

DESCRIPTION

Title of the Invention: CONFERENCE SUPPORT DEVICE, CONFERENCE SUPPORT SYSTEM, AND CONFERENCE SUPPORT METHOD

Technical Field

[0001]

The present invention relates to a conference support device, a conference support system, and a conference support method.

Background Art

[0002]

There has been proposed a method of determining the situation of a conference based on how lively the conversation is at the conference, and adjusting the environment of a space where the conference is held, such as a conference room or a conference space, according to the situation of the conference. Patent Literature 1 discloses a method of controlling electronic equipment for adjusting the environment of a conference room according to the environment around the electronic equipment disposed in the conference room or the like, for example. In the method of controlling the electronic equipment disclosed in Patent Literature 1, the color of lighting in the conference room and the content of the reproduction of audiovisual content are controlled according to the situation of the conference and the value of the space of the conference room is improved.

Citation List

Patent Literature

[0003]

PTL 1: Japanese Unexamined Patent Application Publication No. 2020-65097

Summary of the Invention

[0004]

Normally, a conference is held due to a gathering of participants, and the

psychological states of the conference participants affect, at least in part, how the conference progresses and how lively the conference becomes. In other words, it is preferable that the psychological states (subjectivity) of the conference participants be reflected in the adjustment of the environment in the conference room, in terms of the appropriate progress of the conference. However, in the above method of controlling the electronic equipment, the psychological states of the participants are not reflected in the electronic equipment for controlling a space such as a conference room. If the electronic equipment performs extreme control according to the situation of a conference, even if the control is appropriate for the situation of the conference, there may be a case where the conference participants feel uncomfortable, for example. In other words, there are cases where control performed simply according to the situation of the conference is actually control that is contrary to the intentions of the participants, and there may be cases where the environment of a space such as a conference room where a conference is held is not controlled appropriately.

[0005]

The present invention has been devised in view of such problems of the prior art. An object of the present invention is to provide a conference support device capable of appropriately controlling the environment of a space in which a conference is held.

[0006]

In order to solve the above problems, a conference support device according to a first aspect of the present invention includes: a conference information acquisition unit that acquires conference information on a conference to be held; a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of environment control equipment that controls an environment of a space in which the conference is held; a control information acquisition unit that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit; an equipment control unit that

controls the environmental control equipment based on the control information; a display control unit that causes a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated; a questionnaire result acquisition unit that acquires a questionnaire result transmitted from the user terminal; a tabulation unit that tabulates the questionnaire result and generates a tabulation result; a determination unit that determines a value of the tabulation result based on a predetermined threshold; and a control information adjustment unit that updates the control information included in the correspondence relationship information according to a determination result determined by means of the determination unit.

[0007]

A conference support device according to a second aspect of the present invention includes: a conference information acquisition unit that acquires conference information on a conference to be held; a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of environment control equipment that controls an environment of a space in which the conference is held; a control information acquisition unit that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit; an equipment control unit that controls the environmental control equipment based on the control information; a display control unit that causes a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated; a questionnaire result acquisition unit that acquires a questionnaire result transmitted from the user terminal; a tabulation unit that tabulates the questionnaire result and generates a tabulation result; and a learning unit that learns the correspondence relationship between the conference information and the control information based on a value of the tabulation result, the conference information, and the control information, in which the learning unit reflects a result of learning the correspondence relationship between the conference information and the

control information in the correspondence relationship information.

[0008]

A conference support system according to a third aspect of the present invention is a conference support system including: environment control equipment that controls an environment of a space in which a conference is held; a user terminal; and a conference support device that controls the environment control equipment, in which the conference support device includes: a conference information acquisition unit that acquires conference information on the conference; a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of the environment control equipment; a control information acquisition unit that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit; an equipment control unit that controls the environmental control equipment based on the control information; a display control unit that causes the user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated; a questionnaire result acquisition unit that acquires a questionnaire result transmitted from the user terminal; a tabulation unit that tabulates the questionnaire result and generates a tabulation result; a determination unit that determines a value of the tabulation result based on a predetermined threshold; and a control information adjustment unit that updates the control information included in the correspondence relationship information according to a determination result determined by means of the determination unit.

[0009]

A conference support method according to a fourth aspect of the present invention is a conference support method executed by a computer, and the conference support method includes: acquiring conference information on a conference to be held; acquiring the control information corresponding to the conference information from a storage unit that stores correspondence relationship information indicating a

correspondence relationship between the conference information and control information of environmental control equipment that controls an environment of a space in which the conference is held; controlling the environmental control equipment based on the control information; causing a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated; acquiring a questionnaire result transmitted from the user terminal; tabulating the questionnaire result and generating a tabulation result; determining a value of the tabulation result based on a predetermined threshold; and updating the control information included in the correspondence relationship information according to a determination result.

[0010]

A conference support program according to a fifth aspect of the present invention is a conference support program for causing a computer to execute processes of: acquiring conference information on a conference to be held; acquiring the control information corresponding to the conference information from a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of environmental control equipment that controls an environment of a space in which the conference is held; controlling the environmental control equipment based on the control information; causing a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated; acquiring a questionnaire result transmitted from the user terminal; tabulating the questionnaire result and generating a tabulation result; determining a value of the tabulation result based on a predetermined threshold; and updating the control information included in the correspondence relationship information according to a determination result.

Brief Description of the Drawings

[0011]

[Fig. 1] Fig. 1 is a diagram showing an example of a conference support system according to a first embodiment.

[Fig. 2] Fig. 2 is a functional block diagram for explaining functions of a conference support device 100 according to a first embodiment.

[Fig. 3] Fig. 3 is a diagram showing examples of screen displays for inputting conference information, which are displayed on a user terminal according to a first embodiment.

[Fig. 4] Fig. 4 is a diagram showing an example of conference information according to a first embodiment.

[Fig. 5] Fig. 5 is a diagram showing an example of correspondence relationship information according to a first embodiment.

[Fig. 6] Fig. 6 is a diagram showing an example of control information according to a first embodiment.

[Fig. 7] Fig. 7 is a diagram showing examples of screen displays of a questionnaire, which are displayed on a user terminal according to a first embodiment.

[Fig. 8] Fig. 8 is a diagram for explaining a psychological state of a conference participant indicated by a questionnaire result.

[Fig. 9] Fig. 9 is diagram showing an example of tabulation result of questionnaire results.

[Fig. 10] Fig. 10 is a diagram showing an example of thresholds for questionnaire results.

[Fig. 11] Fig. 11 is a diagram for explaining update content of control information updated by means of a control information adjustment unit.

[Fig. 12] Fig. 12 is a flow chart for explaining processing performed by means of a conference support device according to a first embodiment.

[Fig. 13] Fig. 13 is a functional block diagram for explaining functions of a conference support device 105 according to a second embodiment.

Description of Embodiments

[0012]

A conference support system according to the present embodiment will be described in detail below with reference to the drawings. Note that embodiments

described below are intended to provide comprehensive or specific examples. The numerical values, shapes, materials, components, locations and connection states of components, steps, and the order of steps shown in the following embodiments are examples and are not intended to be limited to the present disclosure. In addition, among the components described in the embodiments below, components that are not recited in independent claims indicating the the most significant concept are described as optional components. Furthermore, the dimensional proportions of the drawings are exaggerated for illustrative purposes and may differ from the actual proportions.

