user. In this case, it would not be effective to

display the content intended for the user of the station considered by the user as the nearest station to home (such as coupon information for takeout sweets) to the user for whom the station is the nearest station to work. Thus, according to the first embodiment, the type of station is estimated on a user by user basis so that the type of station can be considered when deciding on what content is to be displayed to which user. In this way, the content can be provided in a more effective manner. The details of the processing procedure for determining the type of station will be described later with reference to Figure 16.

[0094]

The day-of-week field 422024 is a data field for holding the day of the week on which the content identified by the value in the content ID field 42201 is presented to the user. The type of the day of the week is the same as regards the day-of-week field 42103. An example of the content that may be effectively displayed on a weekday is an advertisement for a service that is available only on the weekday. The content pertaining to information about a holiday event or the like may be effectively displayed on a holiday.

[0095]

The time slot field 422025 holds the time slot in which the content identified by the value in the content ID field 42201 is presented to the user. The type of the time slot is the same as that for the time slot field 42104. An example of the content that may be effectively displayed at night is an advertisement for a shop that is open until late at night.

[0096]

The line field 422026 is a data field for holding the line utilized by the user to which the content identified by the value in the content ID field 42201 is presented. According to the first embodiment, as an example of the line field 42206, the line name and direction (up/down) are used. The value of the line name may indicate the line to which the station held in the station field 422021 belongs. In other examples, only the line name may be designated without designating the station field

422021 (In this case, all stations that belong to the line are the subject of content display), or the station field 422021 and the line name 422026 that does not include the station name designated in the station field 422021 may be designated (In this case, the users who utilize the station via a certain line are the subject of content display). By thus designating the line in the presentation condition field 42202, the presentation conditions can be more freely designated, and the target for information delivery can be more narrowed.

[0097]

The ticket gate machine display content field 42203 is a data field for storing the content presented to the user by the ticket gate machine 200. Preferably, the content held in this field is relatively simple with a small data amount such that the content can be displayed by the ticket gate machine 200 at high speed.

[0098]

The detailed display content field 42204 is a data field for storing content more detailed than the content presented to the user by the ticket gate machine 200. This field holds the content that the user who recognized, on the screen of the ticket gate machine 200, the presence of information that he or she should view refers to for obtaining more detailed information. For example, in the case of service information, the detailed content includes the name of the line on which a delay or suspension has occurred, its cause, the expected time for recovery, and information about transfer service. In the case of an advertisement for a shop, the detailed content may include a menu, detailed service content, and charges, in addition to basic information such as the open hours of the shop and access information. In practice, displaying or referring to such detailed information on the ticket gate machine 200 is difficult. Thus, it is assumed that the user will acquire the content in this field via a higher functionality information terminal, such as the cellular phone 500, the information terminal 600, or the digital signage 700.

[0099]

<Data configuration: center server group 400: information providing center server 420:

behavior pattern data 423>

The behavior pattern data 423 are data extracted from the utilization history of the IC card ticket 100 of all users, indicating which station is usually used by a railroad user on what day of the week, in what time slot, and at what frequency. The behavior pattern data 423 include a user ID field 42301; an entry/exit field 42302; a station name field 42303; a type field 42304; a day-of-week field 42305; a time slot field 42306; a line field 42307; a departure/destination station field 42308; and a frequency field 42309.

[0100]

The user ID field 42301 is a data field for holding the ID of the user of which the behavior pattern is held in the behavior pattern data 423. This field represents the extraction of the user ID stored in the IC card ticket 100.

[0101]

The entry/exit field 42302 is a data field for holding the class indicating whether the user entered or exited the ticket gate machine 200. The station name field 42303 is a data field for holding the name of the station that the user entered or exited. The type field 42304 is a data field for holding the value predicting what type of station the station identified by the value in the station name field 42303 is to the user. The type of station is the same as regards the type field 422023 and therefore its description will be omitted.

[0102]

The day-of-week field 42305 is a data field for holding the day of the week on which the user entered or exited the ticket gate machine 200. In the entire utilization history data 411, the date on which the user entered or exited the ticket gate machine 200 is recorded. The date is acquired and converted into the day of the week in the day-of-week field 42305. The type of the day of the week is the same as regards the day-of-week field 42103.

[0103]

The time slot field 42306 is a data field for holding the time slot in

which the user entered or exited the ticket gate machine 200. In the entire utilization history data 411, the time at which the user entered or exited the ticket gate machine 200 is recorded. The time is acquired and converted into the time slot in the time slot field 42306. The type of the time slot is the same as regards the time slot field 42104.

[0104]

The line field 42307 is a data field for holding the name of the line that the user utilized to move between the station identified by the value in the station name field 42303 and the station identified by the value in the departure/destination station field 42308. Because the name of the line utilized by the user is not recorded in the entire utilization history data 411, the value in the present field needs to be acquired by searching a line database or the like, which is not shown, for a utilizable line by using the entry/exit station name as a key. When there is more than one candidate, the name of the line with the highest likelihood may be stored in the present field. Specifically, the line that is used in a route with the minimum travel time may be stored.

[0105]

The departure/destination station field 42308 is a data field for holding the name of the departing station or destination station (arriving station) of the user. Regarding the record with "entry" in the entry/exit field 42302, the destination station (arriving station) is stored in the present field. Regarding the record with "exit" in the entry/exit field 42302, the departure station is stored in the present field. The destination station with respect to the entry station, and the departure station with respect to the exit station can be acquired from the entire utilization history 411. Specifically, when the utilization history of the IC card ticket 100 of a certain user is arranged in chronological order, if the utilization history of "entry" is immediately followed by the utilization history of "exit", the former is the departure station with respect to the "exit" station, and the latter is the destination station with respect to the "entry" station. The detailed processing procedure will be described later with reference to a flowchart.

[0106]

The frequency field 42309 is a data field for holding the number of records with the same contents from the entry/exit field 42302 to the departure/destination station field 42308. In the present field, a numerical value of one or more is stored.

[0107]

Thus, the configuration of the data in the information providing system 1 has been described with reference to FIGS. 5 to 13.

[0108]

<Processing procedure>

With reference to FIGS. 14 to 19, the processing procedure of the information providing system 1 will be described.

[0109]

<Processing procedure: overall processing procedure>

Figure 14 is a flowchart of an overall processing procedure of the information providing system 1. In the following, the steps of Figure 14 will be described.

[0110]

(Figure 14: step S1401)

When the passenger passes through the ticket gate machine 200, the ticket gate machine 200 reads the user ID and the like from the IC card ticket 100, and accumulates the data in the ticket gate machine utilization history data 201. The ticket gate machine 200 transmits the ticket gate machine utilization history data 201 to the ID management station server 310 at a predetermined timing. The ID management station server 310 consolidates the ticket gate machine utilization history data 201 and transmits the data to the ID management center server 410. The ID management center server 410 accumulates the utilization history of the IC card ticket 100 of each user in the entire utilization history data 411.

[0111]

(Figure 14: step S1402)

The information providing center server 420 extracts the behavior pattern of the user from the entire utilization history data 411 accumulated by the ID management center server 410 and stores the behavior pattern in the temporary behavior pattern data 424. The information providing center server 420 also consolidates the temporary behavior pattern data 424 into the monthly behavior pattern data 425 and the behavior pattern data 423 at an appropriate timing. The details of the present step will be described later with reference to Figure 15.

[0112]

(Figure 14: step S1403)

The information providing center server 420, on the basis of the behavior pattern of the user extracted from the entire utilization history data 411, associates the user with the contents in the information content 422, and generates the content correspondence list 421 describing their correspondence relationship. The details of the present step will be described later with reference to Figure 17.

[0113]

(Figure 14: step S1404)

The information providing center server 420 divides the content correspondence list 421 generated in step S1403 on a station by station basis and delivers the list to the information providing station server 320. Similarly, the information content 422 is also divided on a station by station basis, and delivered to the information providing station server 320. The information providing station server 320 receives the content correspondence list 421 and the information content 422 intended for its own station, and stores them as the station-based content correspondence list 321 and the station-based information content 322.

[0114]

(Figure 14: step S1404: supplement No. 1)

The timing of implementation of the present step by the information providing center server 420 may be determined appropriately such that the station-based content correspondence list 321 and the station-based information content 322 that are to

be provided by the information providing station server 320 to the ticket gate machine 200 are not exhausted.

[0115]

(Figure 14: step S1404: supplement No. 2)

Regarding the station-based information content 322, from the viewpoint of simplifying delivery processing, all of the contents held in the information content 422 may be delivered as the station-based information content 322 as long as permitted by constraints, such as storage capacity.

[0116]

(Figure 14: step S1405)

The information providing station server 320 extracts, in each predetermined transmission time slot (in the present example, the time slot distinguished by the value in the time slot field 32103), the records in the content correspondence list stored in the station-based content correspondence list 321 up to the next transmission time slot, and transmits the records to the ticket gate machine 200. The ticket gate machine 200 stores the received content correspondence list as the time slot-based content correspondence list 202. The preceding time slot-based content correspondence list 202 may be discarded, or withdrawn as unused data. The details of the present step will be described later with reference to Figure 18.

