

DESCRIPTION

Title of Invention: TARGET MONITORING APPARATUS, TARGET MONITORING
METHOD, PROGRAM, AND RECORDING MEDIUM

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TECHNICAL FIELD

[0001] The present disclosure relates to a target monitoring apparatus, a target monitoring method, a program, and a recording medium.

BACKGROUND ART

10 [0002] In recent years, technologies for reducing fall accidents of subjects under management (for example, patients or care-requiring persons) in hospitals, nursing care facilities, and the like have been studied. As a specific example, a fall detection apparatus that can detect falls and fall patterns is known (Patent Literature 1). The fall detection apparatus described in Patent
Literature 1 includes a plurality of fall detection parts that detect a plurality of falls of different
15 fall patterns of a subject, and a notification part that notifies, when each of the plurality of fall detection parts detects a fall of a corresponding fall pattern, the outside of the detected fall of the corresponding fall pattern.

Citation List

Patent Literature

20 [0003]
Patent Literature 1: JP 2016-067641 A

SUMMARY

Technical Problem

[0004] It is desirable to prevent accidents such as falls in advance, as they may cause the
25 subject to be injured at the time of occurrence or may even lead to a fatal accident. However, while the apparatus described in Patent Literature 1 can detect falls that have occurred, it has a problem that it cannot prevent accidents such as falls in advance. On the other hand, constantly monitoring the subject in order to prevent accidents in advance is not practical.

[0005] Therefore, an example object of the present disclosure is to provide a target monitoring
30 apparatus, a target monitoring method, a program, and a recording medium, which enable automatic monitoring of subjects at high risk of accidents.

Solution to Problem

[0006] A target monitoring apparatus according to an example aspect of the present disclosure

includes a state information acquisition part, an accident risk determination part, an assessment part, and a monitoring part, wherein the state information acquisition part acquires state information of a monitoring candidate, the accident risk determination part determines accident risk of the monitoring candidate based on the state information and alert criterion information, the assessment part assesses whether monitoring of the monitoring candidate is required based on the accident risk, and the monitoring part sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[0007] A target monitoring method according to an example aspect of the present disclosure includes acquiring state information, determining accident risk, assessing, and monitoring,

wherein the acquiring state information acquires state information of a monitoring candidate, the determining accident risk determines accident risk of the monitoring candidate based on the state information and alert criterion information, the assessing assesses whether monitoring of the monitoring candidate is required based on the accident risk, and the monitoring sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[0008] A program for causing a computer to execute procedures according to an example aspect of the present disclosure includes a state information acquisition procedure, an accident risk determination procedure, an assessment procedure, and a monitoring procedure, wherein the state information acquisition procedure acquires state information of a monitoring candidate, the accident risk determination procedure determines accident risk of the monitoring candidate based on the state information and alert criterion information, the assessment procedure assesses whether monitoring of the monitoring candidate is required based on the accident risk, and the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[0009] A computer-readable recording medium recorded with a program for causing a

computer to execute procedures according to an example aspect of the present disclosure. The program includes a state information acquisition procedure, an accident risk determination procedure, an assessment procedure, and a monitoring procedure, wherein the state information acquisition procedure acquires state information of a monitoring candidate, the accident risk determination procedure determines accident risk of the monitoring candidate based on the state information and alert criterion information, the assessment procedure assesses whether monitoring of the monitoring candidate is required based on the accident risk, and the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

Advantageous Effects of Invention

[0010] According to an example advantage of the present disclosure, subjects at high risk of accidents can be automatically monitored.

BRIEF DESCRIPTION OF DRAWINGS

5 [0011] [FIG. 1] FIG. 1 is a block diagram illustrating an exemplary configuration of a target monitoring apparatus of the present disclosure.

[FIG. 2] FIG. 2 is a block diagram illustrating an exemplary hardware configuration of the target monitoring apparatus of the present disclosure.

10 [FIG. 3] FIG. 3 is a flowchart illustrating an exemplary processing in the target monitoring apparatus of the present disclosure.

[FIG. 4] FIG. 4 is a block diagram illustrating an exemplary configuration of a target monitoring apparatus of the present disclosure.

[FIG. 5] FIG. 5 is a flowchart illustrating an exemplary processing in the target monitoring apparatus of the present disclosure.

15 EXAMPLE EMBODIMENTS

[0012] Next, example embodiments of present disclosure are described below with reference to the drawings. It is to be noted, however, that the present disclosure is by no means limited or restricted by the following example embodiments. In the following drawings, identical parts are indicated with identical reference signs. Regarding the descriptions of the example embodiments,
20 reference can be made to one another unless otherwise stated. Furthermore, the configurations of the example embodiments can be combined unless otherwise stated.

[0013] First Example Embodiment

A target monitoring apparatus according to the present example embodiment will be described with reference to FIG. 1. FIG. 1 is a block diagram illustrating an exemplary
25 configuration of a target monitoring apparatus 10 of the present example embodiment. As shown in FIG.1, the target monitoring apparatus 10 (hereinafter also referred to as "the apparatus 10") includes a state information acquisition part 11, an accident risk determination part 12, an assessment part 13, and a monitoring part 14. Although it is not shown, the apparatus 10 may include, for example, a storage part.