[0013]

(Overview of conference support system)

A conference support system 1 according to the present embodiment appropriately controls environmental control equipment that controls the environment of a space in which a conference is held and supports the conference such that the conference is held appropriately. The conference support system 1 will be described below by using several specific embodiments.

[0014]

(First embodiment)

Fig. 1 is a schematic diagram of the conference support system 1. The conference support system 1 includes a server 10, a user terminal 30, a network 40, and environment control equipment 200.

[0015]

In the present embodiment, the server 10 has a conference support device 100. As shown in Fig. 1, the conference support device 100 includes a control unit 110, a storage unit 120, an input/output interface 130, and a network interface 140. The configuration example of the conference support device 100 shown in Fig. 1 is only an example, and the present embodiment is not limited thereto. The server 10 can be replaced by one or more computers that can perform each function performed by means of the control unit 110, for example. Further, the server 10 exchanges data with the user terminal 30 and the environment control equipment 200 via the network 40.

Details of the control unit 110 and the storage unit 120 will be described later.

[0016]

The input/output interface 130 is a component (an interface) through which a user exchanges data with the server 10, for example, and includes an input unit and an output unit, for example.

[0017]

The input unit has a function as an interface for receiving input of various pieces of information from a user, and information is input from outside the server 10 to the input unit. Information is input to the input unit by the user by using a keyboard, mouse, touch panel, trackball, voice recognition device, and the like connected to the server 10, for example. The input unit can also receive information as a data input terminal for receiving data from an external storage device (not shown) or the like.

[0018]

The output unit causes a display unit (not shown) connected to the server 10 to display various kinds of pieces of information. Examples of the display unit include a display device, a projector device, and the like. It is also possible to use the user terminal 30 as the display unit to display various kinds of pieces of information thereon. In the above case, the various kinds of pieces of information are transmitted to the user terminal 30 through the network interface 140.

[0019]

The network interface 140 is an interface through which communication is made between the environment control equipment 200 and user terminal 30, and the server 10 via a wired and/or wireless network.

[0020]

The user terminal 30 is constituted by a personal computer, for example, and is usually operated by a conference room manager, conference participants, and the like. The user terminal 30 may be constituted by a mobile device such as a tablet or a smartphone. Further, the user terminal 30 can communicate with the server 10 via the network 40. In addition, since Fig. 1 is a schematic diagram of the conference support

system 1, although the user terminal 30 is located at a different position from the conference room 20, the location of the user terminal 30 is not limited to above. The user terminal 30 may be placed at the hands of participants in the conference room 20 and operated by the participants, for example. Alternatively, the user terminal 30 may be a terminal in a participant's office or a terminal in a system management office or the like that manages a conference room, for example. That is, the user terminal 30 can be located either inside or outside the conference room 20.

[0021]

The network 40 is a communication network via which the server 10, and the environment control equipment 200 and user terminal 30 can communicate with each other, and is constituted by, for example, a carrier network which is a mobile phone network, or the Internet.

[0022]

The environment control equipment 200 is provided in a room or a space in which a conference is held (hereinafter referred to as the conference room 20) and controls the environment in the space of the conference room 20, for example. The environment control equipment 200 may include at least one of, or a combination of, a lighting device, an air conditioner, an aroma generating device, an acoustic device, and a ventilator, for example. In the example shown in Fig. 1, the environment control equipment 200 is provided on the ceiling of the conference room 20, but the location of the environment control equipment 200 is not limited to the ceiling of the conference room 20. The environment control equipment 200 may be built into a wall or floor of the conference room 20, for example. The environment control equipment 200 can also be disposed inside the conference room 20 as a device.

[0023]

Fig. 2 is a functional block diagram for explaining the functions of the conference support device 100.

[0024]

As shown in Fig. 2, the control unit 110 includes, as functions, a conference

information acquisition unit 111, a control information acquisition unit 112, an equipment control unit 113, a display control unit 114, a questionnaire result acquisition unit 115, a tabulation unit 116, a determination unit 117, and a control information adjustment unit 118. The control unit 110 operates the operation system and controls the entire server 10, for example. In addition, the control unit 110 operates based on a program (not shown) stored in the storage unit 120 and performs each function described above. The program is not necessarily always stored in the storage unit 120, and may be stored in a ROM (not shown) or the like in the conference support device 100. Details of the conference information acquisition unit 111, control information acquisition unit 112, equipment control unit 113, display control unit 114, questionnaire result acquisition unit 115, tabulation unit 116, determination unit 117, and control information adjustment unit 118 will be described later.

[0025]

As shown in Fig. 2, the storage unit 120 includes a conference information DB 121, a correspondence relationship information DB 122, an equipment control DB 123, and a tabulation result DB 124. The conference information DB 121 stores conference information as data. Further, the correspondence relationship information DB 122 stores correspondence relationship information as data. Furthermore, the equipment control DB 123 stores control information of the environmental control equipment 200 as data. The tabulation result DB 124 stores, as data, the tabulation result of questionnaire results transmitted from user terminals 30. The conference information, correspondence relationship information, control information, and tabulation result will be described later. The number of storage units 120 for storing each of these pieces of data may be one or more. The above pieces of data may be stored in one storage unit 120 by dividing the area of the one storage unit 120 into a plurality of areas, for example. Alternatively, the pieces of data may be stored in a distributed manner in a plurality of storage devices that are located at physically separated positions.

[0026]

(Functional configuration of conference support device 100)

Next, the functions of the conference support device 100 will be described with reference to the functional block diagram shown in Fig. 2.

[0027]

The conference information acquisition unit 111 acquires conference information such as the type and the like of a conference to be held and stores the information in the conference information DB 121. The screens shown in Fig. 3 are displayed on the user terminal 30 before the conference is held. The conference organizer, a conference participant, or the like (hereinafter referred to as a user) inputs information on the type and the like of the conference through the screen displayed on the user terminal 30. Examples of the information on the conference include the location, type, and time of the conference. The conference information acquisition unit 111 acquires conference information input by using the user terminal 30 via the network 40.

[0028]

The location of the conference is displayed on the screen as shown in Fig. 3(a). The user specifies the location of the conference by specifying the place displayed on the screen. Examples of the location of the conference include conference rooms organized as rooms and open spaces. In the example shown in Fig. 3(a), conference room 1602 corresponds to a conference room and meeting corners A to C correspond to the open spaces, for example.

[0029]

In the present embodiment, the conference type can be selected from categories of “formal”, “standard”, and “casual” as shown in Fig. 3(b), for example. In the present embodiment, a “standard” type conference means a general conference and includes an internal meeting and the like. A “formal” type conference means a somewhat more formal conference than the “standard” type conference, such as a meeting with a client of the company. A “casual” type conference means an informal

conference and includes an in-house social gathering, for example. However, the conference type is not limited to above. An icebreaker held before the actual conference for the purpose of softening the atmosphere of the place may be set as the conference type, and a conference type such as “break” may be added, for example.

