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(54) **DISPLAY CONTROL DEVICE, DISPLAY CONTROL SYSTEM, AND DISPLAY CONTROL METHOD**

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(57) **ABSTRACT**

It is an object of the present invention to set concealment targets suited to a user, as to a display of a display device mounted on a vehicle, without requiring user's time and effort. A navigation device includes a communication unit for receiving a classification criterion in accordance with an attribute of a user, from a server, a classification unit for classifying the display information into the confidential information and the non-confidential information on the basis of the classification criterion received by the communication unit, and a display control unit for performing a display control of a display device so that the confidential information and the non-confidential information should be displayed in a first display mode and the confidential information should not be displayed and the non-confidential information should be displayed in a second display mode.

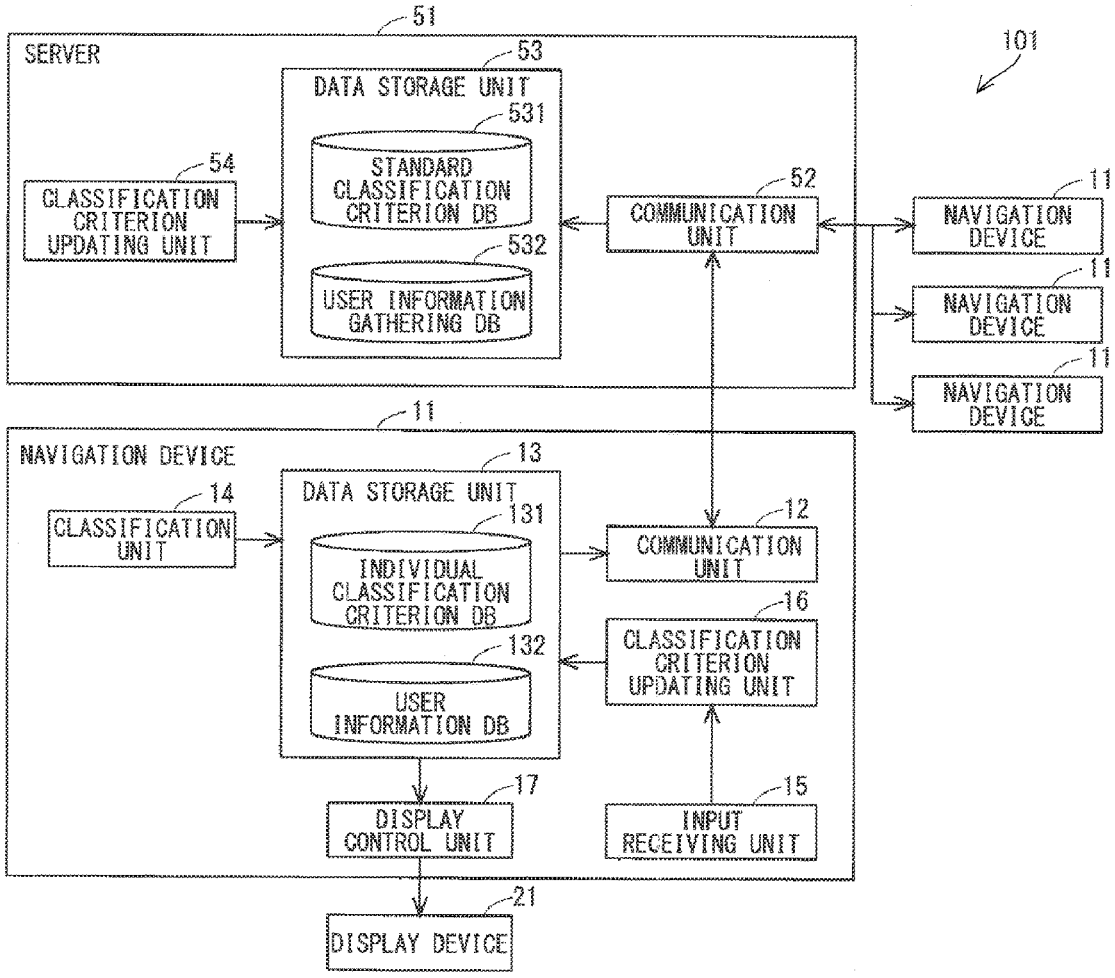


FIG. 1

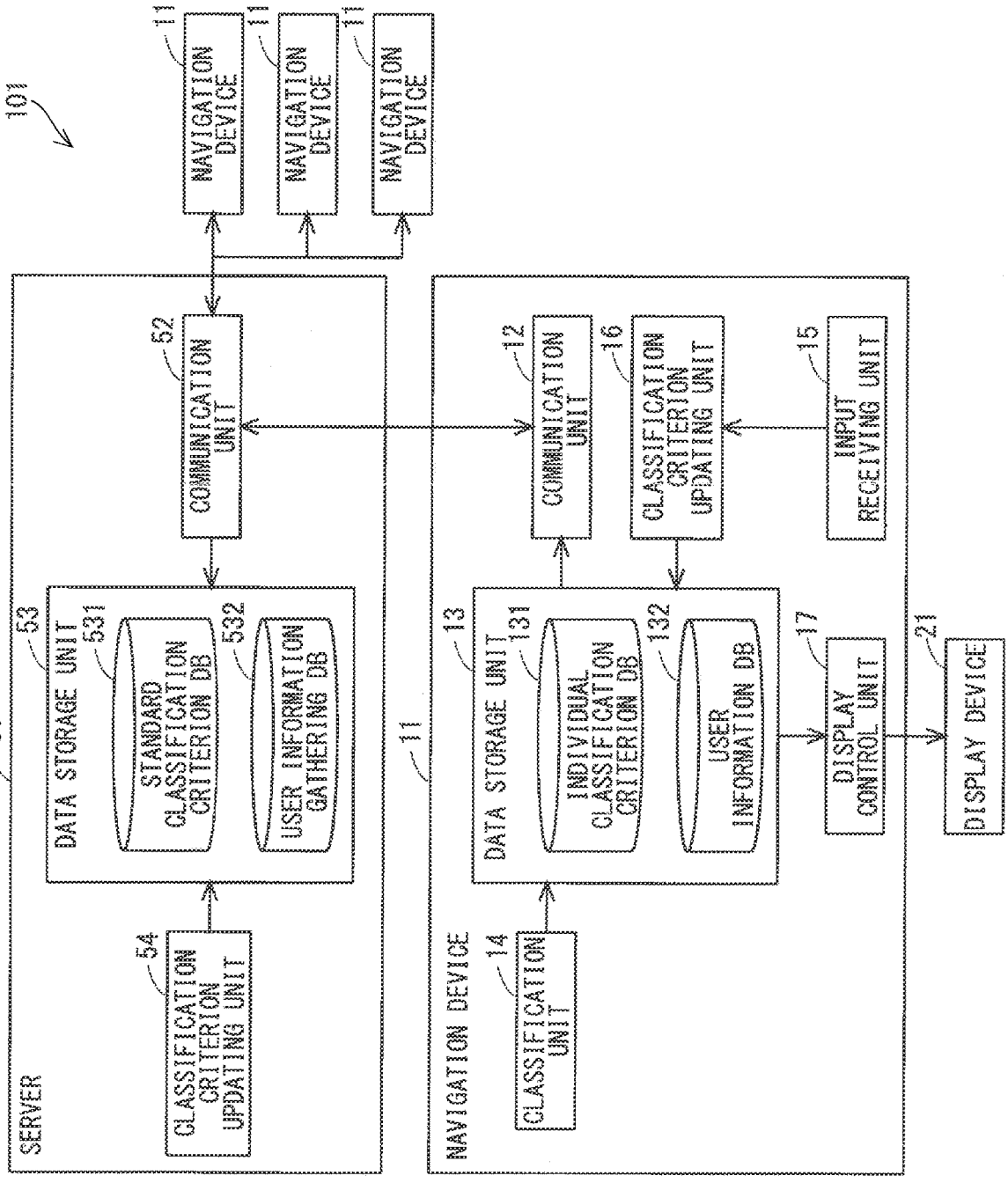

101
NAVIGATION DEVICE
11
NAVIGATION DEVICE
11
NAVIGATION DEVICE
11
SERVER
51
COMMUNICATION UNIT
52
DATA STORAGE UNIT
53
STANDARD CLASSIFICATION CRITERION DB
531
USER INFORMATION GATHERING DB
532
CLASSIFICATION CRITERION UPDATING UNIT
54
NAVIGATION DEVICE
11
COMMUNICATION UNIT
12
DATA STORAGE UNIT
13
INDIVIDUAL CLASSIFICATION CRITERION DB
131
USER INFORMATION DB
132
CLASSIFICATION UNIT
14
CLASSIFICATION CRITERION UPDATING UNIT
16
INPUT RECEIVING UNIT
15
DISPLAY CONTROL UNIT
17
DISPLAY DEVICE
21