30 [0014] The apparatus 10 may be, for example, one apparatus including the aforementioned parts, or may be an apparatus to which the respective parts are connectable via a communication line network. Further, the apparatus 10 is connectable to an external device to be described below, via the communication line network. The communication line network is not particularly

limited and may be a known network and may be, for example, wired or wireless. Examples of the communication line network include an internet line, WWW (World Wide Web), a telephone line, LAN (Local Area Network), SAN (Storage Area Network), DTN (Delay Tolerant Networking), LPWA (Low Power Wide Area), and L5G (local 5G). Examples of wireless communication include WI-FI® (registered trademark), BLUETOOTH® (registered trademark), local 5G, and LPWA. The wireless communication may be a form where apparatuses directly communicate with each other (Ad-Hoc communication), infrastructure communication, or indirect communication via an access point or the like. The apparatus 10 may be built in a server of a system, for example. The apparatus 10 may also be, for example, a personal computer (PC, e.g., a desktop PC and a laptop), a smartphone, a tablet terminal, or the like with the program of the present disclosure installed therein. The apparatus 10 may be in a form of, for example, cloud computing, edge computing, or the like such that at least one of the aforementioned parts is on a server and the rest of the parts are on a terminal.

[0015] FIG. 2 is a block diagram showing an exemplary hardware configuration of the apparatus 10. The apparatus 10 includes, for example, a central processing unit (CPU, GPU, etc.) 101, a memory 102, a bus 103, a storage 104, an input unit 105, an output unit 106, a communication device 107, and the like. The units of the apparatus 10 are connected to each other by their respective interfaces (I/F), via the bus 103.

[0016] The central processing unit 101 operates in cooperation with other configurations with a controller (a system controller, an I/O controller, or the like), and is responsible for control of the entire apparatus 10A. In the apparatus 10A, the central processing unit 101 executes, for example, the program of the present disclosure or other programs, and reads and writes various data. Specifically, for example, the central processing unit 101 functions as a state information acquisition part 11, an accident risk determination part 12, an assessment part 13, and a monitoring part 14. The apparatus 10 may include other arithmetic units such as a CPU (Central Processing unit), a GPU (Graphics Processing unit), an APU (Accelerated Processing unit), and the like, or may include a combination of these.

[0017] The bus 103 is connectable to an external device, for example. Examples of the external device include an external storage (external database, or the like), a printer, an external input unit, an external display, an audio output device such as a speaker or the like, an external imaging device such as a camera, and various sensors such as an accelerometer, a geomagnetic sensor, a direction sensor, and the like. The apparatus 10 can be, for example, connected to an external network (the communication line network) through the communication device 107

connected to the bus 103, and can also be connected to other devices such user terminals via the external network.

[0018] The memory 102 may be, for example, a main memory (main storage). When the central processing unit 101 executes processing, for example, the memory 102 reads various operation programs such as the program of the present disclosure stored in the storage 104 to be described below, and the central processing unit 101 receives the data from the memory 102 to execute the program. The main memory is, for example, a RAM (Random-Access Memory). The memory 102 may be, for example, a ROM (Read-Only Memory).

[0019] The storage 104 is also referred to as a so-called auxiliary storage with respect to the main memory (main storage), for example. As mentioned above, the storage 104 stores operation programs including the program of the present disclosure. The storage 104 may be, for example, a combination of a recording medium and a drive for performing reading and writing on a recording medium. The recording medium is not particularly limited and may be a built-in type or an external type, and examples thereof include HD (Hard Disk), CD-ROM, CD-R, CD-RW, MO, DVD, a flash memory, and a memory card. The storage 104 may be, for example, a hard disk drive (HDD), in which a recording medium and a drive are integrated, or a solid state drive (SSD). When the apparatus 10 includes the storage part, for example, the storage 104 functions as the storage part. The storage part can store, for example, at least a piece of data selected from the group consisting of state information of the monitoring candidate, accident risk, side effect information, monitoring candidate identification information, detection information, and detection threshold value.

[0020] In the apparatus 10, the memory 102 and the storage 104 can also store various information such as log information, information acquired from an external data base (not shown) or an external device, information generated by the apparatus 10, and information used when the apparatus 10 executes processing. In this case, the memory 102 and the storage 104 may store, for example, information of the user of the apparatus. It should be noted that, at least a piece of the information may be, for example, stored in an external server other than the memory 102 and the storage 104, or may be dispersedly stored in a plurality of terminals using a blockchain technique or the like.

[0021] The apparatus 10 further includes, for example, an input unit 105 and an output unit 106. Examples of the input unit 105 include a pointing device such as a touch panel, a track pad, a mouse, or the like; a keyboard; an imaging device such as a camera, a scanner, or the like; a card reader such as an IC card reader, a magnetic card reader, or the like; and an audio input

device such as a microphone, or the like. Examples of the output unit 106 include a display such as an LED display, a liquid crystal display, or the like; an audio output device such as a speaker or the like; and a printer. In the present example embodiment, the input unit 105 and the output unit 106 are configured separately, but the input unit 105 and the output unit 106 may be configured integrally like a touch panel display.

[0022] Next, an example of the target monitoring method of the present example embodiment will be described with reference to the flowchart of FIG. 3. The target monitoring method of the present example embodiment may be performed, for example, as follows using the target monitoring apparatus 10 shown in FIG. 1 or 2. Note that the target monitoring method of the present example embodiment is not limited to the use of the target monitoring apparatus 10 of FIG. 1 or 2. FIG. 3 is a flowchart illustrating an exemplary processing performed by the target monitoring apparatus 10.