[0030]

The conference time is the rough time during which the conference is held as shown in Fig. 3(c), for example, and the time is entered in 15 minute increments. In the present embodiment, the start time of the conference is set by the user pressing the “Start” button shown in Fig. 3(c). The time obtained by adding the time during which the conference is held to the start time of the conference is set as the end time of the conference. However, the setting of the start time and the end time of the conference is not limited to the setting means described above. Items for entering the start time and the end time may be provided in Fig. 3(c), and the user may set the predetermined start time and end time.

[0031]

The conference information acquired by means of the conference information acquisition unit 111 is stored in the conference information DB 121 for each conference as shown in Fig. 4. The example shown in Fig. 4 shows that on October 10, 2020, in conference room 1602, a “standard” type conference will be held between 14:00 and 15:00. Similarly, Fig. 4 shows that on October 10, 2020, in meeting corner A, a “casual” type conference will be held between 16:00 and 18:00.

[0032]

The correspondence relationship information DB 122 stores correspondence relationship information indicating the correspondence relationship between the conference information and the control information of the environment control equipment 200 for controlling the environment of the space in which the conference is held. Fig. 5 shows an example of the correspondence relationship information. Fig. 5 shows the location, type, and time zone of the conference as the conference information. Fig. 5 further shows control information of the environmental control

equipment 200 corresponding to the conference information. The time zone indicates the rough time zone of the start time of the conference. The time zones of morning, afternoon 1, afternoon 2, and night respectively indicate the hours of 6:00 to 12:00, 12:00 to 15:00, 15:00 to 18:00, and 18:00 to 24:00.

[0033]

Among the control information, the lighting is controlled by means of the lighting device. In the present embodiment, the lighting is set based on color temperature. Color temperature is a measure for expressing the color of sunlight, natural light, and light emitted from a light source such as artificial lighting, and the unit thereof is expressed in Kelvin (K). The bulb color is expressed as 3000 K, and the color tone is a warm color (yellow or orange), for example. The light type of the bulb color includes sunrise, sunset, incandescent bulb, candle, and the like. Daylight white is expressed as 5000 K and corresponds to sunlight as the light type.

[0034]

The airflow is a flow of air generated by means of an air conditioner or the like. In the present embodiment, it is assumed that the type of airflow such as light flow, steady flow, or fluctuating flow is selectable, for example. The fragrance is an air fragrance generated by means of the air conditioner or the like as similar to the airflow, for example. In the present embodiment, it is assumed that types of fragrance such as mint or citrus are selectable. Among the pieces of environment control equipment 200, a dedicated aroma generating device may be provided as the device that generates the fragrance. Alternatively, the device that generates the fragrance can be included in the air conditioner that generates the airflow as described above.

[0035]

Sound is produced by means of an acoustic device. In the present embodiment, when the conference type is “formal”, no sound is played. When the conference type is “standard”, “natural environmental sounds” are played as the sound. In the present specification, “natural environmental sounds” are sounds heard in a natural environment such as a forest, for example, and sounds such as the chirping of

birds or the murmuring of a river are played to a degree that does not interfere with a conference. In addition, when the conference type is “casual”, it is expected that a more casual atmosphere will be created by playing light music such as jazz.

[0036]

Ventilation is performed by means of a ventilator, and in the present embodiment, the ventilation intensity is indicated by three levels: strong, medium, and weak. In the example shown in Fig. 5, the intensity of ventilation increases from morning toward night in conference room 1602. This is because the carbon dioxide concentration in conference room 20 is expected to increase due to the holding of a conference, and therefore the intensity of ventilation is increased over time. Further ventilation can also be performed during a certain time period in the middle of each conference. It is possible to ventilate a room during a predetermined time from when half of the conference time has elapsed, for example. In the present embodiment, ventilation is performed for 15 minutes from when half of the conference time has elapsed.

[0037]

In addition, the correspondence relationship information indicates the correspondence relationship between the location of the conference of the conference information and the control information of the environmental control equipment 200 that can perform the control. Fig. 5 shows that in conference room 1602, the environment control equipment 200 can control all of lighting, airflow, fragrance, sound, and ventilation, but can control only lighting in meeting corner C, for example.

[0038]

Based on the conference information acquired by means of the conference information acquisition unit 111, the control information acquisition unit 112 acquires the control information of the environment control equipment 200 from the correspondence relationship information DB 122, and stores the control information in the equipment control DB 123. Fig. 6 shows an example of the control information. An example of the control information shown in Fig. 6 is the control information of each

piece of environmental control equipment 200 for a conference held between 15:00 and 16:00 in conference room 1602. In the example shown in Fig. 6, the lighting is set at a color temperature of 4000 K. The airflow is a steady flow, and the fragrance is mint. Further, in the example shown in Fig. 6, the “natural environmental sounds” are played. Fig. 6 shows that the medium level of ventilation is performed during 15 minute from 15:30 to 15:45.

[0039]

The equipment control unit 113 controls the environmental control equipment 200 based on the control information for controlling the environmental control equipment 200, which is stored in the equipment control DB 123. Specifically, the equipment control unit 113 transmits a control instruction to the environmental control equipment 200 through the network interface 140 based on the control information. Each piece of environment control equipment 200 is made to operate according to the control instruction transmitted from the equipment control unit 113.

[0040]

Further, the equipment control unit 113 receives, via the network 40, the control information of the environmental control equipment 200 directly controlled by the user in conference room 20, and reflects the received control information in the control information of the equipment control DB 123. Suppose that in a conference indicated by the control information in Fig. 6, the user changes the lighting to 5000 K, for example. In the above case, the equipment control unit 113 receives the changed control information and changes the lighting of the control information shown in Fig. 6 to 5000 K.

[0041]

After the conference, the display control unit 114 transmits a questionnaire about the conference to the user terminal 30 and causes the user terminal 30 to display the questionnaire. The display control unit 114 causes the user terminal 30 to display the questionnaire when the conference end time is reached, for example. Alternatively, even before the conference end time, if information indicating that the conference will

end is transmitted to the display control unit 114 by the user pressing a “forced end” button shown in Fig. 3(c), the display control unit 114 causes the user terminal 30 to display the questionnaire.

[0042]

The questionnaire to be displayed on the user terminal 30 is shown in a display form as shown in Fig. 7(a), for example. The example of the questionnaire shown in Fig. 7(a) uses a display form in which the user is asked about the environment of the conference and whether the participants were able to concentrate on the conference in addition to conventional content relating to the conference such as the number of participants and the end time. Through the screen shown in Fig. 7(a), the user selects whether the environment of the conference was comfortable and whether the user could concentrate on the conference. By performing this questionnaire, the conference support device 100 can acquire data indicating the satisfaction level of the conference. That is, based on the participants’ satisfaction level with the conference, it is possible to estimate the psychological state of the conference participants. Means for estimating the psychological state of the conference participants is not limited to questions for estimating the satisfaction level. It is possible to estimate the psychological state based on the questions about whether the conference ended in time and whether the purpose of the conference was achieved, as shown in Fig. 7(a), for example. More specifically, if the conference does not end in time and a scheduled end time is exceeded significantly, it is possible to estimate that a participant's psychological state is one of discomfort. In addition, by using the questionnaires shown in Figs. 7(b) and 7(c) which will be described later, it is possible to estimate the psychological state of the participant in more detail. The conference support device 100 estimates the psychological state of the participant based on the data indicating the satisfaction level of the conference and the like. A difference of the control information of the environment control equipment 200 can be adjusted by means of the control information adjustment unit 118 which will be described later based on the estimated result.