[0117]

(Figure 14: step S1405: supplement)

In the present step, when a service interruption such as train delay is present, the information providing station server 320 acquires the irregular time content for users who are affected by the interruption, and transmits the content also to the ticket gate machine 200. The irregular time content may be stored in the station-based information content 322 in advance, or acquired from the center server group 400 in the event of disruption.

[0118]

(Figure 14: step S1406)

The ticket gate machine 200, when the user passes through the ticket gate machine 200, reads the user ID from the IC card ticket 100, and acquires the content ID associated with the user from the time slot-based content correspondence list 202. The ticket gate machine 200 presents the content associated with the content ID to the user on the screen of the content display unit 204.

[0119]

(Figure 14: step S1406: supplement)

The ticket gate machine 200 may acquire the content from the information providing station server 320 at the time of displaying the content on the screen, or the content may be acquired in advance as long as permitted by constraints such as storage capacity.

[0120]

<Detailed processing procedure of step S1402>

Figure 15 is a flowchart of the detailed processing procedure of step S1402 in Figure 14. In step S1402, the information providing center server 420 extracts the user behavior pattern from the utilization history of the day that is transmitted from each station at the end of the day's service, for example, and stores the pattern in the temporary behavior pattern 424. The information providing center server 420 merges the past temporary behavior pattern 424 when a certain amount of behavior pattern has been accumulated, such as after a month, and generates the monthly behavior pattern 425 or the behavior pattern 423. In the following, the steps of Figure 15 will be described.

[0121]

(Figure 15: step S428001)

The behavior pattern extraction unit 428 of the information providing center server 420 sorts a day's worth of the entire utilization history data 411 according to the user ID and the time. Thus, the utilization history of the IC card ticket 100 of the users that has been scattered among the stations can be consolidated.

[0122]

(Figure 15: step S428002)

The behavior pattern extraction unit 428 initializes a variable i for storing the number of utilization histories processed; a variable ID for storing the user ID; a variable Sc for storing the station name of the i-th utilization history; a variable Sp for storing the station name of the i-1-th utilization history; a variable Dc for storing the day of the week of the i-th utilization history; a variable Dp for storing the day of the week of the i-1-th utilization history; a variable Tc for storing the time slot of the i-th utilization history; and a variable Tp for storing the time slot of the i-1-th utilization history.

[0123]

(Figure 15: steps S428003 to S428004)

The behavior pattern extraction unit 428 adds one to i (S428003). If i is smaller than the number of utilization histories for the day, the process goes to step S428005; if not, the process skips to step S428011.

[0124]

(Figure 15: steps S428005 to S428006)

The behavior pattern extraction unit 428 acquires the i-th utilization history (S428005). The behavior pattern extraction unit 428 stores the user ID for the i-th entire utilization history data 411 in ID and the station name in Sc. Further, the behavior pattern extraction unit 428 acquires the day of the week and the time slot from the time field 41103 of the i-th entire utilization history data 411 and stores them in Dc and Tc, respectively (S428006).

[0125]

(Figure 15: step S428007)

When the process field 41102 of the i-th entire utilization history data 411 is "entry", the process goes to step S428008; if not, the process skips to step S428009.

[0126]

(Figure 15: step S428008)

The behavior pattern extraction unit 428 stores Sc in Sp, Dc in Dp, and Tc in Tp. Thereafter, the process returns to step S428003.

[0127]

(Figure 15: step S428009)

The behavior pattern extraction unit 428 stores the record with station name = Sp, day of the week = Dp, time slot = Tp, and departure/destination station = Sc as the record for the temporary behavior pattern data 424 with the user ID = ID. If the same pattern is already stored in the temporary behavior pattern data 424, the frequency field is incremented by one; if not, a new record is generated while setting the frequency = 1.

[0128]

(Figure 15: step S428010)

The behavior pattern extraction unit 428 stores the record with station name = Sc, day of the week = Dc, time slot = Tc, and departure/destination = Sp in the temporary behavior pattern data 424. Thereafter, the process returns to step S428003.

[0129]

(Figure 15: step S428011)

The behavior pattern extraction unit 428 determines the type of the station that each user has utilized. The details of this processing procedure will be described later with reference to Figure 16.

[0130]

(Figure 15: step S428012)

If the date of implementation of the present process flow is the end of the month, the process goes to step S428013; if not, the present process is terminated.

[0131]

(Figure 15: step S428013)

The behavior pattern extraction unit 428 consolidates the past one month's worth of the temporary behavior pattern data 424 into the monthly behavior pattern data 425, and consolidates the past six months' worth of the monthly behavior

pattern data 425 in the behavior pattern data 423.

[0132]

<Detailed processing procedure of step S428011>

Figure 16 is a flowchart of the detailed processing procedure of step S428011 of Figure 15. In step S428011, with regard to the utilization history of all users that is held in the behavior pattern data 423, the type of station is determined by using the utilization frequency of the station that the user used, the day of the week of utilization, and the time slot of utilization. In the following, the steps of Figure 16 will be described.

[0133]

(Figure 16: steps S42801101 to S42801103)

The behavior pattern extraction unit 428 initialize the variable i for storing the number of users by setting "0" (S42801101). The behavior pattern extraction unit 428 increments i by one (S42801102). If i is smaller than the total number of users, the process goes to step S42801104; if not, the present process is terminated (S42801103).

[0134]

(Figure 16: steps S42801104 to S42801106)

Of all the stations that the i-th user utilized, the behavior pattern extraction unit 428 sets "home" as the station type of the station that is most often exited at night (S42801104). As the station type of the station that is most often exited in the morning or during daytime and that is most often entered in the evening or at night on a weekday, "work" is set (S42801105). As the station type of the station that is most often exited on a holiday, "private" is set (S42801106).

[0135]

(Figure 16: steps S42801104 to S42801106: supplement)

The method for determining the station type is not limited to the above. In another method, "home" may be set as the station type of the station that is most often exited at the end of the day; "work" may be set as the station type of the station that is

most often exited in the morning or during daytime and entered in the evening or at night on a weekday, with a long time period between the entry and exit (such as 7 hours or longer); and "private" may be set as the station type of the station that is most often exited on a holiday and that is neither "home" nor "work".

[0136]

<Detailed processing procedure of step S1403>

Figure 17 is a flowchart of the detailed processing procedure of step S1403 of Figure 14. In step S1403, the information providing center server 420 associates, on the basis of the behavior pattern of each user, the information content stored in the individual information content 422 with all of the users held in the behavior pattern data 423. In the following, the steps of Figure 17 will be described.

[0137]

(Figure 17: steps S427001 to S427003)

The information content correspondence unit 427 of the information providing center server 420 initializes the variable i for storing the number of users by setting zero (S427001). The information content correspondence unit 427 increments i by one (S427002). If i is smaller than the total number of users, the process goes to step S427004; if not, the present process is terminated (S427003).

[0138]

(Figure 17: steps S427004 to S427006)

The information content correspondence unit 427 initializes the variable j for storing the number of behavior patterns of the i-th user by setting zero (S427004). The information content correspondence unit 427 increments j by one (S427005). If j is smaller than the number of behavior patterns of the i-th user, the process goes to step S427007; if not, the process returns to step S427002 (S427006).

[0139]

(Figure 17: step S427007)

The information content correspondence unit 427 advances to step S427008 if the utilization frequency of the j-th behavior pattern of the i-th user is greater

than a predetermined number k; if not, the process returns to step S427005.

[0140]

(Figure 17: step S427007: supplement)

The present step is for excluding the station that the user is unlikely to pass through from content association. By the present step, a wasteful content correspondence list can be prevented from being stored in the information providing station server 320 and the ticket gate machine 200 of each station.

[0141]

(Figure 17: steps S427008 to S427009)

The information content correspondence unit 427 searches the information content 422 by using the station name, the entry/exit type, the day of the week, the time slot, and the line of the j-th behavior pattern of the i-th user as keys to acquire a record that matches the search conditions (S427008). If there is a matching record, the process goes to step S427010; if not, the process returns to step S427005 (S427009).

[0142]

(Figure 17: step S427010)

The information content correspondence unit 427 associates the ID of the content retrieved by the search in step S427008 as the information content corresponding to the j-th behavior pattern of the i-th user, and stores the correspondence relationship in the content correspondence list 421.

[0143]

<Detailed processing procedure of step S1405>

Figure 18 is a flowchart of the detailed processing procedure of step S1405 of Figure 14. In step S1405, the information providing station server 320 extracts the day-of-week/time slot based records from the station-based content correspondence list 321, and transmits them to the ticket gate machine 200. In the event of disruption such as a train delay, however, the information providing station server 320 may transmit the irregular time content to the ticket gate machine 200 instead

of, or together with, the station-based content correspondence list 321. In the following, the steps of Figure 18 will be described.