[0023] First, the state information acquisition part 11 acquires state information of a monitoring candidate (S1, state information acquisition). The monitoring candidate is, for example, a person who is a candidate to be monitored by the apparatus 10 to prevent accidents. It is known that people receiving medication are likely to have fall accidents due to the influence (side effects) of drugs. Therefore, the monitoring candidate may be, for example, a medication recipient. The monitoring candidate of the present disclosure however is, for example, not limited to medication recipients. Examples of the medication recipient include a patient in a medical institution, a resident in a nursing care facility, and a person receiving medication under the control of a supervisor (a doctor, a nurse, or a caregiver), however, the medication recipient is not particularly limited, and may be, for example, a person taking a commercially available drug or a person taking a prescription drug. The state information is information for determining the accident risk of the monitoring candidate, and examples thereof include information such as medication history, whether the subject has consumed alcohol, dementia status, and the like. The medication history information includes, for example, information on a medication time and a drug administered to the monitoring candidate. For example, the state information acquisition part 11 may acquire the identification information of the monitoring candidate in association with the state information. The identification information is not particularly limited as long as it can identify an individual, and examples thereof include name, nickname, address, telephone number, email address, medical card number, insurance card number, My Number, ID, password, IP address, MAC address, and device-specific information of the terminal (serial number of the terminal, identification numbers such as International Mobile Equipment Identifier and the like).

The state information acquisition part 11 may acquire the state information, for example, by receiving an input to the input unit 105 of the apparatus 10, or may acquire the state information from outside the apparatus 10. In the latter case, for example, the state information acquisition part 11 may access a hospital database or the like and refer to electronic medical records and the like to acquire the state information. The state information acquisition part 11 may, for example, store the acquired state information in the memory 102 or the storage 104.

[0024] Next, the accident risk determination part 12 determines the accident risk of the monitoring candidate based on the state information and alert criterion information (S2, accident risk determination). The state information includes, for example, the medication history information described above. The alert criterion information is information serving as a criterion for determining accident risk, and is information in which the type of the state information and an accident alert level are associated with each other. Moreover, the alert criterion information may be, for example, further associated with an alert time. The alert time is, for example, information of a time at which the associated accident alert level is set. A specific example of the alert criterion information is, for example, side effect information. The side effect information is, for example, information in which drug information such as the type of a drug, drug combinations, and the like; side effect information such as the presence or absence of a side effect, the type of a side effect, the occurrence time of the side effect, and the like; and accident alert levels for the side effects are associated with one another. The accident alert level may be, for example, information indicating whether alert is required (alert required: 1, alert not required: 0), or information indicating the degree of alert in stages (for example, alert level 1, 2, 3... n (n is an integer of 1 or more)). In the case where the state information includes whether the subject has consumed alcohol, the alert criterion information includes, for example, information in which whether the subject has consumed alcohol, the amount of alcohol consumed, and the like, and the accident alert level are associated with one another. In a case where the state information includes information on dementia status, the alert criterion information includes, for example, information in which the dementia status and the accident alert level are associated with each other. The accident risk determination part 12 can determine the accident risk of the monitoring candidate based on, for example, the medication history information and the side effect information. Specifically, for example, the accident risk determination part 12 refers to the type of drug administered to the monitoring candidate and the administration time of the drug from the medication history information of the monitoring candidate. Next, the accident risk determination part 12 refers to the side effect information, and extracts the presence or absence

of side effects and the type of side effects for the drug administered to the monitoring candidate and the drug combinations. Then, for example, the accident risk determination part 12 can determine the accident alert level associated with the side effect as the accident risk of the monitoring candidate during the period from the administration time to the side effect occurrence
5 time. For example, the alert criterion information may be stored in the storage part of the apparatus 10, or may be stored in an external database. In the latter case, the accident risk determination part 12 can refer to the alert criterion information by accessing the external database via a communication line network, for example. For example, the accident risk determination part 12 may store the determined accident risk of the monitoring candidate in the
10 memory 102 or the storage 104.

[0025] Next, the assessment part 13 assesses whether monitoring of the monitoring candidate is required based on the accident risk (S3, assessment). For example, the assessment part 13 may assess that monitoring is required for a monitoring candidate whose accident risk (accident alert level) is "alert required (1)", or may assess that monitoring is required for a monitoring candidate
15 whose degree of accident risk is greater than or equal to a predetermined value. When an alert time is associated with the alert criterion information, the assessment part 13 may assess that monitoring of the monitoring candidate is required during the alert time associated with the accident alert level, for example. In addition, for example, the assessment part 13 may refer to a monitoring candidate list in which monitoring candidate identification information, monitoring
20 candidate detection information, and a monitoring candidate detection threshold value are associated with one another, and assess whether monitoring of the monitoring candidate is required based on the accident risk and the detection threshold value. In this case, for example, the assessment part 13 can refer to the monitoring candidate list, for each monitoring candidate, compare the detection threshold value associated with the corresponding monitoring candidate
25 identification information with the accident risk of the monitoring candidate, and assess the monitoring candidate having the accident risk exceeding the detection threshold value as the monitoring subject. The monitoring candidate identification information is, for example, not particularly limited as long as it can identify an individual, and examples thereof include name, nickname, address, telephone number, email address, medical card number, insurance card
30 number, My Number, ID, password, IP address, MAC address, and device-specific information of the terminal (serial number of the terminal, identification numbers such as International Mobile Equipment Identifier and the like). The detection information is, for example, information for detecting a monitoring candidate by the monitoring part 14 to be described

