

【SPECIFICATION】

【TITLE】

METHOD AND SYSTEM FOR PROVIDING EXERCISE PROGRAM BY USING
LARGE LANGUAGE MODEL

【TECHNICAL FIELD】

The present disclosure relates to a method and system for providing an exercise program using a large language model.

【BACKGROUND】

Recently, as artificial intelligence (AI) technology has rapidly advanced, generative models capable of natural conversation with humans (e.g., ChatGPT) have emerged.

In particular, generative models including a large language model (Large Language Model), unlike conventional chatbots that are manually built and provide only limited responses, communicate as naturally as humans, demonstrate technological capability in providing fast and accurate information, and are showing innovation in the artificial intelligence market.

Furthermore, the utilization of artificial intelligence (AI) technology in the medical industry is rapidly expanding.

In particular, interest is growing in artificial intelligence technology that uses a large language model to provide non-face-to-face customized management to patients who require consistent care and rehabilitation during the treatment process.

For example, a large language model may be effectively utilized for management and rehabilitation of musculoskeletal disorders.

A musculoskeletal disorder refers to pain or injury occurring in the musculoskeletal system, including muscles, nerves, tendons, ligaments, bones, and surrounding tissues.

As a principle, treatment of musculoskeletal disorders begins with less invasive approaches, such that non-pharmacological conservative treatments (e.g., exercise therapy and education, cognitive therapy, or relaxation therapy) are administered first, followed by pharmacological treatment and surgical treatment, which are to be considered sequentially thereafter.

Treatment guidelines actively recommend non-pharmacological conservative treatment of musculoskeletal disorders, and research on methods for performing non-pharmacological conservative treatment of musculoskeletal disorders is being actively conducted, particularly in the United States and Europe.

However, non-pharmacological conservative treatment of musculoskeletal disorders requires continuous treatment and rehabilitation, and the fact that patients must frequently visit hospitals for such treatment has been a significant burden.

To address these problems and to enable consistent management and rehabilitation of musculoskeletal disorders, there is a need to provide a user-customized exercise program in a non-face-to-face manner using a large language model.

【BRIEF SUMMARY】

The present disclosure is intended to provide a method and system capable of providing a customized exercise program to a user using a large language model.

More specifically, the present disclosure is intended to provide a method and system for providing an exercise program using a large language model, which is capable of generating a user-customized exercise program based on response data for a questionnaire provided to a user terminal and an evaluation of the exercise performance capability of the user.

Furthermore, the present disclosure is intended to provide a method and system for providing an exercise program using a large language model, which is capable of updating an exercise program based on feedback received from a medical staff terminal and providing an exercise program approved by the medical staff terminal.

In order to solve the problems discussed above, the present disclosure proposes a method for generating a user-customized exercise program by interacting with a user and medical staff in a non-face-to-face manner using a large language model.

A method for providing an exercise program using a large language model according to the present disclosure may comprise: providing at least one questionnaire related to an indication of a user to a user terminal; receiving, from the user terminal, response data for the questionnaire; evaluating an exercise performance capability of the user from exercise motion data received from the user terminal, using a pre-trained motion evaluation model; generating a prompt to be input to a large language model, using at least one of the response data for the questionnaire and a result of the exercise performance capability evaluation; inputting the prompt

to the large language model to generate an exercise program related to the indication of the user through the large language model; transmitting a review request for the exercise program generated through the large language model to a medical staff terminal; receiving, in response to the review request, feedback on the exercise program from the medical staff terminal; specifying the exercise program based on the feedback; and providing the specified exercise program to the user terminal.

Furthermore, the exercise program may be configured to include a plurality of exercise modules, and each of the plurality of exercise modules may be matched to a different exercise type and may include at least one exercise motion content related to the exercise type matched to each of the exercise modules.

Furthermore, the receiving of the feedback may comprise: providing a service page associated with the review request to the medical staff terminal; displaying information associated with the exercise program on the service page; and receiving the feedback of the medical staff on the exercise program through the service page.

Furthermore, the information associated with the exercise program may include an exercise module list for the plurality of exercise modules constituting the exercise program, and the exercise module list may include at least one of at least one exercise motion content included in each of the plurality of exercise modules and a review icon indicating whether the medical staff has reviewed each of the plurality of exercise modules.

Furthermore, the feedback may be at least one of a first feedback approving the exercise program and a second feedback requesting modification of the exercise program.

Furthermore, in specifying the exercise program, different data processing processes for the exercise program may be performed according to the feedback received from the medical staff terminal, and the different data processing processes may include at least one of a first process of specifying the generated exercise program based on receiving the first feedback from the medical staff terminal and providing the specified exercise program to the user terminal, and a second process of modifying the exercise program based on receiving the second feedback from the medical staff terminal.

Furthermore, in the second process, the method may comprise: receiving, through the service page, a medical staff query related to at least one specific exercise module among the plurality of exercise modules constituting the exercise program from the medical staff terminal;

processing information on the specific exercise module for which the medical staff query has been received and the medical staff query as input to the large language model to obtain a response of the large language model related to the specific exercise module; and modifying the specific exercise module using the response of the large language model related to the specific exercise module.

Furthermore, the modifying the specific exercise module may comprise: providing, based on the medical staff query related to the specific exercise module, at least one candidate exercise motion content associated with the specific exercise module that is subject to modification to the medical staff terminal; specifying, from the medical staff terminal, a specific candidate exercise motion content to replace a specific exercise motion content included in the specific exercise module among the at least one candidate exercise motion content; and changing the specific exercise motion content included in the specific exercise module to the specific candidate exercise motion content.