FIG. 2

USER ATTRIBUTE NO.	NAVIGATION				TELEPHONE			AV	...
001	GENRE SEARCH HISTORY	REGISTERED PLACE	LANDMARK SETTING	...	CALL HISTORY	TELEPHONE DIRECTORY	...	PLAYLIST	...
002	GENRE SEARCH HISTORY	REGISTERED PLACE	DESTINATION HISTORY	...	CALL HISTORY	TELEPHONE DIRECTORY	...	PLAYLIST	...
003	GENRE SEARCH HISTORY	REGISTERED PLACE	LANDMARK SETTING	...	CALL HISTORY	TELEPHONE DIRECTORY	...	ALL PLAYED SONGS	...
004	GENRE SEARCH HISTORY	REGISTERED PLACE	DESTINATION HISTORY	...	CALL HISTORY	TELEPHONE DIRECTORY	...	ALL PLAYED SONGS	...
005	GENRE SEARCH HISTORY	REGISTERED PLACE	LANDMARK SETTING	...	CALL HISTORY	TELEPHONE DIRECTORY	...	ALL PLAYED SONGS	...
...	...	...	...	...	...	...	...	...	...

FIG. 3

AGE	MALE	FEMALE
TWENTIES(20' S)	001	002
THIRTIES(30' S)	003	004
FOURTIES(40' S)	005	006
FIFTIES(50' S)	007	008
SIXTIES OR HIGHER (60' S OR HIGHER)	009	010

FIG. 4

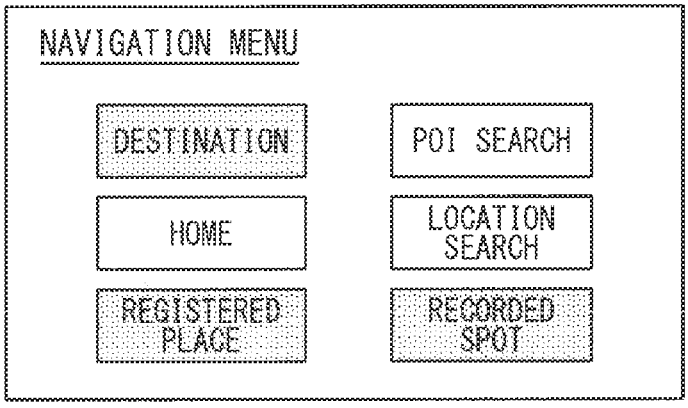


FIG. 5

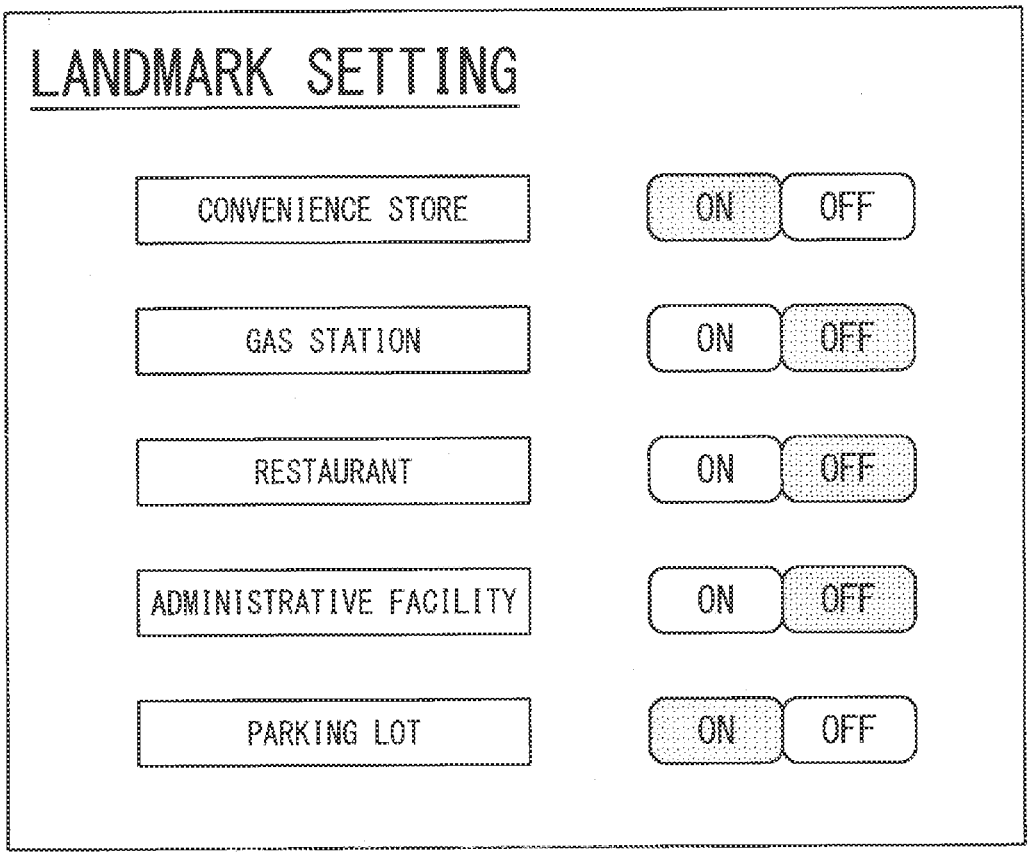

LANDMARK SETTING
CONVENIENCE STORE
ON
OFF
GAS STATION
ON
OFF
RESTAURANT
ON
OFF
ADMINISTRATIVE FACILITY
ON
OFF
PARKING LOT
ON
OFF