below. Specifically, examples of the detection information include images (such as face image, full body image, and the like) of the monitoring subject, and feature amounts of face image. The detection threshold value is, for example, a threshold value for determining whether monitoring of a monitoring candidate is required, and information corresponding to the accident alert level can be set. For example, in the monitoring candidate list, either a common detection threshold value may be set for all monitoring candidates, or different threshold values may be set for each of the monitoring candidates. In the latter case, for example, the threshold value may be set in accordance with the attribute of the monitoring candidate. The attribute is not particularly limited, and examples thereof include information such as sex, age, disease status, presence or absence of injury, presence or absence of disability, visual acuity, and hearing ability.

[0026] Then, the monitoring part 14 sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject (S4, monitoring). For example, the monitoring part 14 may set a monitoring candidate having the accident risk exceeding the detection threshold value as a monitoring subject. For example, the apparatus 10 may monitor the monitoring candidate set as the monitoring subject, or may transmit information of the monitoring candidate set as the monitoring subject to a monitoring apparatus (monitoring system) outside the apparatus 10 and cause the monitoring apparatus outside the apparatus 10 to monitor the monitoring subject. When the apparatus 10 monitors the monitoring subject, for example, the monitoring part 14 first acquires an image of a monitoring target area. The monitoring target area is not particularly limited, and for example, a freely selected region can be set. Specific examples of the monitoring target area include medical facilities such as hospitals and nursing care facilities, and public roads. For example, the monitoring part 14 can acquire an image of the monitoring target area from a monitoring camera provided in the monitoring target area and/or a server or the like that records video from the monitoring camera via a communication line network. The image of the monitoring target area may be, for example, a still image or a video. Then, for example, the monitoring part 14 can detect the monitoring subject from the image of the monitoring target area based on the monitoring candidate detection information and monitor the detected monitoring subject. A method for detecting the monitoring subject from the image of the monitoring target area is not particularly limited, and for example, a known image processing method can be used. The image processing method is not particularly limited, and may be, for example, a face recognition processing. In this case, for example, the monitoring part 14 detects a person and a face image from the image of the monitoring target area by object detection processing or the like, and performs face recognition processing on the detected face image using

the detection information (for example, the face image of the monitoring subject and the feature amount information of the face image of the monitoring subject). Then, for example, the monitoring part 14 can monitor and track the recognized monitoring subject in the image of the monitoring target area.

5 [0027] The target monitoring apparatus of the present example embodiment can acquire state information of a monitoring candidate, determine an accident risk of the monitoring candidate based on the state information and alert criterion information, assess whether monitoring of the monitoring candidate is required based on the accident risk, and set a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

10 [0028] Second Example Embodiment

The second example embodiment is another example of the target monitoring apparatus of the present disclosure.

[0029] FIG. 4 is a block diagram illustrating an exemplary configuration of a target monitoring apparatus 10A. As shown in FIG. 4, the target monitoring apparatus 10A includes a danger
15 assessment part 15 and a warning part 16 in addition to the configuration of the target monitoring apparatus 10 of the first example embodiment. The hardware configuration of the target monitoring apparatus 10A is the same as the hardware configuration of the target monitoring apparatus 10 of FIG. 2 except that the central processing unit 101 includes the configuration of the target monitoring apparatus 10A of FIG. 4 instead of the configuration of the target
20 monitoring apparatus 10 of FIG. 1. The processing of the danger assessment part 15 and the warning part 16 will be described below. The processing of the danger assessment part 15 and the warning part 16 can be appropriately inserted, for example, at any position in the flowchart of FIG. 3 described in the first example embodiment, and are preferably inserted after S4 as shown in FIG. 5.

25 [0030] The danger assessment part 15 assesses that the monitoring subject is in a dangerous state when the monitoring subject satisfies a warning condition (S11, danger assessment). The warning condition is not particularly limited, and examples thereof include entering pre-designated hazardous areas, wandering during prohibited hours, and engaging in prohibited actions. The hazardous area is not particularly limited, and can be appropriately set in accordance
30 with, for example, the type and nature of the monitoring target area. The prohibited action is not particularly limited, and may be, for example, actions to be avoided under conditions corresponding to the state information (for example, administration of a predetermined drug), and examples thereof include engaging in strenuous exercise and operating a vehicle. For

example, the danger assessment part 15 may set a warning threshold value for the monitoring subject, and assess that the monitoring subject is in a dangerous state when the accident risk of the monitoring subject exceeds the warning threshold value.

[0031] The warning part 16 issues a warning when the monitoring subject is assessed to be in a dangerous state (S12, warning). For example, the warning part 16 may issue a warning to an output unit (for example, display, speaker, or the like) 106 of the apparatus 10A, or may issue a warning to the outside of the apparatus 10A. The warning to the outside of the apparatus 10A may be, for example, a warning to a manager of the monitoring target area (for example, a terminal of a staff of a hospital, a nursing care facility, or the like). The form of the warning is not particularly limited, and may be a voice, a text, or an image. As a specific example of the warning, an alert sound may be output.