[0144]

(Figure 18: step S320001)

The content list reception unit 324 of the information providing station server 320 checks to see if there is disruption, such as a train delay. If there is service disruption, the process goes to step S320002; otherwise, the process goes to step S320005.

[0145]

(Figure 18: step S320002)

The content list reception unit 324 searches the station-based content correspondence list 321 with reference to the line or station at which the disruption such as service delay has occurred, and acquires the ID of the relevant user.

[0146]

(Figure 18: steps S320003 to S320004)

The content list transmission unit 323 acquires the irregular time content from the station-based information content 322 (S320003). The content list transmission unit 323 transmits the irregular time content to the ticket gate machine 200 (S320004). Thereafter, the process returns to step S320001.

[0147]

(Figure 18: step S320005)

If the current time slot is later than the time slot in which the regular time content was transmitted to the ticket gate machine 200 previously, the process goes to step S320006; if not, the process returns to step S320001.

[0148]

(Figure 18: step S320006)

The content list transmission unit 323 acquires a record from the station-based content correspondence list 321 that matches the current day of the week and time slot (S320006). The content list transmission unit 323 transmits the acquired

record to the ticket gate machine 200 as the regular time content (S320007).

[0149]

<Detailed processing procedure of step S1406>

Figure 19 is a flowchart of the detailed processing procedure of step S1406 of Figure 14. In step S1406, the ticket gate machine 200 reads the user ID from the IC card ticket 100 when the user passes through the ticket gate machine 200. After the ticket gate process is performed, the time slot-based content correspondence list 202 is referenced, and if the content corresponding to the user is found, the content is presented to the user. In the following, the steps of Figure 19 will be described.

[0150]

(Figure 19: step S204001)

The ticket gate machine 200 stands by in the present step until a user passes through the ticket gate machine 200. When the user passes through the ticket gate machine 200, the process goes to step 204002.

[0151]

(Figure 19: steps S204002 to S204003)

The ticket gate process unit 203 reads the ID of the user from the IC card ticket 100 (S204002). The content display unit 204 then searches for irregular time content by referring to the time slot-based content correspondence list 202. If there is the irregular time content corresponding to the user, the process goes to step S204004; if not, the process goes to step S204005.

[0152]

(Figure 19: step S204004)

The content display unit 204 displays the irregular time content on the display of the ticket gate machine 200. Thereafter, the process returns to step S204001.

[0153]

(Figure 19: step S204005)

The content display unit 204 searches for regular time content by referring to the time slot-based content correspondence list 202. If there is the regular

time content corresponding to the user, the process goes to step S204006; if not, the process goes to step S204007.

[0154]

(Figure 19: step S204006)

The content display unit 204 displays the regular time content on the display of the ticket gate machine 200. Thereafter, the process returns to step S204001.

[0155]

(Figure 19: step S204007)

The content display unit 204 displays default content on the display of the ticket gate machine 200. Thereafter, the process returns to step S204001.

[0156]

<First embodiment: summary>

As described above, the information providing station server 320 according to the first embodiment transmits the content correspondence list describing the correspondence relationship between the passenger and the information content to be presented to the passenger to the ticket gate machine 200 in each predetermined time slot. The content correspondence list that is transmitted at once may include data up to the next time slot. Thus, the ticket gate machine 200 needs to search for only the content correspondence list of each time slot when the passenger passes through the ticket gate machine 200. Accordingly, the processing load of the search for the information content associated with the passenger can be decreased.

[0157]

Further, according to the first embodiment, the process for decreasing the processing load of the search for the information content by the ticket gate machine 200 is performed by the information providing station server 320. Thus, the objective of displaying the information content matching the purpose of utilization of the station by the user on the ticket gate machine 200 at high speed can be achieved without modifying the hardware configuration of the existing ticket gate machine 200.

[0158]

Further, the information providing station server 320 according to the first embodiment holds the station-based content correspondence list 322 only for users whose utilization frequency of the station is not less than a predetermined number of times k. Thus, the information providing station server 320 and the ticket gate machine 200 at each station needs to hold the content correspondence list only for those passengers with a high likelihood of utilization of the station. Accordingly, the storage capacity for holding the content correspondence list can be saved, and search load can be decreased by a decrease in the amount of data that is searched.

[0159]

According to the first embodiment, in the event of train service disruption and the like, the information providing center server 420 identifies the passenger whose frequency of utilization of the station related to the line having the service disruption is not less than a predetermined number of times, and transmits the irregular time content for the passenger to the information providing station server 320 of the station. Thus, the information about the service disruption can be delivered only to the user who requires the information, whereby the likelihood of delivering unnecessary information to a user unrelated to the service disruption, and thus bothering the user, can be decreased.

[0160]

In the first embodiment, the information providing center server 420 estimates the station type on the basis of the station that each passenger uses during daytime, at night, and on a holiday, and the time slot. Further, the information providing center server 420 associates the information content corresponding to the station type with the passenger and stores their correspondence relationship in the content correspondence list 421. Thus, the information content matching the behavior pattern of the passenger can be displayed on the screen of the ticket gate machine 200 at an appropriate timing.

[0161]

<Second embodiment>

In step S427009 of Figure 17 described with reference to the first embodiment, if there is no relevant information content, the process returns to step S427005 so that the user and the content ID are not associated with each other. In this case, even if the user frequently utilizes the station, the information content and the user are not associated with each other if the j-th behavior pattern is not matched.

[0162]

However, even when no association is made with regard to regular time content, there may be cases in which it is desirable to make association with the user with regard to irregular time content. In this case, with regard to a user for whom the decision was "yes" in step S427007, only the user ID may be extracted and sent to the information providing station server 320. In this case, while the regular time content is not presented to the user, the irregular time content can be presented because it is known in step S427007 that the frequency of the behavior pattern is high and that the user often utilizes the station.

[0163]

Meanwhile, according to the first embodiment, it has been described that the information providing center server 420 transmits both the regular time content and the irregular time content to the information providing station server 320. Instead of, or in parallel with, this, the irregular time content may be transmitted from the service management center server 430 to the service management station server 330.

[0164]

In this case, the service management center server 430 acquires the irregular time content for each station from the information content 422, and delivers it to the service management station server 330 of the station. The service management station server 330 stores the received irregular time content in the station-based information content 322. The procedure for transmitting the irregular time content from the information providing station server 320 to the ticket gate machine 200 is similar to that illustrated in Figure 18.

[0165]

While the invention made by the present inventor has been described in specific terms, it should be obvious that the present invention is not limited to the foregoing embodiments and that various modifications can be made without departing from the scope of the invention.

[0166]

The configurations, functions, process units, and the like may be provided, either entirely or partially, in the form of hardware implemented as integrated circuits, for example, or they may be provided in the form of software, such as a program, executed by a processor for implementing the respective functions. The program for implementing the functions, and information of tables and the like may be stored in a storage apparatus such as a memory or a hard disk, or a store medium such as an IC card or a DVD.

REFERENCE SIGNS LIST

[0167]

1: Information providing system

100: IC card ticket

1001: CPU

1002: Nonvolatile memory

1003: Wireless communication unit

1004: Antenna

200: Ticket gate machine

201: Ticket gate machine utilization history data

20101: User ID field

20102: Process field

20103: Time field

20104: Entry station field

20105: Exit station field

202: Time slot-based content correspondence list

20201: User ID field

20202: Content ID field

203: Ticket gate process unit

204: Content display unit

2001: CPU

2002: Hard disk

2003: Memory

2004: Display

2005: Display control unit

2006: Wireless communication unit

2007: Antenna

300: Station server group

310: ID management station server

311: Station utilization history data

31101: User ID field

31102: Process field

31103: Time field

31104: Entry station field

31105: Exit station field

312: Utilization history collection unit

313: Utilization history transmission unit

320: Information providing station server

321: Station-based content correspondence list

32101: Entry/exit field

32102: Day-of-week field

32103: Time slot field

32104: User ID field

32105: Content ID field

32106: Route field

32107: Departure/destination station field

322: Station-based information content

32201: Content ID field

32202: Ticket gate machine display content field

323: Content list transmission unit

324: Content list reception unit

330: Service management station server

331: Station schedule information

332: Irregularity notification unit

400: Center server group

410: ID management center server

411: Entire utilization history data

41101: User ID field

41102: Process field

41103: Time field

41104: Entry station field

41105: Exit station field

412: Utilization history reception unit

420: Information providing center server

421: Content correspondence list

42101: Station name field

42102: Entry/exit field

42103: Day-of-week field

42104: Time slot field

42105: User ID field

42106: Content ID field

42107: Route field

42108: Departure/destination station field

422: Information content

42201: Content ID field

42202: Presentation condition field

422021: Station field

422022: Entry/exit field

422023: Type field

422024: Day-of-week field

422025: Time slot field

422026: Line field

42203: Ticket gate machine display content field

42204: Detailed display content field

423: Behavior pattern data

42301: User ID field

42302: Entry/exit field

42303: Station name field

42304: Type field

42305: Day-of-week field

42306: Time slot field

42307: Line field

42308: Departure/destination station field

42309: Frequency field

424: Temporary behavior pattern data

425: Monthly behavior pattern data

426: Content list delivery unit

427: Information content correspondence unit

428: Behavior pattern extraction unit

4201: CPU

4202: Hard disk

4203: Memory

4204: Display

4205: Display control unit

4206: Keyboard

4207: Keyboard control unit

4208: Mouse

4209: Mouse control unit

430: Service management center server

431: Schedule information

432: Irregularity notification unit

500: Cellular phone

501: Carrier

502: Network

600: Information terminal

700: Digital signage

CLAIMS

[Claim 1]

An information providing server apparatus comprising:

a network interface for connection with a network;

a processor for communication via the network interface;

and a storage unit that stores a content correspondence list describing a correspondence relationship between information presented by a ticket gate machine at a station and a passenger to whom the ticket gate machine is to present the information,

wherein the processor transmits, in each predetermined transmission time slot, the content correspondence list describing the correspondence relationship up to the start of the next transmission time slot to the ticket gate machine.