[0043]

Further, the questionnaire to be displayed on the user terminal 30 can be shown in display forms as shown in Fig. 7(b) and 7(c). Fig. 7(b) shows an example of a questionnaire in matrix form. In the example shown in Fig. 7(b), arousal and sedation are plotted on the vertical axis, and comfort and discomfort are plotted on the horizontal axis. On the screen shown in Fig. 7(b), the user selects the area corresponding to the psychological state (mood) after the conference. This enables the conference support device 100 to estimate the subjective psychological state (mood) of the participant (the user) with respect to the conference. The questionnaire may also be shown in a form in which the user is asked questions in a worded form, as shown in Fig. 7(c). In the case of the questionnaire shown in the form of Fig. 7(c), as in the case of the questionnaire shown in Fig. 7(b), it is also possible to estimate the psychological state (mood) of the user with respect to the conference. In the examples of the questionnaires shown in Figs. 7(a) to 7(c) above, any one of Figs. 7(a) to 7(c) may be displayed as a questionnaire. Alternatively, the questionnaire may be performed by displaying a plurality of display forms from among Figs. 7(a) to 7(c) in sequence. The questionnaire in Fig. 7(a) may be performed first, and then the questionnaire in Fig. 7(b) may be performed, for example.

[0044]

The questionnaire shown in Fig. 7(b) will be described. The user's psychological state and emotions can be estimated and assigned as shown in Fig. 8 according to the places plotted by the user. The upper-left section of Fig. 8 indicates that the participant is in a state of "irritation", and the level of "irritation" increases toward the upper-left corner, for example. Similarly, the upper right section of Fig. 8 indicates that the user is in a state of "concentration", and the level of "concentration" increases toward the upper right corner. In addition, the lower right section of Fig. 8 indicates that the user is in a state of "relaxation" and the level of "relaxation" increases toward the lower right corner. Furthermore, the lower left section indicates that the user has the emotion of "boredom", and as similar to other psychological

states and emotions, the level of “boredom” increase toward the lower left corner.

[0045]

The questionnaire result acquisition unit 115 acquires, via the network 40, information selected by the user in response to the questionnaire displayed on the user terminal 30 and transmits the information to the tabulation unit 116.

[0046]

The tabulation unit 116 tabulates the questionnaire results acquired by means of the questionnaire result acquisition unit 115 and stores the tabulation result in the tabulation result DB 124. In the present embodiment, the tabulation unit 116 calculates the average value of the acquired questionnaire results of the participants.

[0047]

When the display form of the questionnaire is in the matrix format shown in Fig. 7(b), the average value of the places plotted by the users is calculated as the tabulation result. Meanwhile, suppose that the display form of the questionnaire is the worded form as shown in Figs. 7(a) or Fig. 7(c), for example. In the above case, the tabulation unit 116 assigns “4” as a value if the answer is “yes” on the comfort-discomfort axis, and assigns “-4” as a value if the answer is “no”. Furthermore, the tabulation unit 116 performs tabulation by calculating the average value of the assigned values of the participants.

[0048]

Fig. 9(a) shows information on the tabulation result of questionnaires. The questionnaire result for the conference held in conference room 1602 shown on the first line of Fig. 9(a) has (2, -2) as the questionnaire result, for example. This indicates that as a result of calculating the average value of the questionnaire results of the participants acquired by means of the tabulation unit 116, the value corresponds to the location in area 124a shown in Fig. 9(b). Area 124a shown in Fig. 9(b) results in (2, -2) by converting the location in the area into a numerical value. Meanwhile, in the conference shown in the second line of Fig. 9(a), the location in area 124b of Fig. 9(b) is the average value for the participants based on the tabulation of the questionnaire

results. As a result of converting the location in the area into a numerical value, the area is $(-1, -1)$, and the tabulation result is $(-1, -1)$.

[0049]

The present embodiment has showed a means for calculating the average value for the participants as a means for tabulating the questionnaire results, but the means for tabulating the questionnaire results is not limited thereto. The tabulation unit 116 may calculate a standard deviation for the participants from whom the questionnaire results are obtained and use the calculated result as the tabulation result of the questionnaire. In addition, the tabulation result stored in the tabulation result DB 124 may be displayed on the user terminal 30 via the display control unit 114. This enables the conference manager or the like to check the tabulation result as shown in Fig. 9(a) through the user terminal 30, and perceive tendencies in the user's psychological state with respect to the conference information, for example. Accordingly, if there is a malfunction in the environment control equipment 200 or the conference room 20 itself, it becomes possible to become aware of the malfunction from the tendencies in the user's psychological state, for example.

[0050]

The determination unit 117 determines the tabulation result of the participants' questionnaires for the conference based on predetermined thresholds. Fig. 10 shows predetermined thresholds of tabulation results according to the type of each conference. If the conference type is "formal", on the axis of arousal-sedation (the vertical axis), the value of the tabulation result is preferably -2 or more and 2 or less, and -2 and 2 become thresholds, for example. In a "formal" conference, it is assumed that the conference will become active to some extent due to discussions and the like. However, if the conference is overly active, discussions will diverge and it is considered that this kind of conference is undesirable as a "formal" conference. Similarly, if a conference is too sedate, this kind of conference is undesirable as the formal conference. Therefore, in the present embodiment, the range of the vertical axis of the "formal" conference defined based on the thresholds is -2 or more and 2 or less.

[0051]

In addition, in the case of a “standard” conference, it is considered that it is preferable to increase the degree of arousal and to make the conference active to some extent. Therefore, in the present embodiment, the range of the vertical axis of the “standard” conference defined based on the thresholds is 0 or more and 4 or less. Further, in the present embodiment, the thresholds are not used for a “casual” conference on the axis of arousal-sedation (the vertical axis). It is preferable that all of “formal”, “standard”, and “casual” conferences be on the comfortable side on the axis of comfort-discomfort (the horizontal axis). Therefore, in the present embodiment, all the ranges defined based on the thresholds are 0 or more and 4 or less. The example shown in Fig. 10 shows an example of thresholds for the conference types, but thresholds reflecting the location and the time zone of the conference may be used. If a conference is held at night, it is expected that the psychological state of the user will have poorer numerical values than when a conference is held in the morning due to reasons such as fatigue, for example. For this reason, for a conference to be held in the night time zone, threshold values may be used that are higher than thresholds when a conference is held in the morning or afternoon and the changes shown in Fig. 11 performed by means of the control information adjustment unit 118 may be facilitated, for example.