[0032] According to the target monitoring apparatus of the present example embodiment, when the monitoring subject satisfies the warning condition and/or when the accident risk of the monitoring subject exceeds a warning threshold value, it is possible to assess that the monitoring subject is in a dangerous state and to issue a warning.

[0033] Third example embodiment

The third example embodiment is an example of use of the target monitoring apparatus of the present disclosure.

[0034] The present example embodiment will be described below with reference to a patient in a hospital as an example of a monitoring candidate. The present disclosure, however, is not limited to the following example. The term "monitoring" and "watching" can be interchangeably used, for example.

[0035] First, prior to the processing by the target monitoring apparatus of the present disclosure (hereinafter, also referred to as the present apparatus), a database (monitoring candidate list) in which a patient face image, patient identification information, and a patient detection threshold value are associated with one another is prepared. In addition, a database (side effect database) recorded with side effect information in which the type of administered drug, its side effects, and the expected occurrence time of the side effects are associated with one another is prepared as the alert criterion information.

[0036] Next, the doctor or nurse administers drugs (for example, drugs A + B + C) to patient A. Then, the doctor or the nurse inputs medication information (the drugs A+B+C are administered to the patient A at 13:00 on July 4) as the state information of the patient to the state information acquisition part of the present apparatus. The present apparatus acquires the input state

information (medication information), refers to the side effect database, determines the accident risk of the patient A as "alert required" based on the medication information, and assesses whether monitoring of the patient A is required. The present apparatus then accesses a monitoring camera in the hospital, which is a monitoring target area, and acquires an image in the hospital. Next, the present apparatus refers to the monitoring candidate list, detects the patient A from the acquired image in the hospital by face recognition, and monitors and tracks the patient A. Then, when the patient A satisfies the warning condition described above, a warning can be issued to the doctor or the nurse.

[0037] Fourth Example Embodiment

The program of the present example embodiment is a program for causing a computer to execute each of the processes of the target monitoring method described above. Specifically, the program of the present example embodiment is a program for causing a computer to execute a state information acquisition procedure, an accident risk determination procedure, an assessment procedure, and a monitoring procedure.

[0038] The state information acquisition procedure acquires state information of a monitoring candidate, the accident risk determination procedure determines accident risk of the monitoring candidate based on the state information and alert criterion information, the assessment procedure assesses whether monitoring of the monitoring candidate is required based on the accident risk, and the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[0039] In addition, the program of the present example embodiment can also be regarded as a program that causes a computer to function as the state information acquisition procedure, the accident risk determination procedure, the assessment procedure, and monitoring procedure.

[0040] The program of the present example embodiment can incorporate the descriptions given in the target monitoring apparatus and the target monitoring method of the present disclosure. In each of the processes, for example, "procedure" and "processing" can be interchangeably used. The program of the present example embodiment may be recorded in a computer-readable recording medium, for example. The recording medium is, for example, a non-transitory computer-readable recording medium (a non-transitory computer-readable storage medium). The recording medium is not particularly limited and examples thereof include a random access memory (RAM), a read only memory (ROM), a hard disk (HD), a flash memory (e.g., SSD (Solid State Drive), a USB flash memory, and a SD/SDHC card), an optical disc (e.g., CD-R/CD-RW, DVD-R/DVD-RW, and BD-R/BD-RE), a magneto-optical disk (MO), and a

FLOPPY[®] (registered trademark) disk (FD). The program (may be referred to as a programming product or a program product, for example) of the present example embodiment may be in a form to be distributed from an external computer, for example. The "distribution" may be distribution via a communication line network or distribution via a wired-connected device. The program of the present example embodiment may be executed by being installed in a device where the program is distributed, or may be executed without being installed.

[0041] While the present disclosure has been particularly shown and described with reference to example embodiments thereof, the present disclosure is not limited to these embodiments. It will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present disclosure as defined by the claims. Each of the example embodiments may be combined with other embodiments as appropriate.

[0042] This application claims priority from Japanese Patent Application No. 2023-116954 filed on July 18, 2023. The entire subject matter of the Japanese Patent Application is incorporated herein by reference.

[0043] SUPPLEMENTARY NOTE

The whole or part of the example embodiments disclosed above can be described as, but not limited to, the following supplementary notes.

(Supplementary Note 1)

A target monitoring apparatus, including:

a state information acquisition part;

an accident risk determination part;

an assessment part; and

a monitoring part, wherein

the state information acquisition part acquires state information of a monitoring candidate,

the accident risk determination part determines accident risk of the monitoring candidate based on the state information and alert criterion information,

the assessment part assesses whether monitoring of the monitoring candidate is required based on the accident risk, and

the monitoring part sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

(Supplementary Note 2)

The target monitoring apparatus according to Supplementary Note 1, wherein

the state information acquisition part acquires medication history information of the monitoring candidate as the state information, and

the accident risk determination part determines the accident risk of the monitoring candidate based on the medication history information and side effect information.
(Supplementary Note 3)

The target monitoring apparatus according to Supplementary Note 1 or 2, wherein

the assessment part refers to a monitoring candidate list in which monitoring candidate identification information, monitoring candidate detection information, and a monitoring candidate detection threshold value are associated with one another, and assesses whether monitoring of the monitoring candidate is required based on the accident risk and the detection threshold value, and

the monitoring part sets a monitoring candidate having the accident risk exceeding the detection threshold value as a monitoring subject.