FIG. 6

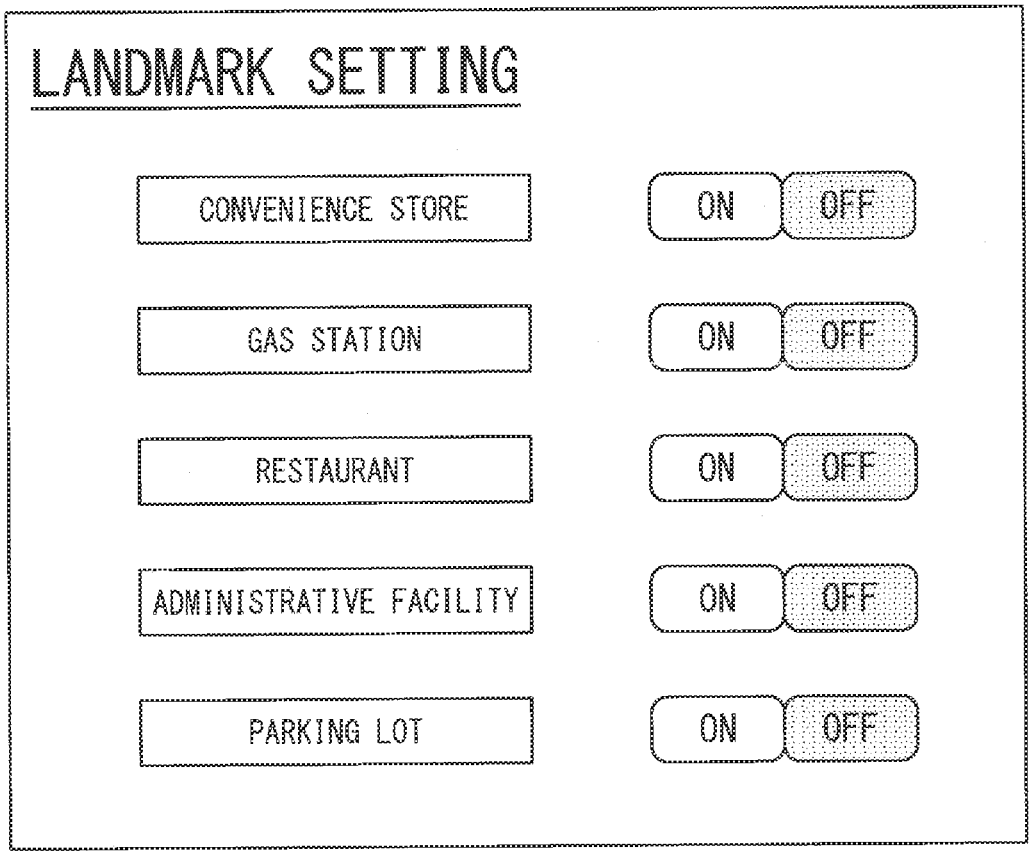

LANDMARK SETTING
CONVENIENCE STORE
ON
OFF
GAS STATION
ON
OFF
RESTAURANT
ON
OFF
ADMINISTRATIVE FACILITY
ON
OFF
PARKING LOT
ON
OFF

FIG. 7

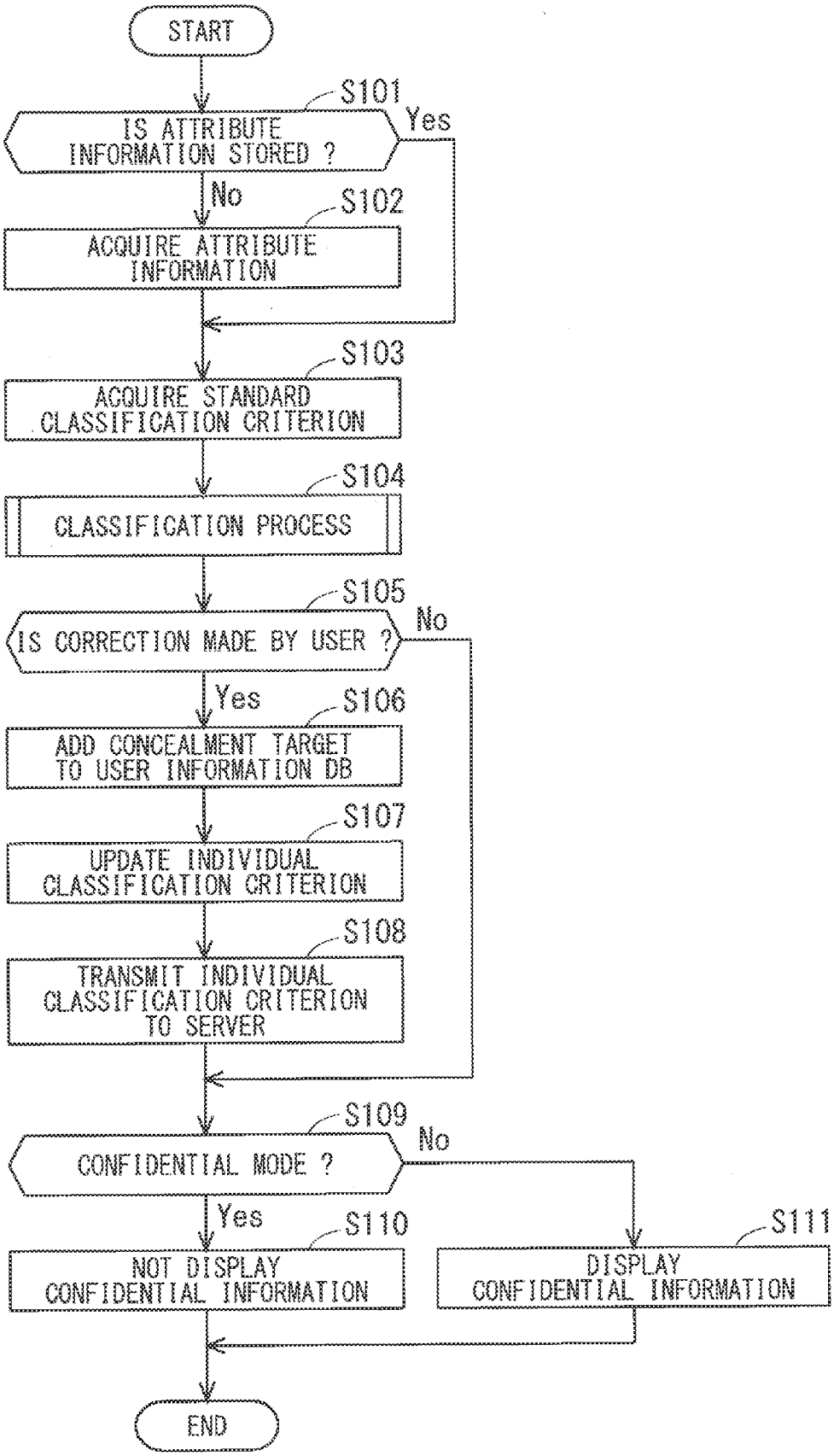

START
S101
IS ATTRIBUTE INFORMATION STORED ?
Yes
No
S102
ACQUIRE ATTRIBUTE INFORMATION
S103
ACQUIRE STANDARD CLASSIFICATION CRITERION
S104
CLASSIFICATION PROCESS
S105
IS CORRECTION MADE BY USER ?
No
Yes
S106
ADD CONCEALMENT TARGET TO USER INFORMATION DB
S107
UPDATE INDIVIDUAL CLASSIFICATION CRITERION
S108
TRANSMIT INDIVIDUAL CLASSIFICATION CRITERION TO SERVER
S109
CONFIDENTIAL MODE ?
No
Yes
S110
NOT DISPLAY CONFIDENTIAL INFORMATION
S111
DISPLAY CONFIDENTIAL INFORMATION
END

FIG. 8

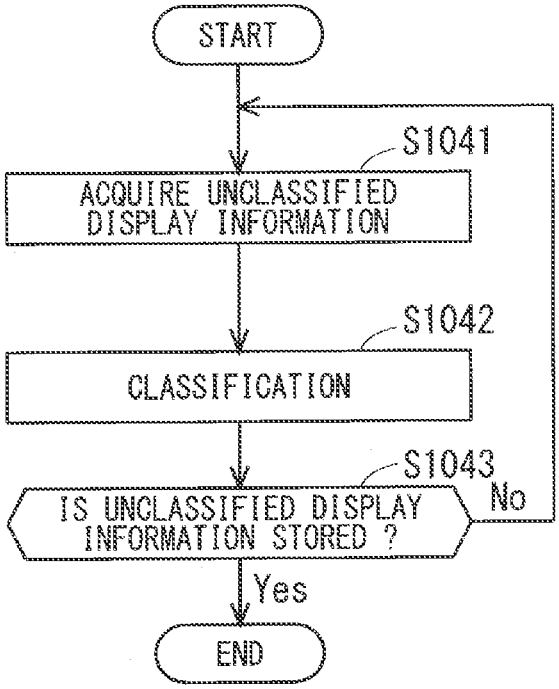

START
S1041
ACQUIRE UNCLASSIFIED DISPLAY INFORMATION
S1042
CLASSIFICATION
S1043
IS UNCLASSIFIED DISPLAY INFORMATION STORED ?
No
Yes
END