[Claim 2]

The information providing server apparatus according to claim 1, wherein the content correspondence list describes the correspondence relationship between a behavior pattern at the time of the passenger passing through the ticket gate machine and the information that the ticket gate machine is to present to the passenger behaving in accordance with the behavior pattern.

[Claim 3]

The information providing server apparatus according to claim 2, wherein:

the content correspondence list describes, as the behavior pattern, an entry/exit distinction at the time of the passenger passing through the ticket gate machine, the day of the week on which the passenger passes through the ticket gate machine, and a time slot in which the passenger passes through the ticket gate machine; and

the content correspondence list further describes the correspondence relationship between the information and the passenger to whom the ticket gate machine is to present the information for each of the entry/exit distinction, the day of the week,

and the time slot.

[Claim 4]

The information providing server apparatus according to claim 2, wherein:

the content correspondence list describes, as the behavior pattern, a combination of a station entered by the passenger and a destination station or a combination of a station exited by the passenger and a departure station, and an inter-station route; and

the content correspondence list further describes, for each of the combination and the inter-station route, the correspondence relationship between the information and the passenger to whom the ticket gate machine is to present the information.

[Claim 5]

The information providing server apparatus according to claim 2, wherein the content correspondence list describes the correspondence relationship between the information and the passenger to whom the ticket gate machine is to present the information only with respect to the behavior pattern of which the frequency of occurrence is not less than a predetermined number.

[Claim 6]

The information providing server apparatus according to claim 4, wherein:

the processor, upon reception of information indicating the presence of disruption in train service, identifies from among the passengers described in the content correspondence list the passenger of whom the inter-station route includes a route having the disruption; and

the processor generates the content correspondence list associating service information about the line having the disruption and the identified passenger, and immediately transmits the content correspondence list to the ticket gate machine.

[Claim 7]

An information providing system comprising:

the information providing server apparatus according to claim 2; and

a center server apparatus that provides the content correspondence list to the information providing server apparatus,

wherein:

the information providing server apparatus is installed at the station, and the center server apparatus is connected to the information providing server apparatus via the network; and

the center server apparatus generates the content correspondence list for each station by extracting the behavior pattern from a utilization history of an IC card ticket held by the passenger, and transmits the content correspondence list to the information providing server apparatus installed at each station.

[Claim 8]

An information providing system comprising:

the information providing server apparatus according to claim 4; and

a center server apparatus that provides the content correspondence list to the information providing server apparatus,

wherein:

the information providing server apparatus is installed at the station, and the center server apparatus is connected to the information providing server apparatus via the network;

the center server apparatus determines that the station for which the number of times of exit of the passenger is the greatest at night is utilized by the passenger as the nearest station to home, that the station for which the number of times of exit of the passenger is the greatest during daytime and for which the number of times of entry of the passenger is the greatest in the evening or at night is utilized by the passenger as the nearest station to work, or that the station for which the number of times of exit of the passenger is the greatest on a holiday is utilized by the passenger as a station for private purpose; and

the center server apparatus generates, according to the above determinations, the content correspondence list describing a station type classified by the purpose of utilization of the station by the passenger, and transmits the generated content correspondence list to the information providing server apparatus installed in the station matching the classification of the station type.

FIG. 1

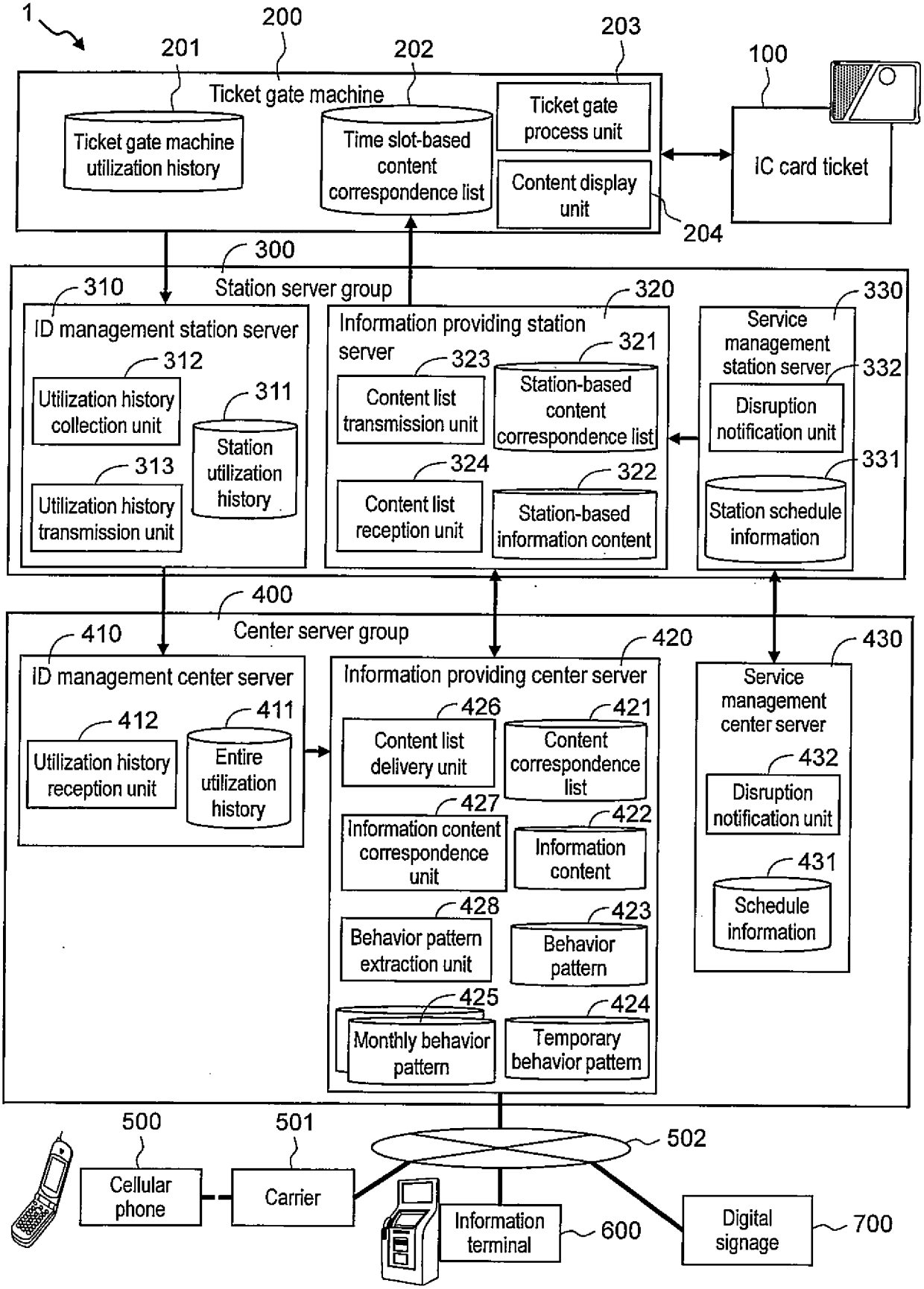

1
200
201
202
203
100
Ticket gate machine
Ticket gate machine utilization history
Time slot-based content correspondence list
Ticket gate process unit
Content display unit
IC card ticket
204
300
Station server group
310
ID management station server
312
Utilization history collection unit
311
Station utilization history
313
Utilization history transmission unit
320
Information providing station server
321
323
Content list transmission unit
Station-based content correspondence list
324
322
Content list reception unit
Station-based information content
330
Service management station server
332
Disruption notification unit
331
Station schedule information
400
Center server group
410
ID management center server
412
411
Utilization history reception unit
Entire utilization history
420
Information providing center server
426
421
Content list delivery unit
Content correspondence list
427
422
Information content correspondence unit
Information content
428
423
Behavior pattern extraction unit
Behavior pattern
425
424
Monthly behavior pattern
Temporary behavior pattern
430
Service management center server
432
Disruption notification unit
431
Schedule information
500
501
502
Cellular phone
Carrier
Information terminal
600
Digital signage
700