[0052]

The control information adjustment unit 118 updates the control information included in the correspondence relationship information stored in the correspondence relationship information DB 122 according to the determination result determined by means of the determination unit 117. Specifically, suppose that the determination unit 117 determines that the value of the tabulation result is within the range defined based on predetermined thresholds. In the above case, the control information adjustment unit 118 generates correspondence relationship information based on the control information stored in the equipment control DB 123 and the conference information stored in the conference information DB 121. Further, the control information

adjustment unit 118 stores the generated correspondence relationship information in the correspondence relationship information DB 122. Specifically, the correspondence relationship information DB 125 is updated by using the parameters of the control information stored in the equipment control DB 123.

[0053]

Suppose that a conference is held by using the control information acquired from the correspondence relationship information DB 122 at the start of the conference, and the control information is not changed in the middle of the conference, for example. In the above case, the values of the control information are not changed, and therefore, there is no change in the control information even if the correspondence relationship information is updated. In other words, when the determination unit 117 determines that the tabulation result is within the range defined based on the thresholds, if the control information is changed in the middle of the conference, updating is performed by using the changed control information of the environment control equipment 200. The predetermined thresholds shown in Fig. 10 are examples and do not limit the present embodiment. It is possible to change the thresholds according to the conference type depending on the intention of the host of the conference and to apply the thresholds to the present embodiment, for example.

[0054]

Meanwhile, suppose that the determination unit 117 determines that the value of the tabulation result is not within the range defined based on the thresholds. In the above case, the control information adjustment unit 118 corrects the control information according to the content of the tabulation result, and updates the correspondence relationship information DB 122 by using the corrected control information. Specifically, if the tabulation result of the axis of sedation-arousal (the vertical axis) is lower than the threshold, the correction shown in the row from sedation to arousal in the first line shown in Fig. 11 is performed on the control information of the environment control equipment 200 so as to increase the value, for example. In the correction from sedation to arousal in the example shown in Fig. 11,

the lighting is raised by 1000 K. Also in the correction, the type (or intensity) of airflow is changed. In the present embodiment, the intensity of the airflow is increased by one level, for example. In addition, the type (or intensity) of fragrance is changed when necessary. In the present embodiment, the intensity of the fragrance is increased by one level, for example. Similarly, intensities of both the acoustics and air conditioning are increased by one level.

[0055]

Meanwhile, if the tabulation result on the axis of sedation-arousal (the vertical axis) is higher than the threshold, the control information is changed so as to decrease the set values of each piece of environment control equipment 200 as shown in Fig. 11, for example. In the present embodiment, the control of the airflow and fragrance to shift from arousal to sedation is not limited to the correction of decreasing the values by one level. If control of the airflow and fragrance to make the user feel more peaceful (relieve tension) is possible, the control information is corrected so that the user feels more peaceful.

[0056]

In addition, if the tabulation result on the comfort-discomfort axis (the horizontal axis) is below the threshold, the types of airflow and fragrance are changed. Specifically, a natural airflow and a mint or citrus fragrance are used. The correction of control information shown in Fig. 11 is an example and does not limit the present embodiment. Although Fig. 11 shows an example in which no correction is made for lighting, acoustic, and air conditioning as a correction for the shift from discomfort to comfort, acoustic and air conditioning may be controlled so that the user feels comfortable.

[0057]

(Outline of processing flow of conference support system 1)

Next, a flow chart of an example of the operation by the conference support system 1 will be described with reference to Fig. 12. In the flow chart of Fig. 12, the processing also ends due to power being turned off or an interruption such as

processing being ended. In the explanation of the flow chart below, the same contents as those described in the explanation of the conference support device 100 described above are omitted or simplified.

[0058]

In step S1201, the conference information acquisition unit 111 acquires conference information such as the type of a conference to be held and stores the conference information in the conference information DB 121. As for the conference information, the screens shown in Fig. 3 are displayed on the user terminal 30, and the user inputs information such as the conference type through the screens displayed on the user terminal 30. Examples of information on the conference include the location, type, and time of the conference.

[0059]

In step S1202, the control information acquisition unit 112 acquires control information of the environment control equipment 200 from the correspondence relationship information DB 122 based on the conference information and stores the control information in the equipment control DB 123.

[0060]

In step S1203, the equipment control unit 113 controls the environmental control equipment 200 based on control information for controlling the environmental control equipment 200, which is stored in the equipment control DB 123. Specifically, the equipment control unit 113 transmits a control instruction to the environment control equipment 200 through the network interface 140 based on the control information. Each piece of environment control equipment 200 is made to operate according to the control instruction transmitted from the equipment control unit 113. If the user directly controls the environment control equipment 200, the control information is transmitted from the environment control equipment 200 to the equipment control unit 113 via the network 40. The equipment control unit 113 receives the transmitted control information and stores the received information in the equipment control DB 123.

[0061]

In step S1204, the display control unit 114 transmits a questionnaire about the conference to the user terminal 30 after the conference, and causes the user terminal 30 to display the questionnaire. The display control unit 114 causes the user terminal 30 to display the questionnaire when the conference end time is reached, for example. Alternatively, even before the conference end time, if information indicating that the conference will end is transmitted to the display control unit 114 by the user pressing the “forced end” button shown in Fig. 3(c), the display control unit 114 causes the user terminal 30 to display the questionnaire.

[0062]

In step S1205, the questionnaire result acquisition unit 115 acquires, via the network 40, information selected by the user in response to the questionnaire displayed on the user terminal 30 and transmits the information to the tabulation unit 116.

[0063]

In step S1206, the tabulation unit 116 tabulates the questionnaire results acquired by means of the questionnaire result acquisition unit 115 and stores the tabulation result in the tabulation result DB 124. In the present embodiment, the tabulation unit 116 calculates the average value of the participants’ questionnaire results that can be obtained.

[0064]

In step S1207, the determination unit 117 determines the tabulation result of the participants’ questionnaires for the conference based on predetermined thresholds. In the present embodiment, the predetermined thresholds are thresholds corresponding to a tabulation result depending on the type of each conference as shown in Fig. 10, for example. In step S1207, when the determination unit 117 determines that the tabulation result is within the range defined based on the thresholds (step S1207: YES), the process proceeds to step S1208. Meanwhile, in step S1207, if the determination unit 117 determines that the tabulation result is not within the range

defined based on the thresholds (step S1207: NO), the process proceeds to step S1209.
[0065]

In step S1208, the control information adjustment unit 118 updates the correspondence relationship information indicating the relationship between the conference information and the control information stored in the correspondence relationship information DB 122 based on the control information stored in the equipment control DB 123. If the control information of the environment control equipment 200 is changed in the middle of the conference, the correspondence relationship information is updated by using the changed control information of the environment control equipment 200, for example.

[0066]

In step S1209, the control information adjustment unit 118 corrects the control information stored in the equipment control DB 123 according to the contents of the tabulation result. Specifically, the control information adjustment unit 118 corrects the control information according to the content of the adjustment to the environment control equipment 200 corresponding to the direction of correction on each axis as shown in Fig. 11, for example,.

[0067]

In step S1210, the control information adjustment unit 118 updates the control information of the correspondence relationship information indicating the relationship between the conference information and the control information stored in the correspondence relationship information DB 122 based on the control information corrected in step S1209.