FIG. 9

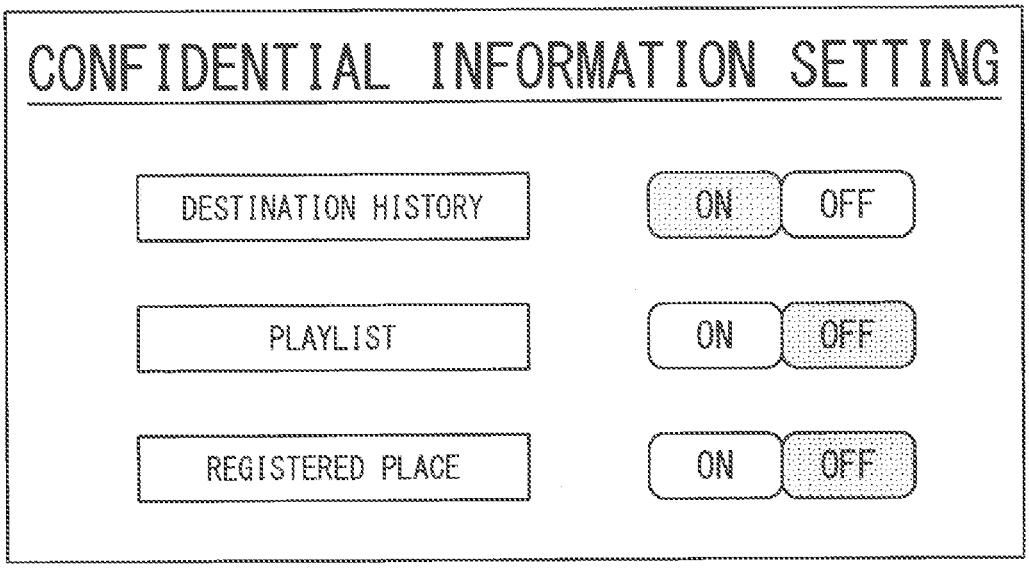

CONFIDENTIAL INFORMATION SETTING
DESTINATION HISTORY
ON
OFF
PLAYLIST
ON
OFF
REGISTERED PLACE
ON
OFF

FIG. 10

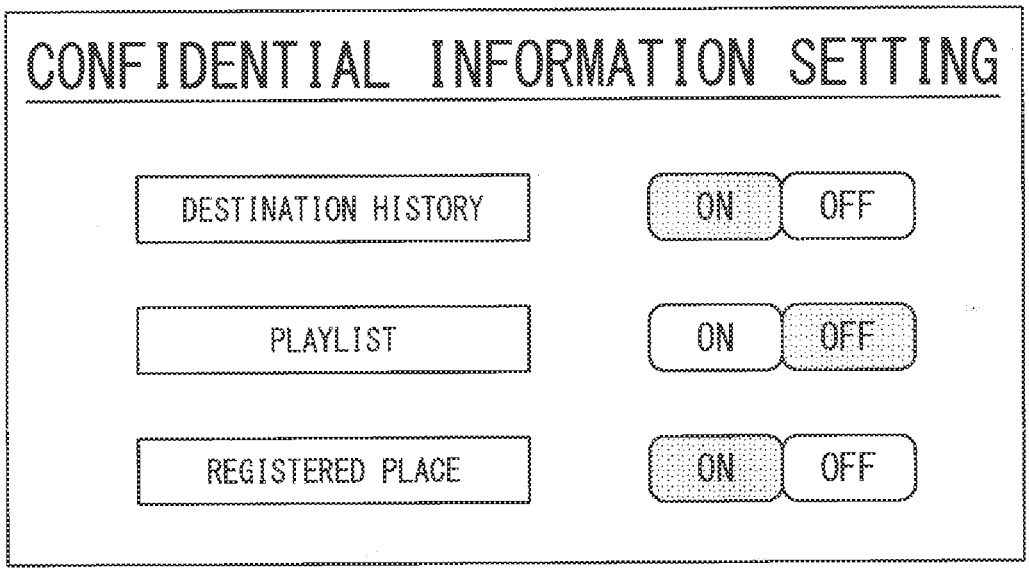

CONFIDENTIAL INFORMATION SETTING
DESTINATION HISTORY
ON
OFF
PLAYLIST
ON
OFF
REGISTERED PLACE
ON
OFF

FIG. 11

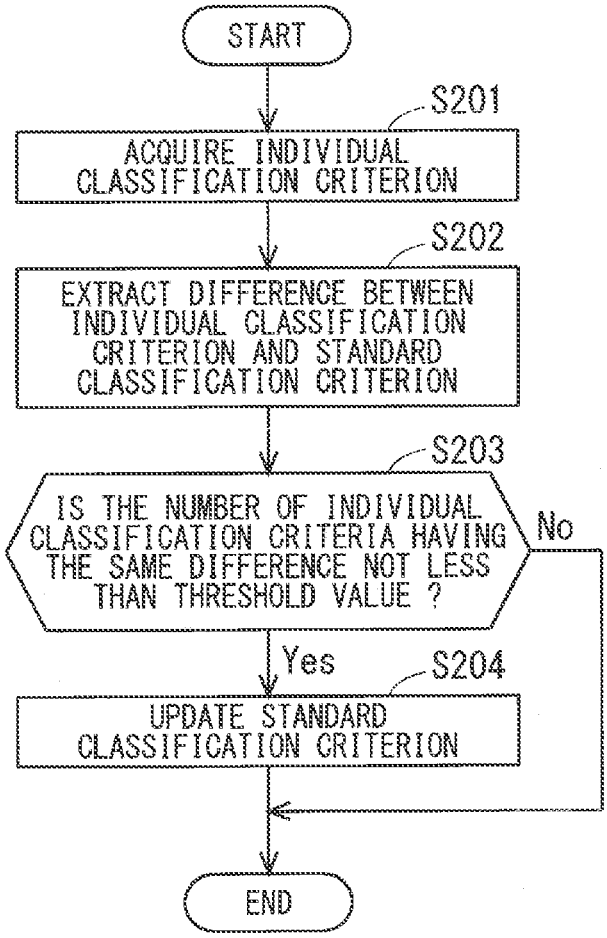

START
S201
ACQUIRE INDIVIDUAL CLASSIFICATION CRITERION
S202
EXTRACT DIFFERENCE BETWEEN INDIVIDUAL CLASSIFICATION CRITERION AND STANDARD CLASSIFICATION CRITERION
S203
IS THE NUMBER OF INDIVIDUAL CLASSIFICATION CRITERIA HAVING THE SAME DIFFERENCE NOT LESS THAN THRESHOLD VALUE ?
No
Yes
S204
UPDATE STANDARD CLASSIFICATION CRITERION
END