FIG. 2

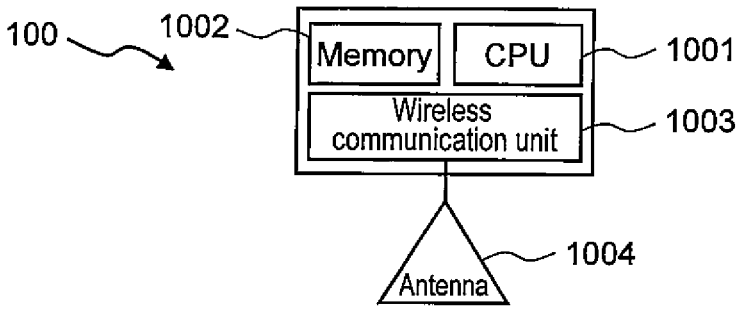

100
1002
Memory
CPU
1001
Wireless communication unit
1003
Antenna
1004

FIG. 3

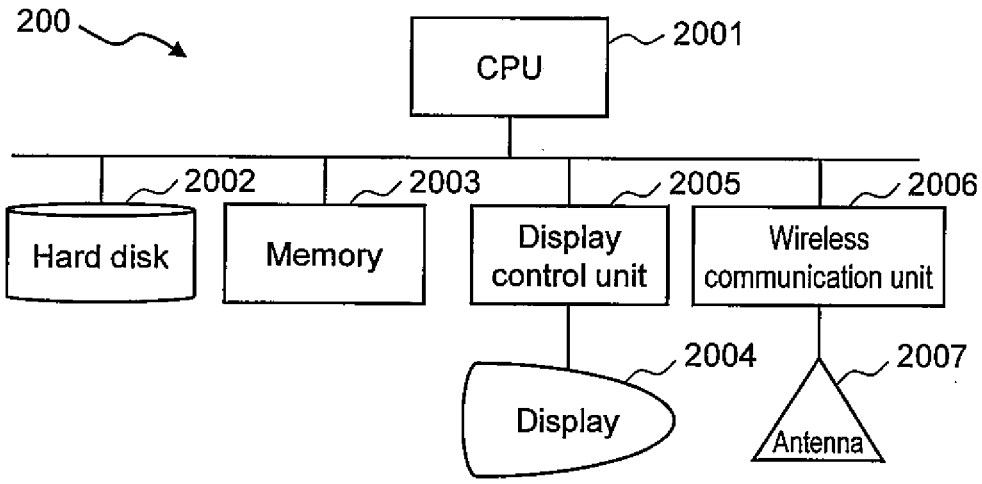

200
CPU
2001
2002
2003
2005
2006
Hard disk
Memory
Display control unit
Wireless communication unit
2004
2007
Display
Antenna

FIG. 4

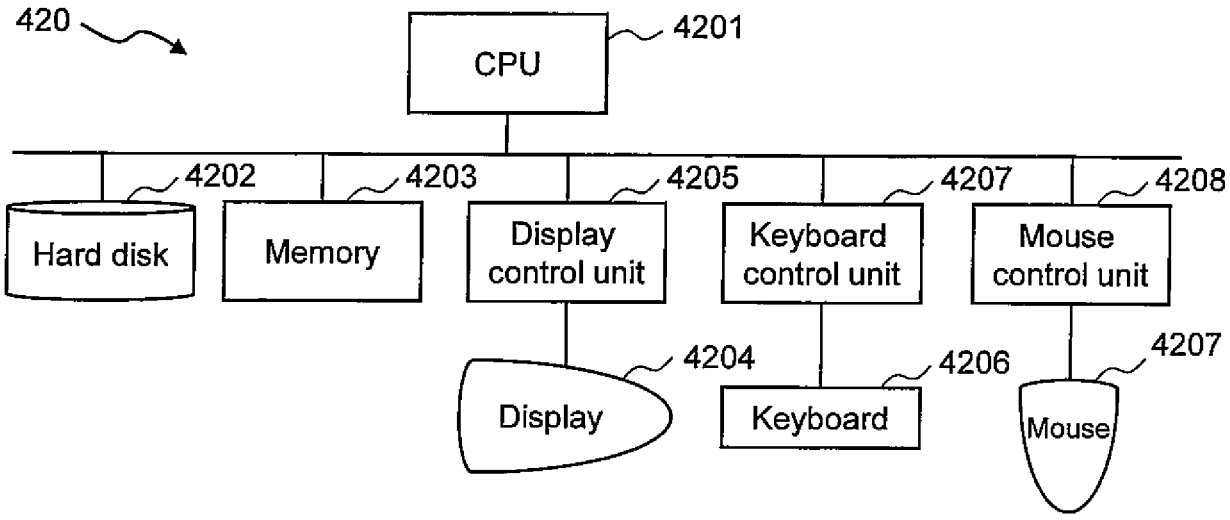


FIG. 5

201

20101 User ID	20102 Process	20103 Time	20104 Entry station	20105 Exit station
U001	Entry	2010/12/1 08:00	X station	-
U002	Entry	2010/12/1 08:05	X station	-
U003	Exit	2010/12/1 08:08	Y station	X station
...				

FIG. 6

(a)

202

20201 User ID	20202 Content ID
U001	CC002
U003	CC011
U004	CC012

(b)

User ID	Content ID
U003	CE0003
U007	CE0008
...	...

FIG. 7

31101 User ID	31102 Process	31103 Time	31104 Entry station	31105 Exit station
U001	Entry	2010/12/1 08:00	X station	-
U002	Entry	2010/12/1 08:05	X station	-
U003	Exit	2010/12/1 08:08	Y station	X station
...				
U002	Exit	2010/12/1 22:02	P station	X station
U008	Exit	2010/12/1 22:10	O station	X station

FIG. 8

32101 Entry /Exit	32102 Day-of-week	32103 Time slot	32104 User ID	32105 Content ID	32106 Route	32107 Departure/ Destination station
Entry	Weekday	Morning	U001	CC002	Chuo line (up)	Y station
			U003	CC011	...	P station
			U004	CC012	...	Q station
	Holiday	Noon	U001	CC013	...	Z station
			...		...	
Exit	Weekday	Night	U001	CC001	...	Y station
			U003	CC014	...	P station
			U004	CC015	...	Q station
	Holiday	Night	U001	CC010	...	Z station
			...		...	

FIG. 9

32201 Content ID	32202 Ticket gate machine display
CC01	Book store open until 10 pm
CC02	Juice stand open early morning
CC03	Inside Z station cafe lunch
CE01	Chuo line (up) delayed
...	

FIG. 10

41101 User ID	41102 Process	41103 Time	41104 Entry station	41105 Exit station
U003	Entry	2010/12/1 07:45	Y station	-
U001	Entry	2010/12/1 08:00	X station	-
U002	Entry	2010/12/1 08:05	X station	-
U003	Exit	2010/12/1 08:08	Y station	X station
...				
U001	Exit	2010/12/1 08:37	X station	Z station

FIG. 11

42101 Station name	42102 Entry /Exit	42103 Day-of -week	42104 Time slot	42105 User ID	42106 Content ID	42107 Route	42108 Departure/ Destination station
X station	Entry	Weekday	Morning	U001	CC002	Chuo line (up)	Y station
				U003	CC011	Chuo line (up), Yamanote line (inner)	P station
				U004	CC012	Chuo line (up)	Q station
		Holiday	Noon	U001	CC013	Chuo line (up), Keio-inokashira line (up)	Z station
	Exit	Weekday	Night	U001	CC001	Chuo line (down)	Y station
				U003	CC014	Yamanote line (outer), Chuo line (down)	P station
				U004	CC015	Chuo line (down)	Q station
		Holiday	Night	U001	CC010	Keio-inokashira line (down), Chuo line (down)	Z station
Y station	Entry	Weekday	Night	U001	CC016	Chuo line (up)	X station
	Exit	Weekday	Morning	U001	CC0017	Chuo line (down)	X station
Z station	Entry	Holiday	Noon	U001	CC0018	Chuo line (up), Keio-inokashira line (up)	X station
	Exit	Holiday	Night	U001	CC0019	Chuo line (down), Keio-inokashira line (down)	X station

FIG. 12

Content ID (42201)	Presentation condition (42202)						Ticket gate machine display (42203)	Detailed display (42204)
	Station (422021)	Entry/Exit (422022)	Type (422023)	Day-of-week (422024)	Time slot (422025)	Line (422026)		
CC01	X station	Exit	-	-	Night	-	Book store open until 10 pm	...
CC02	X station/R station	Entry	Home	Weekday	Morning	-	Juice stand open early morning	...
CC03	Y station/P station /Q station	Entry	Work	Weekday	Daytime	Chuo line (up)	Inside Z station cafe lunch	...
CC04	Y station	Exit	Home	-	Evening	-	Deli time service	...
CC05	Z station	Exit	Private	Holiday	Daytime	-	Shop open	...
CC06	...						...	