(Supplementary Note 4)

The target monitoring apparatus according to Supplementary Note 3, wherein

the monitoring part acquires an image of a monitoring target area, detects the monitoring subject from the image of the monitoring target area based on the monitoring candidate detection information, and monitors the detected monitoring subject.

(Supplementary Note 5)

The target monitoring apparatus according to any one of Supplementary Notes 1 to 4, further including:

a danger assessment part; and

a warning part, wherein

the danger assessment part assesses that the monitoring subject is in a dangerous state when the monitoring subject satisfies a warning condition, and

the warning part issues a warning when the monitoring subject is assessed to be in a dangerous state.

(Supplementary Note 6)

The target monitoring apparatus according to Supplementary Note 5, wherein

the danger assessment part sets a warning threshold value for the monitoring subject and assesses that the monitoring subject is in a dangerous state when the accident risk of the monitoring subject exceeds the warning threshold value, and

the warning part issues a warning when the monitoring subject is assessed to be in a dangerous state.

(Supplementary Note 7)

A target monitoring method, including:

- 5 acquiring state information;
- determining accident risk;
- assessing; and
- monitoring, wherein
- the acquiring state information acquires state information of a monitoring candidate,
- 10 the determining accident risk determines accident risk of the monitoring candidate based
- on the state information and alert criterion information,
- the assessing assesses whether monitoring of the monitoring candidate is required based
- on the accident risk, and
- the monitoring sets a monitoring candidate assessed to be in need of monitoring as a
- 15 monitoring subject,
- which are executed by a computer.

(Supplementary Note 8)

The target monitoring method according to Supplementary Note 7, wherein

- the acquiring state information acquires medication history information of the
- 20 monitoring candidate as the state information, and
- the determining accident risk determines the accident risk of the monitoring candidate
- based on the medication history information and side effect information.

(Supplementary Note 9)

The target monitoring method according to Supplementary Note 7 or 8, wherein

- 25 the assessing refers to a monitoring candidate list in which monitoring candidate
- identification information, monitoring candidate detection information, and a monitoring
- candidate detection threshold value are associated with one another, and assesses whether
- monitoring of the monitoring candidate is required based on the accident risk and the detection
- threshold value, and
- 30 the monitoring sets a monitoring candidate having the accident risk exceeding the
- detection threshold value as a monitoring subject.

(Supplementary Note 10)

The target monitoring method according to Supplementary Note 9, wherein

the monitoring acquires an image of a monitoring target area, detects the monitoring subject from the image of the monitoring target area based on the monitoring candidate detection information, and monitors the detected monitoring subject.

(Supplementary Note 11)

- 5 The target monitoring method according to any one of Supplementary Notes 7 to 10, further including:

assessing danger; and

warning, wherein

the assessing danger assesses that the monitoring subject is in a dangerous state when

- 10 the monitoring subject satisfies a warning condition, and

the warning issues a warning when the monitoring subject is assessed to be in a dangerous state.

(Supplementary Note 12)

The target monitoring method according to Supplementary Note 11, wherein

- 15 the assessing danger sets a warning threshold value for the monitoring subject and assesses that the monitoring subject is in a dangerous state when the accident risk of the monitoring subject exceeds the warning threshold value, and

the warning issues a warning when the monitoring subject is assessed to be in a dangerous state.

- 20 (Supplementary Note 13)

A target monitoring program for causing a computer to execute procedures, including:

a state information acquisition procedure;

an accident risk determination procedure;

an assessment procedure; and

- 25 a monitoring procedure, wherein

the state information acquisition procedure acquires state information of a monitoring candidate,

the accident risk determination procedure determines accident risk of the monitoring candidate based on the state information and alert criterion information,

- 30 the assessment procedure assesses whether monitoring of the monitoring candidate is required based on the accident risk, and

the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

(Supplementary Note 14)

The target monitoring program according to Supplementary Note 13, wherein

the state information acquisition procedure acquires medication history information of the monitoring candidate as the state information, and

5 the accident risk determination procedure determines the accident risk of the monitoring candidate based on the medication history information and side effect information.

(Supplementary Note 15)

The target monitoring program according to Supplementary Note 13 or 14, wherein

10 the assessment procedure refers to a monitoring candidate list in which monitoring candidate identification information, monitoring candidate detection information, and a monitoring candidate detection threshold value are associated with one another, and assesses whether monitoring of the monitoring candidate is required based on the accident risk and the detection threshold value, and

15 the monitoring procedure sets a monitoring candidate having the accident risk exceeding the detection threshold value as a monitoring subject.

(Supplementary Note 16)

The target monitoring program according to Supplementary Note 15, wherein

20 the monitoring procedure acquires an image of a monitoring target area, detects the monitoring subject from the image of the monitoring target area based on the monitoring candidate detection information, and monitors the detected monitoring subject.