[0068]

As described above, in the conference support system 1 according to the first embodiment, questionnaire results from which the psychological state of the conference participants can be estimated are tabulated, the psychological state of the user is determined, and the control information of the environment control equipment 200 in the conference room is updated based on the determination result. This enables

the conference support device 100 to reflect the psychological state of the user when controlling the environment control equipment 200 that controls the environment of the space in which the conference is held. Therefore, by controlling the environment control equipment 200 using the control information in which the psychological state of a conference participant (the user) is reflected, the control of the environment of a space such as a conference room that is suited to the user's intention becomes possible.

[0069]

Further, in the conference support system 1 according to the first embodiment, at least one of a lighting device, an air conditioner, an aroma generating device, an acoustic device, and a ventilator can be disposed as the environment control equipment 200. This makes it possible to adjust the environment of the space more flexibly in the conference room 20. Still further, in the conference support system 1, the environment of the space can be adjusted depending on the type and the location of the conference.

[0070]

In addition, the determination unit 117 of the conference support device 100 according to the first embodiment can determine the value of the tabulation result of the questionnaires based on thresholds corresponding to the conference information. This makes it possible to determine detailed thresholds corresponding to conference information such as the conference type, and to set control information of the environment control equipment 200 in which the user's psychological state is reflected more appropriately.

[0071]

(Second embodiment)

As described above, one specific embodiment has been described, but the above-described embodiment is an example and is not intended to limit the present embodiment. The above embodiment has exemplified a form in which the determination unit 117 makes a determination based on predetermined thresholds according to questionnaire results, and the control information adjustment unit 118 updates the control information of the environment control equipment 200, for

example. In a conference support system according to a second embodiment, a conference support device 105 is caused to learn the control information of the environment control equipment 200 and the questionnaire results, and the learned results are used as a correspondence relationship information DB 125. The configuration of the second embodiment different from that of the first embodiment will be described below.

[0072]

Fig. 13 is a functional block diagram for explaining the functions of the conference support device 105 according to the second embodiment.

[0073]

The second embodiment differs from the first embodiment in that the conference support device 105 includes a learning unit 150 having a machine learning unit 151, instead of the determination unit 117 and the control information adjustment unit 118 provided in the control unit 110 of the conference support device 100 according to the first embodiment.

[0074]

The machine learning unit 151 inputs, to the machine learning unit 151, a set of the conference information, the control information, and the tabulation result of the questionnaire as learning data and teaching data. Then, the machine learning unit 151 learns the relationship among the conference information, the control information, and the tabulation result to generate the correspondence relationship information DB 125 as a learned model. Specifically, the tabulation result of the questionnaire indicating the psychological state of the user is used as teaching data, and the conference information, the corresponding control information, and the tabulation result of the questionnaire are used as data input to the machine learning unit 151. That is, learning is performed such that the psychological state of the user becomes better in the correspondence relationship between the conference information and control information. A good psychological state of the user is a state in which the level of “comfort” is higher in Fig. 8, for example.

[0075]

A neural network model is used for the machine learning unit 151. As the neural network model used for the machine learning unit 151, a model of a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN, LSTM), or the like can be applied. However, the type of neural network model does not limit the present embodiment.

[0076]

Further, Fig. 13 shows an example of a configuration in which the learning unit 150 is provided as a separate component from the control unit 110, but the second embodiment is not limited to this configuration. The learning unit 150 may be included in the control unit 110, for example. Furthermore, the learning unit 150 is not necessarily disposed in the conference support device 105. A configuration may be adopted in which all of the conference information, control information, and tabulation result are read from the storage unit 120, these are used as a learning set, and a system other than the server 10 is made to learn the learning set, and the correspondence relationship information DB 125 is generated as the learned model, for example. In this case, it is assumed that the correspondence relationship information DB 125 is brought into the storage unit 120 of the conference support device 105 from outside the server 10 through the input/output interface 130 or the network interface 140.

[0077]

As described above, in the conference support device 105 according to the second embodiment, it is possible to acquire the correspondence relationship information DB 125 in which the psychological state of the participant (the user) is reflected by using the correspondence relationship information DB 125 which is a learned model generated by actual learning. This makes it possible to acquire more appropriate control information of the environmental control equipment 200 according to the form of the conference, and to appropriately control the environment of the space of the conference.

[0078]

(Other embodiments)

Although embodiments of the present invention have been described above, the embodiments are not limited thereto, and various modifications can be made within the scope of the gist of the embodiments. It is also possible to combine some or all of the various embodiments to form a new embodiment.

[0079]

The above embodiments have showed an example in which, in the conference support system 1, the questionnaire is displayed on the user terminal 30 at the end of the conference, but the questionnaire may be displayed on the user terminal 30 in the middle of the conference. A form may be adopted in which the questionnaire is performed during a break in the conference, and the control information of the environment control equipment 200 is changed according to the result of the questionnaire, for example. In this case, the control information adjustment unit 118 updates the control information in the correspondence relationship information DB 122. Then, the control information acquisition unit 112 acquires the changed control information and stores the information in the equipment control DB 123. Thereafter, the equipment control unit 113 may control the environmental control equipment 200 based on the changed control information. Alternatively, the control information adjustment unit 118 may directly update the equipment control DB 123, and the equipment control unit 113 may control the environmental control equipment 200 based on the changed control information.

[0080]

In the above embodiments, a configuration example using what is referred to as a cloud computing is given in which, in the conference support system 1, the conference support device 100 controls the environment control equipment 200 based on conference information input through the user terminal 30. However, the configuration of the conference support system 1 is not limited thereto. What is referred to as edge computing may be adopted in which the conference support device 100 and the user terminal 30 are provided for each conference room 20, and the

environment control equipment 200 is controlled for each conference room 20, for example. In that case, the network 40 may be wired or wireless for short-range communication.

[0081]

In addition, a computer program (a conference support program) for causing a computer to execute the above method and a computer-readable recording medium on which the program is recorded are within the scope of the present embodiment. Any type of computer-readable recording medium can be used. In addition, the computer program described above is not limited to the program recorded in the recording medium described above, and may be transmitted via a telecommunication line, a wireless or wired communication line, a network represented by the Internet, or the like.

[0082]

The features of the conference support devices 100 and 105, the conference support system 1, and the conference support method according to the present embodiment will be described below.

[0083]

(1) The conference support device 100 has the following configurations.

(i) The conference support device 100 includes the conference information acquisition unit 111 that acquires conference information on the conference to be held.

(ii) The conference support device 100 includes the storage unit 120 that stores the correspondence relationship information indicating the correspondence relationship between the control information of the environment control equipment 200 that controls the environment of the space in which the conference is held and the conference information.

(iii) The conference support device 100 includes the control information acquisition unit 112 that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit 120.

(iv) The conference support device 100 includes the equipment control unit 113 that controls the environmental control equipment 200 based on the control information.

(v) The conference support device 100 includes the display control unit 114 that causes the user terminal 30 to display a questionnaire from which the psychological state of the conference participant can be estimated.

(vi) The conference support device 100 includes the questionnaire result acquisition unit 115 that acquires questionnaire results transmitted from user terminals 30.

(vii) The conference support device 100 includes the tabulation unit 116 that tabulates the questionnaire results and generates the tabulation result.