Content ID	Presentation condition						Ticket gate machine display	Detailed display
	Station	Entry/Exit	Type	Day-of-week	Time slot	Line		
CE01	-	Entry	-	-	-	Chuo line (up)	Chuo line (up) delayed	Chuo line (up) train delayed at X:XX
CE02	-	Entry	-	-	-	Chuo line (down)	Chuo line (down) delayed	...
CE03	-	Entry	-	-	-	Yamanote line (inner)	Yamanote line (inner) delayed	
CE04	-	Entry	-	-	-	Yamanote line (outer)	Yamanote line (outer) delayed	

FIG. 13

42301 User ID	42302 Entry/Exit	42303 Station name	42304 Type	42305 Day-of-week	42306 Time slot	42307 Line	42308 Departure/ Destination station	42309 Frequency
U001	Entry	X station	Home	Weekday	Morning	Chuo line (up)	Y station	120
				Holiday	Noon	Chuo line (up), Keio-inokashira line (up)	Z station	1
		Y station	Work	Weekday	Night	Chuo line (down)	X station	20
		Z station	Private	Holiday	Night	Chuo line (down), Keio-inokashira line (down)	X station	18
	Exit	X station	Home	Weekday	Night	Chuo line (down)	Y station	140
				Holiday	Night	Chuo line (down), Keio-inokashira line (down)	Z station	6
		Y station	Work	Weekday	Morning	Chuo line (up)	X station	20
		Z station	Private	Holiday	Noon	Chuo line (up), Keio-inokashira line (up)	X station	18
U002	Entry	P station	Home	Weekday	Morning	Sobu line (up)	Q station	
		Q station	Work	Weekday	Night	Sobu line (down)	P station	
	Exit	P station	Home	Weekday	Night	Sobu line (down)	Q station	
		Q station	Work	Weekday	Morning	Sobu line (up)	P station	

FIG. 14

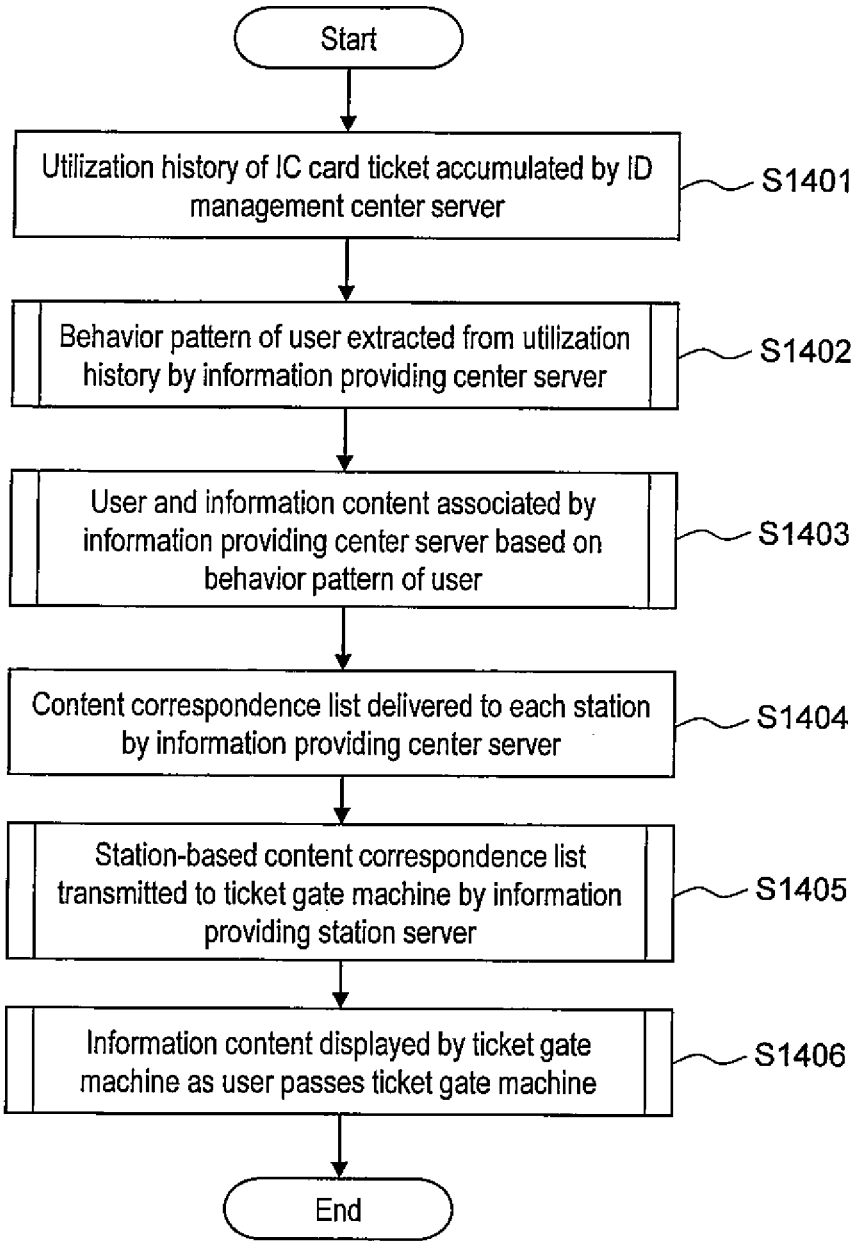

Start
Utilization history of IC card ticket accumulated by ID management center server
S1401
Behavior pattern of user extracted from utilization history by information providing center server
S1402
User and information content associated by information providing center server based on behavior pattern of user
S1403
Content correspondence list delivered to each station by information providing center server
S1404
Station-based content correspondence list transmitted to ticket gate machine by information providing station server
S1405
Information content displayed by ticket gate machine as user passes ticket gate machine
S1406
End