(Supplementary Note 17)

The target monitoring program according to any one of Supplementary Notes 13 to 16, further including:

25 a danger assessment procedure; and

a warning procedure, wherein

the danger assessment procedure assesses that the monitoring subject is in a dangerous state when the monitoring subject satisfies a warning condition, and

the warning procedure issues a warning when the monitoring subject is assessed to be in a dangerous state.

30 (Supplementary Note 18)

The target monitoring program according to Supplementary Note 17, wherein

the danger assessment procedure sets a warning threshold value for the monitoring subject and assesses that the monitoring subject is in a dangerous state when the accident risk of

the monitoring subject exceeds the warning threshold value, and

the warning procedure issues a warning when the monitoring subject is assessed to be in a dangerous state.

(Supplementary Note 19)

5 A computer-readable recording medium recorded with a target monitoring program for causing a computer to execute procedures, wherein the program includes:

a state information acquisition procedure;

an accident risk determination procedure;

an assessment procedure; and

10 a monitoring procedure, wherein

the state information acquisition procedure acquires state information of a monitoring candidate,

the accident risk determination procedure determines accident risk of the monitoring candidate based on the state information and alert criterion information,

15 the assessment procedure assesses whether monitoring of the monitoring candidate is required based on the accident risk, and

the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

(Supplementary Note 20)

20 The computer-readable recording medium according to Supplementary Note 19, wherein

the state information acquisition procedure acquires medication history information of the monitoring candidate as the state information, and

the accident risk determination procedure determines the accident risk of the monitoring candidate based on the medication history information and side effect information.

25 (Supplementary Note 21)

The recording medium according to Supplementary Note 19 or 20, wherein

the assessment procedure refers to a monitoring candidate list in which monitoring candidate identification information, monitoring candidate detection information, and a

30 monitoring candidate detection threshold value are associated with one another, and assesses whether monitoring of the monitoring candidate is required based on the accident risk and the detection threshold value, and

the monitoring procedure sets a monitoring candidate having the accident risk exceeding the detection threshold value as a monitoring subject.

(Supplementary Note 22)

The recording medium according to Supplementary Note 21, wherein

the monitoring procedure acquires an image of a monitoring target area, detects the monitoring subject from the image of the monitoring target area based on the monitoring candidate detection information, and monitors the detected monitoring subject.

(Supplementary Note 23)

The recording medium according to any one of Supplementary Notes 19 to 22, further including:

a danger assessment procedure; and

a warning procedure, wherein

the danger assessment procedure assesses that the monitoring subject is in a dangerous state when the monitoring subject satisfies a warning condition, and

the warning procedure issues a warning when the monitoring subject is assessed to be in a dangerous state.

(Supplementary Note 24)

The recording medium according to Supplementary Note 23, wherein

the danger assessment procedure sets a warning threshold value for the monitoring subject, and assesses that the monitoring subject is in a dangerous state when the accident risk of the monitoring subject exceeds the warning threshold value, and

the warning procedure issues a warning when the monitoring subject is assessed to be in a dangerous state.

[0044] The target monitoring apparatus of the present disclosure can, for example, automatically monitor subjects at high risk of accidents. Therefore, for example, the present disclosure can be used in various fields in which prevention of accidents is important, and as specific examples, the present disclosure can be suitably used in the medical field, the nursing care field, and the like.

[0045]

10, 10A:target monitoring apparatus

11: state information acquisition part

12: accident risk determination part

13: assessment part

14: monitoring part

15 : danger assessment part

16: warning part

	101:	CPU
	102:	memory
	103:	bus
	104:	storage
5	105:	input unit
	106:	output unit
	107:	communication device

CLAIMS

[Claim 1] A target monitoring apparatus, comprising:

a state information acquisition part;

5 an accident risk determination part;

an assessment part; and

a monitoring part, wherein

the state information acquisition part acquires state information of a monitoring candidate,

10 the accident risk determination part determines accident risk of the monitoring candidate based on the state information and alert criterion information,

the assessment part assesses whether monitoring of the monitoring candidate is required based on the accident risk, and

15 the monitoring part sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[Claim 2] The target monitoring apparatus according to claim 1, wherein

the state information acquisition part acquires medication history information of the monitoring candidate as the state information, and

20 the accident risk determination part determines the accident risk of the monitoring candidate based on the medication history information and side effect information.

[Claim 3] The target monitoring apparatus according to claim 1 or 2, wherein

25 the assessment part refers to a monitoring candidate list in which monitoring candidate identification information, monitoring candidate detection information, and a monitoring candidate detection threshold value are associated with one another, and assesses whether monitoring of the monitoring candidate is required based on the accident risk and the detection threshold value, and

30 the monitoring part sets a monitoring candidate having the accident risk exceeding the detection threshold value as a monitoring subject.

[Claim 4] The target monitoring apparatus according to claim 3, wherein

the monitoring part acquires an image of a monitoring target area, detects the

monitoring subject from the image of the monitoring target area based on the monitoring candidate detection information, and monitors the detected monitoring subject.

[Claim 5] The target monitoring apparatus according to any one of claims 1 to 4, further comprising:

a danger assessment part; and

a warning part, wherein

the danger assessment part assesses that the monitoring subject is in a dangerous state when the monitoring subject satisfies a warning condition, and

the warning part issues a warning when the monitoring subject is assessed to be in a dangerous state.