FIG. 12

USER ATTRIBUTE NO.	CONCEALMENT TARGET	
001	GENRE SEARCH HISTORY	DESTINATION HISTORY

FIG. 13

USER ATTRIBUTE NO.	CONCEALMENT TARGET		
001	GENRE SEARCH HISTORY	DESTINATION HISTORY	REGISTERED PLACE

FIG. 14

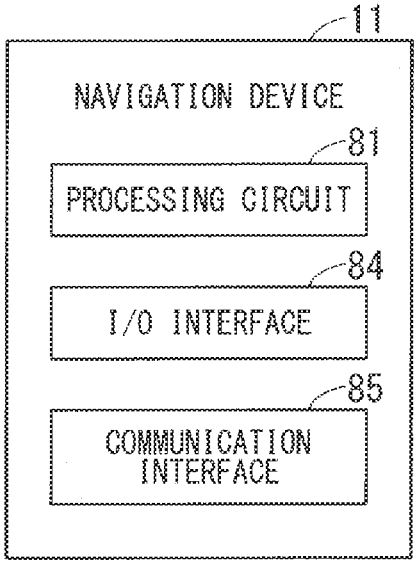
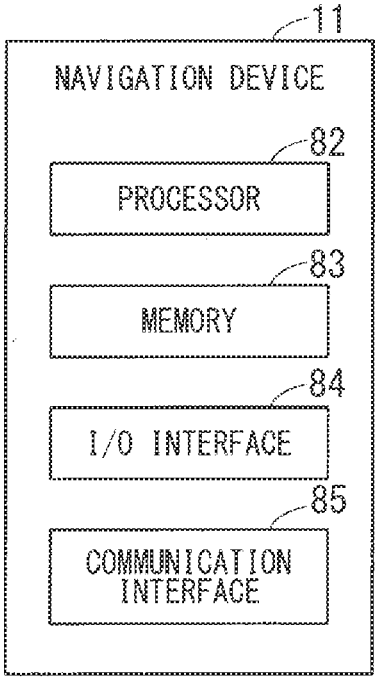

11
NAVIGATION DEVICE
81
PROCESSING CIRCUIT
84
I/O INTERFACE
85
COMMUNICATION INTERFACE

FIG. 15


11
NAVIGATION DEVICE
82
PROCESSOR
83
MEMORY
84
I/O INTERFACE
85
COMMUNICATION INTERFACE

DISPLAY CONTROL DEVICE, DISPLAY CONTROL SYSTEM, AND DISPLAY CONTROL METHOD

TECHNICAL FIELD

[0001] The present invention relates to a display control of a display device mounted on a vehicle.

BACKGROUND ART

[0002] A vehicle is equipped with a variety of devices (hereinafter, referred to as "in-vehicle devices") such as a navigation device or an audio device. Each of these in-vehicle devices incorporates a display device as a user interface or uses a separate display device mounted on the same vehicle as a user interface, and displays display information on the display device.

[0003] In recent years, proposed has been an in-vehicle device which classifies the display information into confidential information and non-confidential information and has a display mode for concealing the confidential information and displaying the non-confidential information. When any person other than an owner (user) of a vehicle uses the vehicle, for example, it is thereby possible to conceal information which the owner does not want to be known by the other person. The confidential information includes personal information such as a telephone directory or the like, and besides, information relating to preferences such as genre search history of music or the like, and the target of the confidential information increases.

[0004] Patent Document 1 discloses an in-vehicle device in which spots which were set as destinations in the past are targets to be concealed (concealment targets), and particularly in Paragraph [0044], it is described that a user explicitly determines a spot which is a concealment target, out of registered spots.

PRIOR ART DOCUMENTS

Patent Documents

[0005] [Patent Document 1] Japanese Patent Application Laid Open Gazette No, 2017-167043

SUMMARY

Problem to be Solved by the Invention

[0006] There is a problem, however, that it requires time and effort for the user to select the concealment target one by one from a variety of display information. The present invention is intended to solve the above problem, and it is an object of the present invention to set concealment targets suited to a user, as to a display of a display device mounted on a vehicle, without requiring user's time and effort.

Means to Solve the Problem

[0007] The present invention is intended for a display control device for performing a display control of a display device mounted on a vehicle. According to the present invention, the display control device includes a receiving unit for receiving a classification criterion used for classifying display information of the display device into confidential information and non-confidential information, in accordance with an attribute of a user, from a server in which the classification criterion is managed for each attribute of the user, a classification unit for classifying the display information into the confidential information and the non-confidential information on the basis of the classification criterion received by the receiving unit, and a display control unit for performing a display control of the display device so that the confidential information and the non-confidential information are displayed in a first display mode and the confidential information is not displayed and the non-confidential information is displayed in a second display mode.

Effects of the Invention

[0008] The display control device according to the present invention receives the classification criterion in accordance with the attribute of the user from the server and classifies the display information into the confidential information and the non-confidential information on the basis of the classification criterion, and it is therefore possible to set the concealment targets suited to the user without requiring user's time and effort. These and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0009] FIG. **1** is a block diagram showing a constitution of a display control system in accordance with a first preferred embodiment;

[0010] FIG. **2** is a view showing standard classification criteria;

[0011] FIG. **3** is a view showing user attributes in the standard classification criteria;

[0012] FIG. **4** is a view showing an exemplary display of a navigation menu in a confidential mode;

[0013] FIG. **5** is a view showing an exemplary display of a landmark setting screen in a non-confidential mode;

[0014] FIG. **6** is a view showing an exemplary display of the landmark setting screen in the confidential mode;

[0015] FIG. **7** is a flowchart showing a confidential classification process and a display control process by the display control system of the first preferred embodiment;

[0016] FIG. **8** is a flowchart showing details of the confidential classification process by the display control system of the first preferred embodiment;

[0017] FIG. **9** is a view showing a confidential information setting screen in a state where setting of confidential information has been made in accordance with the standard classification criteria;

[0018] FIG. **10** is a view showing a state where a registered place is set as the confidential information in the confidential information setting screen;

[0019] FIG. **11** is a flowchart showing an update process of the standard classification criterion by a server;

[0020] FIG. **12** is a view showing a standard concealment criterion;

[0021] FIG. **13** is a view showing an updated standard concealment criterion;

[0022] FIG. **14** is a view showing a hardware constitution of a display control device; and

[0023] FIG. **15** is a view showing another hardware constitution of the display control device.

DESCRIPTION OF EMBODIMENT(S)

A. The First Preferred Embodiment

[0024] <A-1. Constitution>

[0025] FIG. **1** is a block diagram showing a constitution of a display control system **101** in accordance with the first preferred embodiment. The display control system **101** comprises a server **51** and a plurality of navigation devices **11** connected to the server **51**. The server **51** and each of the navigation devices **11** are connected to each other, for example, via the internet. The navigation device **11** is a device mounted on a vehicle and controls a display of a display device **21** mounted on the same vehicle. Display information of the navigation device **11** is displayed on a display screen of the display device **21**, and the navigation device **11** is a display control device for controlling a display of the display device **21**. In the present preferred embodiment, description will be made, using the navigation device **11** as an example of the display control device. The display device **21** is, for example, a liquid crystal display (LCD) or an organic EL (electroluminescence) display. Each navigation device **11** is assigned to a user in one-to-one correspondence. The navigation device **11** has a general navigation function, and besides has a function of making hands-free calling by connecting with a cellular phone terminal such as a smartphone or the like and an AV (Audio Visual) function of playing music, or the like. Further, the "device mounted on a vehicle" in the present specification includes not only a device which is constantly mounted on the vehicle but also a device which is carried into the vehicle and used therein as necessary.

[0026] First, a constitution of the navigation device **11** will be described. The navigation device **11** comprises a communication unit **12**, a data storage unit **13**, a classification unit **14**, an input receiving unit **15**, a classification criterion updating unit **16**, and a display control unit **17**.

[0027] The communication unit **12** performs transmission/reception of data through a communication unit **52** of the server **51** and the internet. The communication unit **12** is formed of, for example, a communication interface compliant with the wireless LAN standard or the like.