FIG. 15

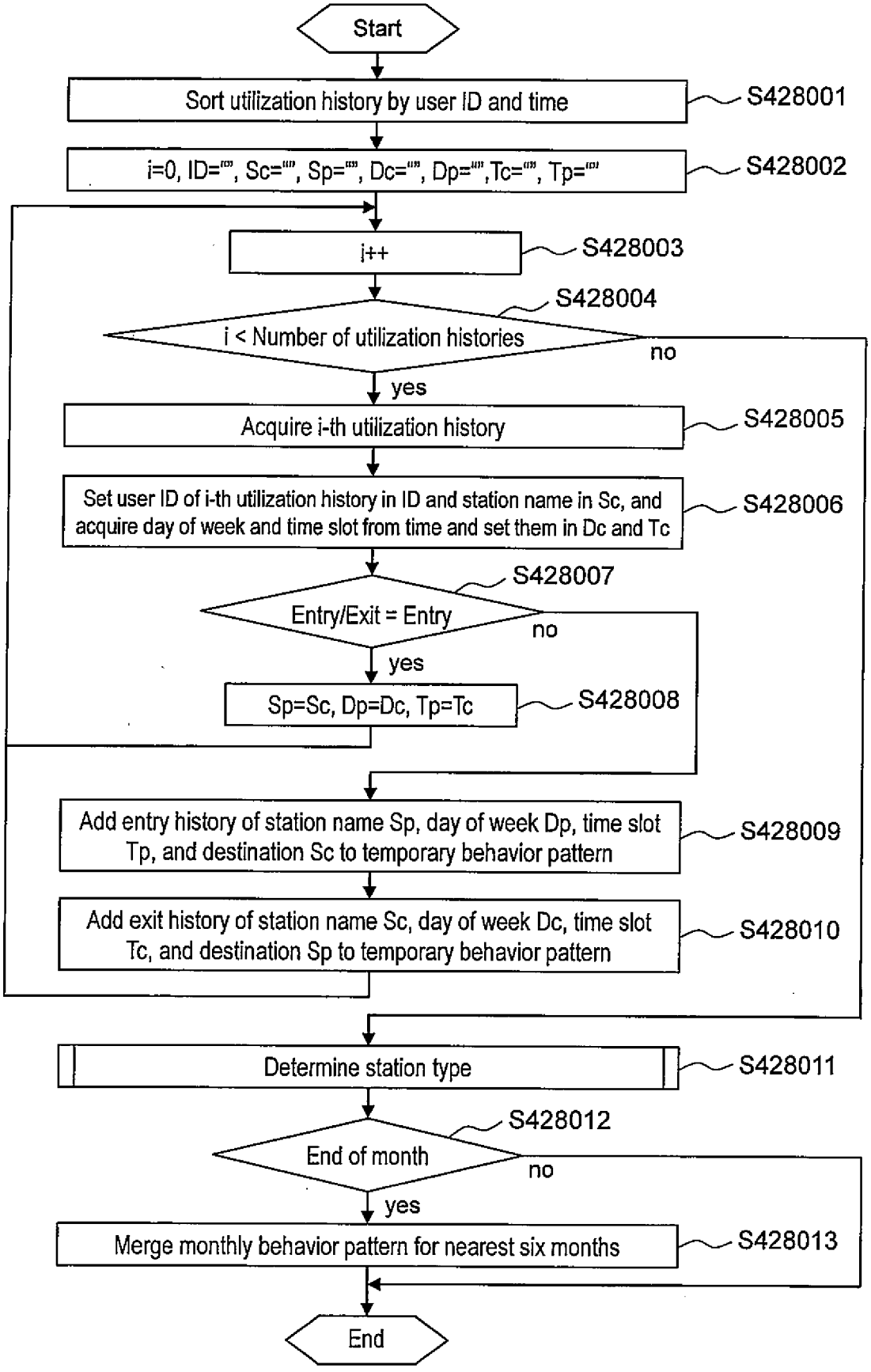

Start
Sort utilization history by user ID and time
S428001
i=0, ID="", Sc="", Sp="", Dc="", Dp="",Tc="", Tp=""
S428002
i++
S428003
S428004
i < Number of utilization histories
no
yes
Acquire i-th utilization history
S428005
Set user ID of i-th utilization history in ID and station name in Sc, and acquire day of week and time slot from time and set them in Dc and Tc
S428006
S428007
Entry/Exit = Entry
no
yes
Sp=Sc, Dp=Dc, Tp=Tc
S428008
Add entry history of station name Sp, day of week Dp, time slot Tp, and destination Sc to temporary behavior pattern
S428009
Add exit history of station name Sc, day of week Dc, time slot Tc, and destination Sp to temporary behavior pattern
S428010
Determine station type
S428011
S428012
End of month
no
yes
Merge monthly behavior pattern for nearest six months
S428013
End

FIG. 16

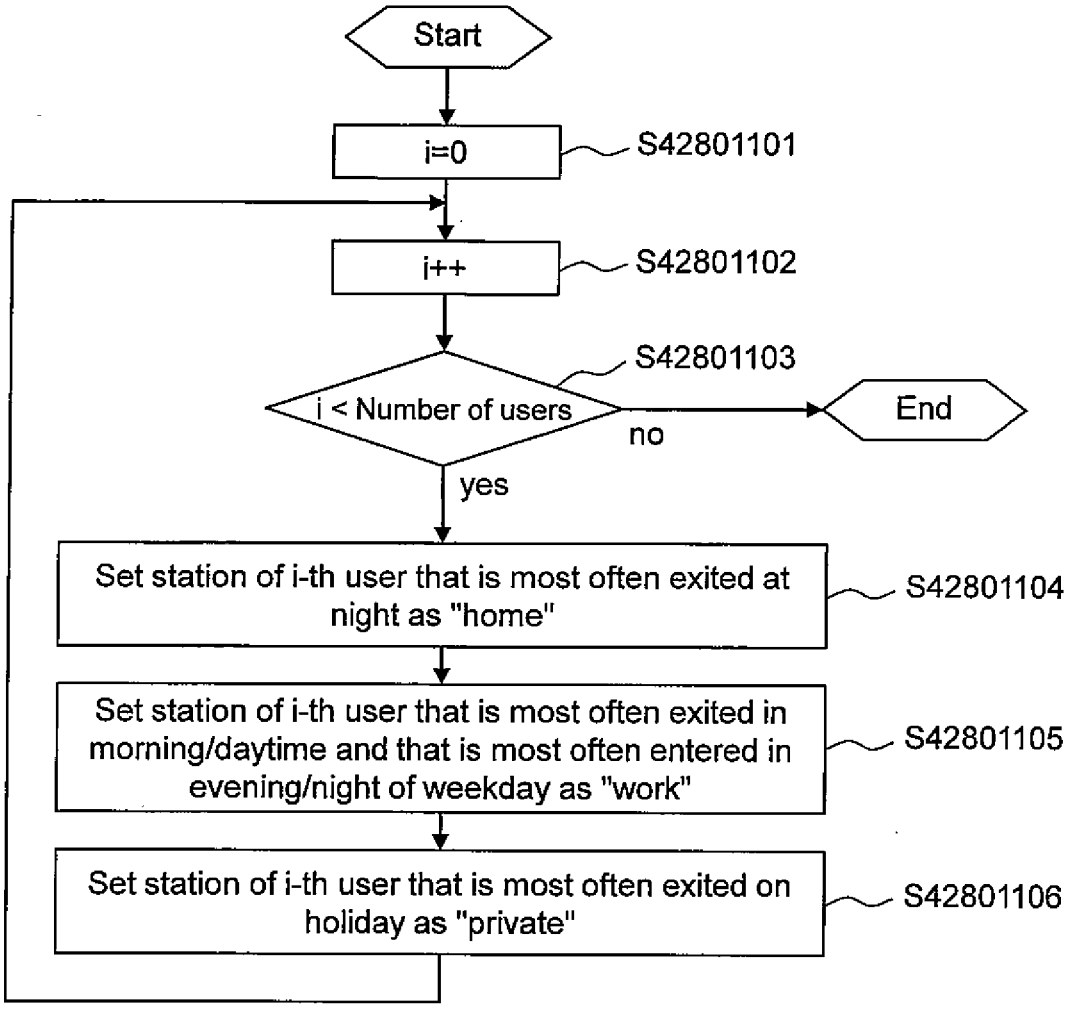

Start
i=0
S42801101
i++
S42801102
S42801103
i < Number of users
no
End
yes
Set station of i-th user that is most often exited at night as "home"
S42801104
Set station of i-th user that is most often exited in morning/daytime and that is most often entered in evening/night of weekday as "work"
S42801105
Set station of i-th user that is most often exited on holiday as "private"
S42801106

FIG. 17

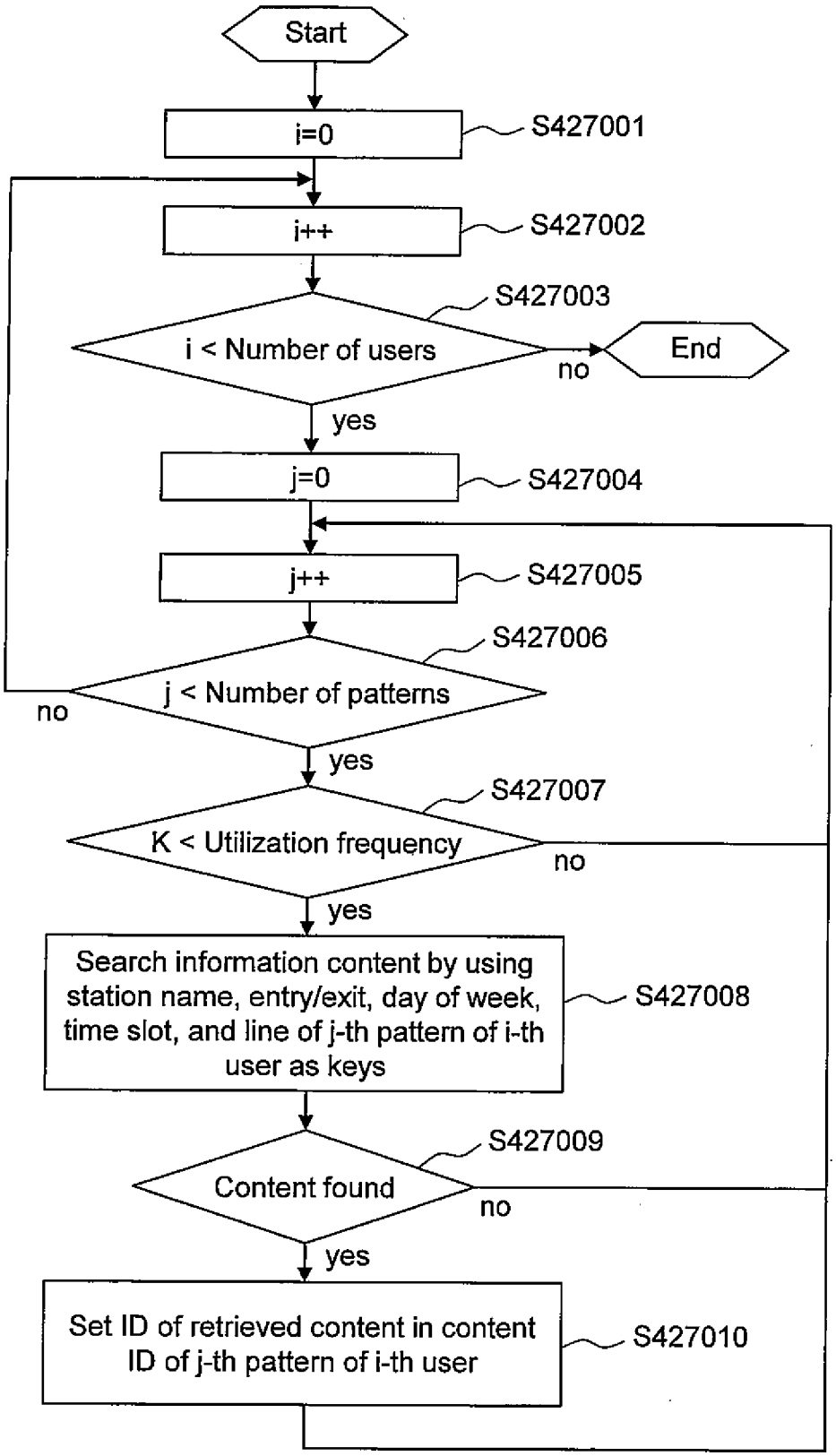

Start
i=0
S427001
i++
S427002
S427003
i < Number of users
no
End
yes
j=0
S427004
j++
S427005
S427006
j < Number of patterns
no
yes
S427007
K < Utilization frequency
no
yes
Search information content by using station name, entry/exit, day of week, time slot, and line of j-th pattern of i-th user as keys
S427008
S427009
Content found
no
yes
Set ID of retrieved content in content ID of j-th pattern of i-th user
S427010