(viii) The conference support device 100 includes the determination unit 117 that determines the value of the tabulation result based on the predetermined thresholds.

(ix) The conference support device 100 includes the control information adjustment unit 118 that updates the control information included in the correspondence relationship information according to the determination result determined by means of the determination unit 117.

[0084]

According to the present disclosure, the conference support device 100 tabulates the questionnaire results from which the psychological state of the conference participants can be estimated, determines the psychological state of the user, and updates the control information of the environment control equipment 200 in the conference room based on the determination result. This enables the conference support device 100 to reflect the psychological state of the user when controlling the environment control equipment 200 that controls the environment of the space in which the conference is held. Therefore, by controlling the environment control equipment 200 using the control information in which the psychological state of the conference participant (the user) is reflected, the control of the environment of a space

such as a conference room that is suited to the user's intention becomes possible.

[0085]

(2) The environment control equipment 200 preferably includes at least one of a lighting device, an air conditioner, an aroma generating device, an acoustic device, and a ventilator.

[0086]

According to the present disclosure, the environment control equipment 200 in the conference support system 1 can include at least one of a lighting device, an air conditioner, an aroma generating device, an acoustic device, and a ventilator. This makes it possible to adjust the environment of the space more flexibly in the conference room 20. In addition, the environment of the space can be adjusted according to the type and the location of the conference.

[0087]

(3) It is preferable that the determination unit 117 determines the value of the tabulation result based on the thresholds corresponding to the conference information.

[0088]

According to the present disclosure, the determination unit 117 of the conference support device 100 can determine the value of the tabulation result of the questionnaire based on the thresholds corresponding to the conference information. This makes it possible to determine detailed thresholds corresponding to the conference information such as the conference type, and to set the control information of the environment control equipment 200 in which the user's psychological state is reflected more appropriately.

[0089]

(4) The conference support device 105 has the following configurations.

(i) The conference support device 105 includes the conference information acquisition unit 111 that acquires conference information on the conference to be held.

(ii) The conference support device 105 includes the storage unit 120 that stores the correspondence relationship information indicating the correspondence

relationship between the control information of the environment control equipment 200 that controls the environment of the space in which the conference is held and the conference information.

(iii) The conference support device 105 includes the control information acquisition unit 112 that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit 120.

(iv) The conference support device 105 includes the equipment control unit 113 that controls the environmental control equipment 200 based on the control information.

(v) The conference support device 105 includes the display control unit 114 that causes the user terminal 30 to display a questionnaire from which the psychological state of the conference participant can be estimated.

(vi) The conference support device 105 includes the questionnaire result acquisition unit 115 that acquires questionnaire results transmitted from user terminals 30.

(vii) The conference support device 105 includes the tabulation unit 116 that tabulates the questionnaire results and generates the tabulation result.

(viii) The conference support device 105 includes the learning unit 150 that learns the correspondence relationship between the conference information and the control information based on the value of the tabulation result, the conference information, and the control information. The learning unit 150 reflects the result of learning the correspondence relationship between the conference information and the control information in the correspondence relationship information.

[0090]

According to the present disclosure, in the conference support device 105, by using the correspondence relationship information DB 125, which is a learned model generated by actual learning, it is possible to acquire the correspondence relationship information DB 125 in which the psychological state of the participant (the user) is

reflected. This makes it possible to acquire more appropriate control information of the environmental control equipment 200 according to the form of the conference, and to appropriately control the environment of the space of the conference.

[0091]

(5) The conference support system 1 has the following configurations.

(i) The conference support system 1 has the following configurations. The conference support system 1 includes the environment control equipment 200 that controls the environment of the space in which the conference is held, the user terminal 30, and the conference support device 100 that controls the environment control equipment 200. In addition, the conference support device 100 has the following configurations.

(ii) The conference support device 100 includes the conference information acquisition unit 111 that acquires conference information on the conference to be held.

(iii) The conference support device 100 includes the storage unit 120 that stores the correspondence relationship information indicating the correspondence relationship between the control information of the environment control equipment 200 that controls the environment of the space in which the conference is held and the conference information.

(iv) The conference support device 100 includes the control information acquisition unit 112 that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit 120.

(v) The conference support device 100 includes the equipment control unit 113 that controls the environmental control equipment 200 based on the control information.

(vi) The conference support device 100 includes the display control unit 114 that causes the user terminal 30 to display a questionnaire from which the psychological state of the conference participant can be estimated.

(vii) The conference support device 100 includes the questionnaire result

acquisition unit 115 that acquires questionnaire results transmitted from user terminals 30.

(viii) The conference support device 100 includes the tabulation unit 116 that tabulates the questionnaire results and generates the tabulation result.

(ix) The conference support device 100 includes the determination unit 117 that determines the value of the tabulation result based on the predetermined thresholds.

(x) The conference support device 100 includes the control information adjustment unit 118 that updates the control information included in the correspondence relationship information according to the determination result determined by means of the determination unit 117.

[0092]

According to the present disclosure, in the conference support system 1, the questionnaire results from which the psychological state of the conference participants can be estimated are tabulated, the psychological state of the user is determined, and the control information of the environmental control equipment 200 in the conference room is updated based on the determination result. This enables, in the conference support system 1, to reflect the psychological state of the user when the environment control equipment 200 that controls the environment of the space in which the conference is held is controlled. Therefore, by controlling the environment control equipment 200 using the control information in which the psychological state of the conference participant (the user) is reflected, the control of the environment of a space such as a conference room that is suited to the user's intention becomes possible.

[0093]

(6) A conference support method executed by a computer preferably has the following processes.

(i) The conference support method includes a process of acquiring the conference information on the conference to be held.

(ii) The conference support method includes a process of acquiring the control

information corresponding to the conference information from the storage unit 120 that stores the correspondence relationship information indicating the correspondence relationship between the control information of the environment control equipment 200 that controls the environment of the space in which the conference is held and the conference information.

(iii) The conference support method includes a process of controlling the environmental control equipment 200 based on the control information.

(iv) The conference support method includes a process of causing the user terminal 30 to display a questionnaire from which the psychological state of the conference participant can be estimated.

(v) The conference support method includes a process of acquiring questionnaire results transmitted from user terminals 30.

(vi) The conference support method includes a process of tabulating questionnaire results and generating the tabulation result.

(vii) The conference support method includes a process of determining the value of the tabulation result based on the predetermined thresholds.

(viii) The conference support method includes a process of updating the control information included in the correspondence relationship information according to the determination result.

[0094]

According to the present disclosure, by means of the conference support method, it is possible to tabulate the questionnaire results from which the psychological state of the conference participants can be estimated, determine the psychological state of the user, and update the control information of the environmental control equipment 200 in the conference room based on the determination result. This enables to, by means of the conference support method, reflect the psychological state of the user when the environment control equipment 200 that controls the environment of the space in which the conference is held is controlled. Therefore, by controlling the environment control equipment 200 using the

control information in which the psychological state of the conference participant (the user) is reflected, the control of the environment of a space such as a conference room that is suited to the user's intention becomes possible.

[0095]

(7) A conference support program causes a computer to execute the following processes.

(i) The processes include a process of acquiring the conference information on the conference to be held.