[0028] The data storage unit **13** comprises an individual classification criterion database (DB) **131** storing therein individual classification criteria and a user information database (DB) **132** storing therein user information. The individual classification criterion is a piece of data serving as a criterion used when the classification unit **14** classifies display information into confidential information and non-confidential information. The classification unit **14** classifies the display information into the confidential information and the non-confidential information in accordance with the individual classification criteria. The individual classification criteria are equal to standard classification criteria which the communication unit **12** receives from the server **51** in an initial state, and can be updated in accordance with an input operation of the user. The user information are various kinds of information which the navigation device **11** needs, other than the individual classification criteria. The user information includes, for example, attribute information of the user, unclassified display information, a classification result of the display information, and the like. The attribute information of the user is information indicating the attributes of the user, such as age, gender, and the like. Information of "male in his twenties", for example, is the attribute information of the user.

[0029] The input receiving unit **15** is an input interface which receives the input operation of the user to the navigation device **11**. The input receiving unit **15** is formed of, for example; a touch panel or a mechanical switch. Though the display device **21** is an external constituent of the navigation device **11** in FIG. **1**, the display device **21** may be a constituent element of the navigation device **11**. In that case, the display device **21** and the input receiving unit **15** may be integrally configured as a touch panel.

[0030] In accordance with the input operation of the user, the classification criterion updating unit **16** changes the classification of the display information and updates the individual classification criterion in accordance with the classification state after being changed.

[0031] The display control unit **17** determines whether a display mode of the navigation device **11** is a confidential mode (first display mode) or a non-confidential mode (second display mode), and causes the display device **21** to perform a display in accordance with the display mode. The confidential mode is also referred to as a valet mode. In the confidential mode, only the non-confidential information is displayed. In the non-confidential mode, both the confidential information and the non-confidential information are displayed.

[0032] Thus, the navigation device **11** is configured. Further, though four navigation devices **11** are connected to the server **51** in FIG. **1**, the number of navigation devices **11** connected to the server **51** is not limited to this (four).

[0033] Next, a constitution of the server **51** will be described. The server **51** comprises a communication unit **52**, a data storage unit **53**, and a classification criterion updating unit **54**. The communication unit **52** is a communication interface which performs transmission reception of data with the communication unit **12** of the navigation device **11**. The communication unit **52** acquires the attribute of the user of the navigation device **11** and a classification status of the display information in the navigation device **11**, from the communication unit **12**. The communication unit **52** transmits a standard classification criterion in accordance with the attribute of the user of the navigation device **11**, to the communication unit **12**.

[0034] The data storage unit **53** comprises a standard classification criterion database (DB) **531** storing therein standard classification criteria and a user information gathering database (DB) **532** storing therein user information of a plurality of navigation devices **11**. In the user information gathering DB **532**, the attribute information of the user and the classification status of the display information which are acquired from each navigation device **11** are stored as the user information. The classification criterion updating unit **54** grasps a classification trend of the display information, which is common to the users who have the same attribute, from the user information stored in the user information gathering DB **532**, and makes the standard classification criterion on the basis of the classification trend. Further, after making the standard classification criterion, when the communication unit **52** acquires another user information from the navigation device **11**, the classification criterion updating unit **54** updates the standard classification criterion on the basis of the user information as appropriate.

[0035] FIG. **2** is a view showing a standard classification criterion table stored in the standard classification criterion

DB **531**. In the standard classification criterion table, several pieces of confidential information are listed for each of the functions of the navigation device **11**, such as navigation, telephone, AV, and the like. Further, in the standard classification criterion table, the attribute information of the user is shown as "User Attribute No.". FIG. **3** is a view showing a user attribute No. management table stored in the standard classification criterion DB **531**. As shown in FIG. **3**, the user attribute No. is assigned for each combination of age and gender. For example, the user attribute No, "001" indicates a male in his twenties. Specifically, the standard classification criterion table shown in FIG. **2** indicates that in a case where the user attribute is "Male in his Twenties", the confidential information as to the navigation function includes "Genre Search History", "Registered Place", and "Landmark Setting". Further, in a case where the user attribute is "Female in her Twenties", the confidential information as to the navigation function includes "Genre Search History", "Registered Place", and "Destination History". Thus, in the standard classification criterion table, the standard classification criteria are determined for each attribute of the user. Further, in the standard classification criterion table of FIG. **2**, the standard classification criteria are shown by listing several pieces of confidential information. In the standard classification criterion table, however, the standard classification criteria may be shown by listing several pieces of non-confidential information.

[0036] The "Genre Search History" refers to a history of searches for a destination, which the user performed in the past, from the genre of facility, such as "Movie Theater", "Parking Lot", or the like. When the "Genre Search History" is the confidential information, an icon relating to the genre search history is not displayed or cannot be operated by the user in the confidential mode. The "Registered Place" refers to a spot registered by the user, such as user's home or workplace, or the like. FIG. **4** is a view showing an exemplary screen display in a case where operations on the concealment targets are invalid. In the exemplary case shown in FIG. **4**, since "Destination", "Registered Place", and "Recorded Spot" among the items in the navigation menu are set as the concealment targets, the icons used for operating these items are displayed in gray and any operation thereon is invalid.

[0037] The "Landmark Setting" refers to setting as to a genre of a landmark to be displayed on a map. Though all landmarks are not displayed in the default setting, the User can change the setting so that a given genre of landmark should be displayed. FIG. **5** is a view showing a landmark setting screen displayed on the display device **21**. In the exemplary case shown in FIG. **5**, as the landmark, displayed are "Convenience Store", "Gas Station", "Restaurant", "Administrative Facility, and "Parking Lot". When the user often uses a convenience store and a parking lot, the user can set to display these places on the map by turning on the "Convenience Store" and the "Parking Lot" as shown in FIG. **5**. When the "Landmark Setting" is the confidential information, the navigation device **11** sets the landmark setting as default. At that time, as shown in FIG. **6**, all the types of landmarks are set "OFF" in the landmark setting screen.

[0038] Thus, as to how to deal with the concealment target in the confidential mode, supposed is (1) not-displaying of the related icon or the like, (2) invalidation of any operation on the related icon or the like, (3) change of the setting details back to the default, or the like.

[0039] <A-2. Operation>

[0040] FIG. **7** is a flowchart showing a classification process and a display control process of the display information, which are performed by the navigation device **11**. Hereinafter, with reference to FIG. **7**, the classification process and the display control process of the display information, which are performed by the navigation device **11**, will be described. The flowchart of FIG. **7** starts, for example, at the timing when an accessory power supply of the vehicle is turned on.

[0041] First, the navigation device **11** determines whether or not the attribute information of the user is stored in the user information DB **132** (Step S**101**). When the attribute information of the user is not stored in the user information DB **132**, the navigation device **11** acquires the attribute information of the user (Step S**102**). Herein, the display control unit **17** causes the display device **21** to display an input screen of the attribute information, and the input receiving unit **15** acquires the attribute information inputted by using the input screen and stores the attribute information into the user information DB **132**. Alternatively, the communication unit **12** may perform a wireless communication with a portable terminal such as a smartphone or the like which the user carries, to thereby acquire the attribute information of the user which the portable terminal has. In this case, the communication unit **12** is implemented by a communication interface compliant with the short-range wireless communication standard, such as Bluetooth (registered trademark) or the like.

[0042] When the attribute information of the user is stored in the user information DB **132** in Step S**101**, or after executing Step S**102**, the communication unit **12** acquires the standard classification criterion from the server **51** (Step S**103**), Herein, first, the communication unit **12** transmits the attribute information of the user to the communication unit **52** of the server **51** and requests the server **51** to provide the standard classification criterion in accordance with the attribute of the user. When the server **51** receives the attribute information of the user from the communication unit **12**, the server **51** takes out the standard classification criterion in accordance with the attribute of the user from the standard classification criterion DB **531** and transmits the standard classification criterion from the communication unit **52** to the communication unit **12** of the navigation device **11**. Thus, the communication unit **12** acquires the standard classification criterion from the server **51**. The standard classification criterion is stored as the individual classification criterion into the individual classification criterion DB **131**.