FIG. 18

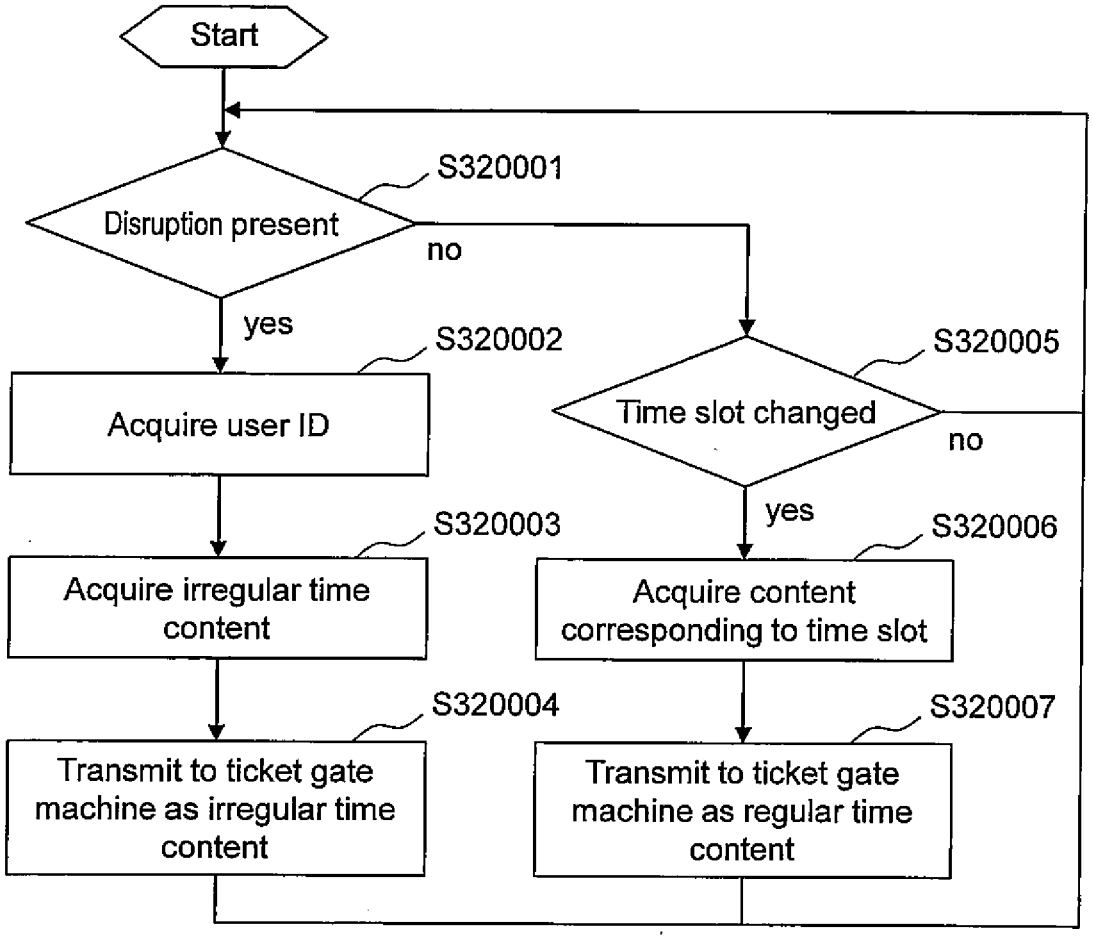
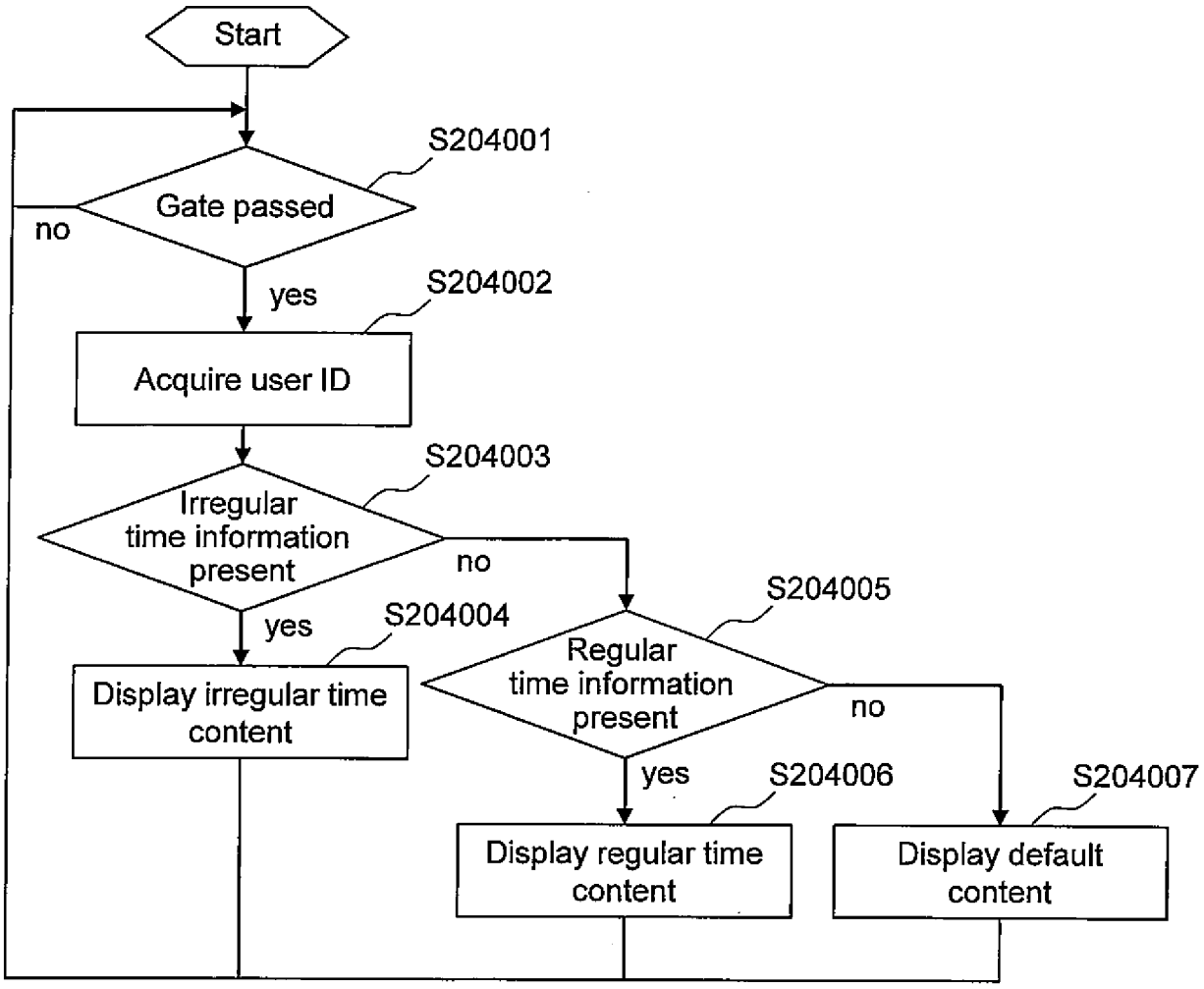

Start
S320001
Disruption present
no
yes
S320002
Acquire user ID
S320005
Time slot changed
no
yes
S320003
Acquire irregular time content
S320006
Acquire content corresponding to time slot
S320004
Transmit to ticket gate machine as irregular time content
S320007
Transmit to ticket gate machine as regular time content

FIG. 19


Start
S204001
Gate passed
no
yes
S204002
Acquire user ID
S204003
Irregular time information present
no
yes
S204004
Display irregular time content
S204005
Regular time information present
no
yes
S204006
Display regular time content
S204007
Display default content