(ii) The processes include a process of acquiring the control information corresponding to the conference information from the storage unit 120 that stores the correspondence relationship information indicating the correspondence relationship between the control information of the environment control equipment 200 that controls the environment of the space in which the conference is held and the conference information.

(iii) The processes include a process of controlling the environmental control equipment 200 based on the control information.

(iv) The processes include a process of causing the user terminal 30 to display a questionnaire from which the psychological state of the conference participant can be estimated.

(v) The processes include a process of acquiring questionnaire results transmitted from user terminals 30.

(vi) The processes include a process of tabulating the questionnaire results and generating the tabulation result.

(vii) The processes include a process of determining the value of the tabulation result based on the predetermined thresholds.

(viii) The processes include a process of updating the control information included in the correspondence relationship information according to the determination result.

[0096]

According to the present disclosure, by means of the conference support program, it is possible to tabulate the questionnaire results from which the psychological state of the conference participants can be estimated, determine the psychological state of the user, and update the control information of the environmental control equipment 200 in the conference room based on the determination result. This enables to, by means of the conference support program, reflect the psychological state of the user when the environment control equipment 200 that controls the environment of the space in which the conference is held is controlled. Therefore, by controlling the environment control equipment 200 using the control information in which the psychological state of the conference participant (the user) is reflected, the control of the environment of a space such as a conference room that is suited to the user's intention becomes possible.

[0097]

(8) A form may be adopted in which the conference support program is recorded in a computer-readable recording medium.

[0098]

According to the present disclosure, by means of the conference support program, it is possible to tabulate the questionnaire results from which the psychological state of the conference participants can be estimated, determine the psychological state of the user, and update the control information of the environmental control equipment 200 in the conference room based on the determination result. This enables to, by means of the conference support program, reflect the psychological state of the user when the environment control equipment 200 that controls the environment of the space in which the conference is held is controlled. Therefore, by controlling the environment control equipment 200 using the control information in which the psychological state of the conference participant (the user) is reflected, the control of the environment of a space such as a conference room that is suited to the user's intention becomes possible.

[0099]

The entire contents of Japanese Patent Application No. 2020-178068 (filing date: October 23, 2020) are incorporated herein.

Industrial Applicability

[0100]

According to the present disclosure, it is possible to provide a conference support device that can appropriately control the environment of a space in which a conference is held.

Reference Signs List

[0101]

- 1 Conference support system
- 10 Server
- 20 Conference room
- 30 User terminal
- 40 Network
- 100 Conference support device
- 110 Control unit
- 111 Conference information acquisition unit
- 112 Control information acquisition unit
- 113 Equipment control unit
- 114 Display control unit
- 115 Questionnaire result acquisition unit
- 116 Tabulation unit
- 117 Determination unit
- 118 Control information adjustment unit
- 120 Storage unit
- 121 Conference information DB
- 122, 125 Correspondence relationship information DB

123 Equipment control DB
124 Tabulation result DB
130 Input/output interface
140 Network interface
150 Learning unit
151 Machine learning unit
200 Environmental control equipment

CLAIMS

[Claim 1]

A conference support device comprising:

a conference information acquisition unit that acquires conference information on a conference to be held;

a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of environment control equipment that controls an environment of a space in which the conference is held;

a control information acquisition unit that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit;

an equipment control unit that controls the environmental control equipment based on the control information;

a display control unit that causes a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated;

a questionnaire result acquisition unit that acquires a questionnaire result transmitted from the user terminal;

a tabulation unit that tabulates the questionnaire result and generates a tabulation result;

a determination unit that determines a value of the tabulation result based on a predetermined threshold; and

a control information adjustment unit that updates the control information included in the correspondence relationship information according to a determination result determined by means of the determination unit.

[Claim 2]

The conference support device according to claim 1, wherein

the environment control equipment includes at least one of a lighting device,

an air conditioner, an aroma generating device, an acoustic device, and a ventilator.

[Claim 3]

The conference support device according to claim 1 or 2, wherein
the determination unit determines the value of the tabulation result based on
the threshold corresponding to the conference information.

[Claim 4]

A conference support device comprising:
a conference information acquisition unit that acquires conference information
on a conference to be held;
a storage unit that stores correspondence relationship information indicating a
correspondence relationship between the conference information and control
information of environment control equipment that controls an environment of a space
in which the conference is held;
a control information acquisition unit that acquires the control information
corresponding to the conference information from the correspondence relationship
information stored in the storage unit;
an equipment control unit that controls the environmental control equipment
based on the control information;
a display control unit that causes a user terminal to display a questionnaire
from which a psychological state of a participant in the conference can be estimated;
a questionnaire result acquisition unit that acquires a questionnaire result
transmitted from the user terminal;
a tabulation unit that tabulates the questionnaire result and generates a
tabulation result; and
a learning unit that learns the correspondence relationship between the
conference information and the control information based on a value of the tabulation
result, the conference information, and the control information, wherein

the learning unit reflects a result of learning the correspondence relationship between the conference information and the control information in the correspondence relationship information.

[Claim 5]

A conference support system comprising:

- environment control equipment that controls an environment of a space in which a conference is held;
- a user terminal; and
- a conference support device that controls the environment control equipment, wherein

the conference support device includes:

- a conference information acquisition unit that acquires conference information on the conference;
- a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of the environment control equipment;
- a control information acquisition unit that acquires the control information corresponding to the conference information from the correspondence relationship information stored in the storage unit;
- an equipment control unit that controls the environmental control equipment based on the control information;
- a display control unit that causes the user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated;
- a questionnaire result acquisition unit that acquires a questionnaire result transmitted from the user terminal;
- a tabulation unit that tabulates the questionnaire result and generates a tabulation result;
- a determination unit that determines a value of the tabulation result based on a

predetermined threshold; and

a control information adjustment unit that updates the control information included in the correspondence relationship information according to a determination result determined by means of the determination unit.

[Claim 6]

A conference support method executed by a computer, the conference support method comprising:

acquiring conference information on a conference to be held;

acquiring the control information corresponding to the conference information from a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of environmental control equipment that controls an environment of a space in which the conference is held;

controlling the environmental control equipment based on the control information;

causing a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated;

acquiring a questionnaire result transmitted from the user terminal;

tabulating the questionnaire result and generating a tabulation result;

determining a value of the tabulation result based on a predetermined threshold; and

updating the control information included in the correspondence relationship information according to a determination result.

[Claim 7]

A conference support program for causing a computer to execute processes of:

acquiring conference information on a conference to be held;

acquiring the control information corresponding to the conference information

from a storage unit that stores correspondence relationship information indicating a correspondence relationship between the conference information and control information of environmental control equipment that controls an environment of a space in which the conference is held;

controlling the environmental control equipment based on the control information;

causing a user terminal to display a questionnaire from which a psychological state of a participant in the conference can be estimated;

acquiring a questionnaire result transmitted from the user terminal;

tabulating the questionnaire result and generating a tabulation result;

determining a value of the tabulation result based on a predetermined threshold; and

updating the control information included in the correspondence relationship information according to a determination result.

[Claim 8]

A computer-readable recording medium on which the program according to claim 7 is recorded.