[0043] Next, the classification unit **14** classifies unclassified display information stored in the user information DB **132** into the confidential information and the non-confidential information in accordance with the individual classification criterion stored in the individual classification criterion DB **131** (Step S**104**). With reference to the flowchart of FIG. **8**, details of the classification process in Step S**104** will be described. First, the classification unit **14** acquires the unclassified display information from the user information DB **132** (Step S**1041**). Then, the classification unit **14** classifies the display information acquired in Step S**1041** into the confidential information and the non-confidential information in accordance with the individual classification

criterion (Step S1042), and stores a classification result into the user information DB 132. Next, the classification unit 14 determines whether or not there is unclassified display information in the user information DB 132 (Step S1043). When there is unclassified display information, the classification unit 14 acquires the unclassified display information from the user information DB 132 again (Step S1041) and classifies the display information (Step S1042). When there is no unclassified display information, the classification process (Step S104) performed by the classification unit 14 is ended.

[0044] Next, the classification criterion updating unit 16 determines whether or not any correction of the classification result is made by the user (Step S105). Herein, the display control unit 17 causes the display device 21 to display such a confidential information setting screen as shown in FIG. 9. When the user performs an input operation in the confidential information setting screen, the operation content is inputted to the classification criterion updating unit 16 through the input receiving unit 15. At that time, the classification criterion updating unit 16 determines that there is a correction of the classification result in Step S105. In the exemplary case shown in FIG. 9, the "Destination History" is "ON" and this indicates that the destination history is the confidential information. From the confidential information setting screen, the user can grasp the current classification status. In a case where the user intends to make the "Registered Place" the confidential information, for example, the user brings the "Registered Place" to "ON" on the confidential information setting screen as shown in FIG. 10. In response to the user operation, the classification criterion updating unit 16 updates the classification result of the "Registered Place" in the user information stored in the user information DB 132, from the non-confidential information to the confidential information (Step S106). Further, the classification criterion updating unit 16 updates the classification result of the "Registered Place" also in the individual classification criterion stored in the individual classification criterion DB 131, to the confidential information (Step S107).

[0045] Next, the communication unit 12 transmits the updated individual classification criterion together with the attribute information of the user to the communication unit 52 of the server 51 (Step S108). Then, the display control unit 17 determines whether the display mode of the navigation device 11 is the confidential mode or not (Step S109). When the display mode of the navigation device 11 is the confidential mode, the display control unit 17 controls the display device 21 to not display the confidential information and display only the non-confidential information (Step S110). When the display mode of the navigation device 11 is the non-confidential mode, the display control unit 17 controls the display device 21 to not display the confidential information and display only the non-confidential information (Step S111). The above is the operation of the navigation device 11.

[0046] Next, with reference to the flowchart of FIG. 1 an update process of the standard classification criterion performed by the server 51 will be described. In Step S108 of FIG. 7, transmission of the individual classification criterion to the server 51 by the navigation device 11 has been described. The communication unit 52 of the server 51 thereby acquires the individual classification criterion of the navigation device 11 together with the attribute information of the user (Step S201). The individual classification criterion and the attribute information of the user which are acquired in Step S201 are stored in the user information gathering DB 532 of the data storage unit 53.

[0047] Next, the classification criterion updating unit 54 compares the individual classification criterion acquired in Step S201 with the standard classification criterion having the same attribute information of the user as that of the individual classification criterion and extracts the difference therebetween (Step S202). It is assumed, for example, that the standard classification criterion indicates that the "Genre Search History" and the "Destination History" are the confidential information, as shown in FIG. 12, Herein, it is assumed that the individual classification criterion acquired from the navigation device 11 indicates that "Genre Search History", the "Destination History", and the "Registered Place" are the confidential information. In this case, the "Registered Place" is the difference between the individual classification criterion and the standard classification criterion.

[0048] Next, the classification criterion updating unit 54 determines whether or not the number of individual classification criteria Which have the difference extracted in Step S202 is not less than a threshold value (Step S203). Specifically, the server 51 acquires the individual classification criteria from the plurality of navigation devices 11 and the individual classification criteria are stored in the user information gathering DB 532. Then, the classification criterion updating unit 54 determines whether or not the number of individual classification criteria indicating that the "Registered Place" is the confidential information, among the individual classification criteria stored in the user information gathering DB 532, is not less than the threshold value.

[0049] When "Yes" in Step S203, the classification criterion updating unit 54 updates the standard classification criterion in accordance with the individual classification criterion (Step S204). Specifically, the classification criterion updating unit 54 updates the standard classification criterion so that the "Registered Place" should be included in the confidential information as shown in FIG. 13. Thus, the update process of the standard classification criterion performed by the server 51 is ended.

[0050] Further, in the above description, as the method of concealing the confidential information, the display of the display device 21 is controlled. The navigation device 11, however, may conceal the confidential information by controlling an audio output of a speaker mounted on the vehicle, such as not performing the audio output of the confidential information, as well as by the display control.

[0051] <A-3. Effects>

[0052] The navigation device 11 which is the display control device of the first preferred embodiment performs a display control of the display device 21 mounted on a vehicle. The navigation device 11 comprises the communication unit which is a receiving unit for receiving a classification criterion used for classifying display information of the display device 21 into confidential information and non-confidential information, in accordance with an attribute of a user, from the server 51 in which the classification criterion is managed for each attribute of the user, the classification unit 14 for classifying the display information into the confidential information and the non-confidential information on the basis of the classification criterion received by the communication unit 12, and the display

control unit **17** for performing the display control of the display device **21** so that the confidential information and the non-confidential information should be displayed in the first display mode and the confidential information should not be displayed and the non-confidential information should be displayed in the second display, mode. It is therefore possible to perform the classification of the display information, which is suited to the user, without requiring user's time and effort.

[0053] In the navigation device **11**, the classification unit **14** updates the classification of the display information in accordance with the user operation. Therefore, the user can correct the classification of the display information which is automatically set by the navigation device **11**, in accordance with user's own preferences.

[0054] In the navigation device **11**, the attribute of the user includes at least age or gender. Therefore, according to the navigation device **11**, it is possible to perform the classification of the display information which reflects preferences common to users having the same age or gender.

[0055] The display control system **101** of the first preferred embodiment comprises a plurality of navigation devices **11** which are the display control devices each for controlling a display of the display device **21** mounted on a vehicle and the server **51** for managing a classification criterion used for classifying display information which is information to be displayed on the display device **21** into confidential information and non-confidential information, for each attribute of a user. Each of the navigation devices **11** comprises the communication unit **12** which is a receiving unit for receiving the classification criterion in accordance with an attribute of a user from the server **51**, the classification unit **14** for classifying the display information into the confidential information and the r on-confidential information on the basis of the classification criterion received by the communication unit **12**, and the communication unit **12** which is a transmitting unit for transmitting a classification status of the display information and attribute information indicating the attribute of the user to the server **51**, and the display control unit **17** for performing a display control of the display device **21** so that the confidential information and the non-confidential information should be displayed in the first display mode and the confidential information should not be displayed and the non-confidential information should be displayed in the second display mode. The server **51** updates the classification criterion for each attribute of the user on the basis of the classification status and the attribute information of the user which are acquired from the plurality of navigation devices **11**. Therefore, according to the display control system **101**, it is possible to perform the classification of the display information, which is suited to the user, without requiring user's time and effort.