[Claim 6] The target monitoring apparatus according to claim 5, wherein

the danger assessment part sets a warning threshold value for the monitoring subject and assesses that the monitoring subject is in a dangerous state when the accident risk of the monitoring subject exceeds the warning threshold value, and

the warning part issues a warning when the monitoring subject is assessed to be in a dangerous state.

[Claim 7] A target monitoring method, comprising:

acquiring state information;

determining accident risk;

assessing; and

monitoring, wherein

the acquiring state information acquires state information of a monitoring candidate, the determining accident risk determines accident risk of the monitoring candidate based on the state information and alert criterion information,

the assessing assesses whether monitoring of the monitoring candidate is required based on the accident risk, and

the monitoring sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject,

which are executed by a computer.

[Claim 8] The target monitoring method according to claim 7, wherein
the acquiring state information acquires medication history information of the
monitoring candidate as the state information, and
the determining accident risk determines the accident risk of the monitoring candidate
5 based on the medication history information and side effect information.

[Claim 9] The target monitoring method according to claim 7 or 8, wherein
the assessing refers to a monitoring candidate list in which monitoring candidate
identification information, monitoring candidate detection information, and a monitoring
10 candidate detection threshold value are associated with one another, and assesses whether
monitoring of the monitoring candidate is required based on the accident risk and the detection
threshold value, and
the monitoring sets a monitoring candidate having the accident risk exceeding the
detection threshold value as a monitoring subject.

15 [Claim 10] The target monitoring method according to claim 9, wherein
the monitoring acquires an image of a monitoring target area, detects the monitoring
subject from the image of the monitoring target area based on the monitoring candidate detection
information, and monitors the detected monitoring subject.

20 [Claim 11] The target monitoring method according to any one of claims 7 to 10, further
comprising:

assessing danger; and

warning, wherein

25 the assessing danger assesses that the monitoring subject is in a dangerous state when
the monitoring subject satisfies a warning condition, and

the warning issues a warning when the monitoring subject is assessed to be in a
dangerous state.

30 [Claim 12] The target monitoring method according to claim 11, wherein
the assessing danger sets a warning threshold value for the monitoring subject and
assesses that the monitoring subject is in a dangerous state when the accident risk of the
monitoring subject exceeds the warning threshold value, and

the warning issues a warning when the monitoring subject is assessed to be in a dangerous state.

[Claim 13] A target monitoring program for causing a computer to execute procedures,
5 comprising:

a state information acquisition procedure;

an accident risk determination procedure;

an assessment procedure; and

a monitoring procedure, wherein

10 the state information acquisition procedure acquires state information of a monitoring candidate,

the accident risk determination procedure determines accident risk of the monitoring candidate based on the state information and alert criterion information,

15 the assessment procedure assesses whether monitoring of the monitoring candidate is required based on the accident risk, and

the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[Claim 14] The target monitoring program according to claim 13, wherein

20 the state information acquisition procedure acquires medication history information of the monitoring candidate as the state information, and

the accident risk determination procedure determines the accident risk of the monitoring candidate based on the medication history information and side effect information.

25 [Claim 15] The target monitoring program according to claim 13 or 14, wherein

the assessment procedure refers to a monitoring candidate list in which monitoring candidate identification information, monitoring candidate detection information, and a monitoring candidate detection threshold value are associated with one another, and assesses whether monitoring of the monitoring candidate is required based on the accident risk and the
30 detection threshold value, and

the monitoring procedure sets a monitoring candidate having the accident risk exceeding the detection threshold value as a monitoring subject.

[Claim 16] The target monitoring program according to claim 15, wherein
the monitoring procedure acquires an image of a monitoring target area, detects the
monitoring subject from the image of the monitoring target area based on the monitoring
candidate detection information, and monitors the detected monitoring subject.

5

[Claim 17] The target monitoring program according to any one of claims 13 to 16, further
comprising:

a danger assessment procedure; and

a warning procedure, wherein

10

the danger assessment procedure assesses that the monitoring subject is in a dangerous
state when the monitoring subject satisfies a warning condition, and

the warning procedure issues a warning when the monitoring subject is assessed to be in
a dangerous state.

15

[Claim 18] The target monitoring program according to claim 17, wherein

the danger assessment procedure sets a warning threshold value for the monitoring
subject and assesses that the monitoring subject is in a dangerous state when the accident risk of
the monitoring subject exceeds the warning threshold value, and

20

the warning procedure issues a warning when the monitoring subject is assessed to be in
a dangerous state.

[Claim 19] A computer-readable recording medium recorded with a target monitoring
program for causing a computer to execute procedures, wherein the program comprises:

a state information acquisition procedure;

25

an accident risk determination procedure;

an assessment procedure; and

a monitoring procedure, wherein

the state information acquisition procedure acquires state information of a monitoring
candidate,

30

the accident risk determination procedure determines accident risk of the monitoring
candidate based on the state information and alert criterion information,

the assessment procedure assesses whether monitoring of the monitoring candidate is
required based on the accident risk, and

the monitoring procedure sets a monitoring candidate assessed to be in need of monitoring as a monitoring subject.

[Claim 20] The computer-readable recording medium according to claim 19, wherein

5 the state information acquisition procedure acquires medication history information of the monitoring candidate as the state information, and
the accident risk determination procedure determines the accident risk of the monitoring candidate based on the medication history information and side effect information.