[0056] The display control method of the first preferred embodiment is a display control method of the display device **21** mounted on a vehicle, which is performed by the server **51** and the navigation device **11** that is the display control device. The display control method of the first preferred embodiment comprises the steps of managing a classification criterion used for classifying display information of the display device **21** into confidential information and non-confidential information, for each attribute of a user, by the server **51**, receiving the classification criterion in accordance with the attribute of the user from the server **51**, by the navigation device **11**, classifying the display information into the confidential information and the non-confidential information on the basis of the received classification criterion, by the navigation device **11**, performing a display control of the display device **21** so that the confidential information and the non-confidential information should be displayed in the first display mode and the confidential information should not be displayed and the non-confidential information should be displayed in the second display mode, by the navigation device **11**, transmitting a classification status of the display information and attribute information indicating the attribute of the user to the server **51**, by the navigation device **11**, and updating the classification criterion for each attribute of the user on the basis of the classification status and the attribute information, by the server **51**. Therefore, it is possible to perform the classification of the display information, which is suited to the user, without requiring user's time and effort.

B. Hardware Configuration

[0057] In the above-described navigation device **11**, the data storage unit **13**, the classification unit **14**, the classification criterion updating unit **16**, and the display control unit **17** are implemented by a processing circuit **81** shown in FIG. **14**, the input receiving unit **15** is implemented by an I/O interface **84**, and the communication unit **12** is implemented by a communication interface **85**. In other words, the processing circuit **81** comprises the data storage unit **13**, the classification unit **14**, the classification criterion updating unit **16**, and the display control unit **17** (hereinafter, referred to as "the classification unit **14** and the like"). To the processing circuit **81**, a dedicated hardware may be applied, or a processor which executes a program stored in a memory may be applied. As the processor, for example, used is a central processing unit, a processing unit, an arithmetic unit, a microprocessor, a microcomputer, a DSP (Digital Signal Processor), or the like.

[0058] When the processing circuit **81** is a dedicated hardware, the processing circuit **81** corresponds to, for example, a single circuit, a complex circuit, a programmed processor, a multiple programmed processor, an ASIC (Application Specific Integrated Circuit), an FPGA (Field Programmable Gate Array), or a combination of these circuits. Respective functions of the constituent elements such as the classification unit **14** and the like may be implemented by a plurality of processing circuits **81**, or these functions of the constituent elements may be collectively implemented by one processing circuit.

[0059] When the processing circuit **81** is a processor, the functions of the classification unit **14** and the like are implemented by combination with software or the like (software, firmware, or software and firmware). The software or the like is described as a program and stored in a memory. As shown in FIG. **15**, a processor **82** applied to the processing circuit **81** reads out and executes the program stored in a memory **83**, to thereby implement the respective functions of the constituent elements. Specifically, the navigation device **11** comprises the memory **83** which stores therein programs which are executed by the processing circuit **81** to consequently perform the step of receiving a classification criterion in accordance with an attribute of a user from a server, the step of classifying display information into confidential information and non-confidential information on the basis of the received classification cri-

terion, the step of performing a display control of the display device so that the confidential information and the non-confidential information should be displayed in the first display mode and the confidential information should not be displayed and the non-confidential information should be displayed in the second display mode, and the step of transmitting a classification status of the display information and attribute information indicating the attribute of the user to the server. In other words, the program is executed to cause a computer to perform a procedure or a method of the classification unit **14** and the like. Herein, the memory **83** may be, for example, a nonvolatile or volatile semiconductor memory such as a RAM (Random Access Memory), a ROM (Read Only Memory), a flash memory, an EPROM (Electrically Programmable Read Only Memory), an EEPROM (Electrically Erasable Programmable Read Only Memory), or the like, a HDD (Hard Disk Drive), a magnetic disk, a flexible disk, an optical disk, a compact disk, a mini disk, or a DVD (Digital Versatile Disc) and a drive unit thereof, or the like, or every storage medium which can be used in the future.

[0060] The case has been described above where the respective functions of the classification unit **14** and the like are implemented by ogre of hardware and software or the like. This is, however, only one exemplary case, and there may be a case where some part of the classification unit **14** and the like is implemented by a dedicated hardware and the other part is implemented by software or the like. For example, there may be a case where the function of the classification unit **14** is implemented by the processing circuit as the dedicated hardware and the respective functions of the constituent elements other than the classification unit **14** are implemented when the processing circuit **81** serving as the processor **82** reads out and executes the programs stored in the memory **83**.

[0061] As described above, the processing circuit can implement the above-described functions by hardware, software or the like, or combination thereof. Further, the data storage unit **13** is formed of the memory **83**, and may be formed of the single memory **83** or may be formed of individual memories.

[0062] In the present invention, the preferred embodiment and variations may be freely combined, or may be changed or omitted as appropriate, without departing from the scope of the invention. While the invention has been shown and described in detail, the foregoing description is in all aspects illustrative and not restrictive. It is therefore understood that numerous modifications and variations can be devised without departing from the scope of the invention.

EXPLANATION OF REFERENCE SIGNS

[0063] **11** navigation device, **12** communication unit, **13** data storage unit, **14** classification unit, **15** input receiving unit, **16** classification criterion updating unit, **17** display control unit, **21** display device, **51** server, **52** communication unit, **53** data storage unit, **54** classification criterion updating unit, **81** processing circuit, **82** processor, **83** memory, **84** I/O interface, **85** communication interface, **131** individual classification criterion DB, **132** user information DB, **531** standard classification criterion DB, **532** user information gathering DB

1. A display control device for performing a display control of a display device mounted on a vehicle, comprising:

a processor to execute a program; and

a memory to store the program which, when executed by the processor, performs processes of

receiving a classification criterion used for classifying display information of the display device into confidential information and non-confidential information, in accordance with an attribute of a user, from a server in which the classification criterion is managed for each attribute of the user;

classifying the display information into the confidential information and the non-confidential information on the basis of the received classification criterion; and

performing a display control of the display device so that the confidential information and the non-confidential information are displayed in a first display mode and the confidential information is not displayed and the non-confidential information is displayed in a second display mode.

2. The display control device according to claim **1**, wherein

the program, when executed by the processor, further performs processes of updating classification of the display information in accordance with an operation of the user.

3. The display control device according to claim **1**, wherein

the attribute of the user includes at least age or gender.

4. A display control system, comprising:

a plurality of display control devices each for controlling a display of a display device mounted on a vehicle; and

a server for managing a classification criterion used for classifying display information which is information to be displayed on the display device into confidential information and non-confidential information, for each attribute of a user,

wherein each of the plurality of display control devices comprises:

a processor to execute a program; and

a memory to store the program which, when executed by the processor, performs processes of

receiving the classification criterion in accordance with an attribute of a user from the server;

classifying the display information into the confidential information and the non-confidential information on the basis of the received classification criterion;

transmitting a classification status of the display information and attribute information indicating the attribute of the user to the server; and

performing a display control of the display device so that the confidential information and the non-confidential information are displayed in a first display mode and the confidential information is not displayed and the non-confidential information is displayed in a second display mode, and

the server updates the classification criterion for each attribute of the user on the basis of the classification status and the attribute information which are acquired from the plurality of display control devices.

5. A display control method of a display device mounted on a vehicle, which is performed by a server and a display control device, comprising:

managing a classification criterion used for classifying display information of the display device into confi-

dential information and non-confidential information, for each attribute of a user, by the server;

receiving the classification criterion in accordance with the attribute of the user from the server, by the display control device;

classifying the display information into the confidential information and the non-confidential information on the basis of the received classification criterion, by the display control device;

performing a display control of the display device so that the confidential information and the non-confidential information are displayed in a first display mode and the confidential information is not displayed and the non-confidential information is displayed in a second display mode, by the display control device;

transmitting a classification status of the display information and attribute information indicating the attribute of the user to the server, by the display control device; and

updating the classification criterion for each attribute of the user on the basis of the classification status and the attribute information, by the server.

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