Furthermore, the different exercise types may be at least one of a warm-up exercise type, a main exercise type, and a cool-down exercise type.

Furthermore, the at least one questionnaire may include at least one of a selection-type questionnaire consisting of a question related to the indication of the user and a plurality of selection items corresponding to each of a plurality of different responses to the question, and an interactive questionnaire capable of receiving a natural language input from the user terminal in relation to the indication of the user.

Furthermore, the receiving of the response data for the questionnaire may comprise: receiving, from the user terminal, the selection-type questionnaire response data including a response matched to an item selected by a user input among the plurality of selection items; and receiving the interactive questionnaire response data from the large language model by processing the natural language input entered in the interactive questionnaire as an input to the large language model.

Furthermore, the evaluating of the exercise performance capability of the user may comprise: receiving the exercise motion data for a specific posture of the user captured by a camera provided in the user terminal; and analyzing at least one of a static posture, a joint range of motion, a balance capability, and a core muscle strength of the user using the pre-trained motion evaluation model.

Furthermore, the generating of the prompt to be input to the large language model may comprise: specifying a body part for which the joint range of motion of the user satisfies a preset condition; and generating the prompt such that exercise motion content related to the specified body part is included in the exercise program.

Meanwhile, a system for providing an exercise program using a large language model according to the present disclosure may comprise a controller configured to provide at least one questionnaire related to an indication of a user to a user terminal, and a communication unit configured to receive, from the user terminal, response data for the questionnaire, wherein the controller may evaluate an exercise performance capability of the user from exercise motion data received from the user terminal using a pre-trained motion evaluation model, generate a prompt to be input to a large language model using at least one of the response data for the questionnaire and a result of the exercise performance capability evaluation, input the prompt to the large language model to generate an exercise program related to the indication of the user, transmit a review request for the exercise program generated through the large language model to a medical staff terminal, receive, in response to the review request, feedback on the exercise program from the medical staff terminal, specify the exercise program based on the feedback, and provide the specified exercise program to the user terminal.

Meanwhile, as a program executed by one or more processors in an electronic device and stored in a computer-readable recording medium, the program may comprise instructions for performing: providing at least one questionnaire related to an indication of a user to a user terminal; receiving, from the user terminal, response data for the questionnaire; evaluating an exercise performance capability of the user from exercise motion data received from the user terminal using a pre-trained motion evaluation model; generating a prompt to be input to a large language model using at least one of the response data for the questionnaire and a result of the exercise performance capability evaluation; inputting the prompt to the large language model to generate an exercise program related to the indication of the user through the large language model; transmitting a review request for the exercise program generated through the large language model to a medical staff terminal; receiving, in response to the review request, feedback on the exercise program from the medical staff terminal; specifying the exercise program based on the feedback; and providing the specified exercise program to the user terminal.

A method and system for providing an exercise program using a large language model according to the present disclosure may generate a user-customized exercise program using response data for a questionnaire provided to a user terminal and a result of the exercise performance capability evaluation of the user.

Through this, the present disclosure may generate an exercise program having a difficulty level that takes into account the current condition of the user, thereby maximizing the rehabilitation effect for the indication of the user.

Furthermore, the method and system for providing an exercise program using a large language model according to the present disclosure may provide an exercise program with guaranteed expertise and stability by reflecting feedback of medical staff on the exercise program using the large language model.

Furthermore, the method and system for providing an exercise program using a large language model according to the present disclosure may provide the generated exercise program to the user terminal in a non-face-to-face manner based on the feedback of the medical staff.

Through this, a patient may easily access rehabilitation treatment without directly visiting a hospital located at a long distance, and medical staff may conveniently monitor the patient's rehabilitation exercise through an electronic device and provide monitoring-based feedback to enhance the effect of the patient's exercise treatment.

【BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS】

FIG. 1 is a conceptual diagram for explaining a system for providing an exercise program using a large language model according to the present disclosure.

FIG. 2 is a flowchart for explaining a method for providing an exercise program using a large language model according to the present disclosure.

FIGS. 3A and 3B are conceptual diagrams for explaining a questionnaire process according to the present disclosure.

FIGS. 4A and 4B are conceptual diagrams for explaining an exercise performance capability evaluation process according to the present disclosure.

FIG. 5 is a conceptual diagram for explaining a prompt generation process according to the present disclosure.

FIG. 6 is a conceptual diagram for explaining a process of generating an exercise program using a large language model according to the present disclosure.

FIGS. 7, 8A to 8C, 9A, and 9B are conceptual diagrams for explaining a process of generating a final exercise program using a large language model at a medical staff terminal and providing the final exercise program to a user terminal according to the present disclosure.

【DETAILED DESCRIPTION】

Hereinafter, embodiments disclosed in the present specification will be described in detail with reference to the accompanying drawings, wherein the same reference numerals are assigned to the same or similar components regardless of reference numerals, and redundant descriptions thereof will be omitted.

The suffixes "module" and "unit" for components used in the following description are given or used interchangeably in consideration of ease of writing the specification only, and do not themselves have meanings or roles that are distinguished from each other.

In addition, in describing the embodiments disclosed in the present specification, if it is determined that a detailed description of related known technologies may obscure the gist of the embodiments disclosed in the present specification, the detailed description thereof will be omitted.

In addition, the accompanying drawings are only for facilitating understanding of the embodiments disclosed in the present specification, and the technical idea disclosed in the present specification is not limited by the accompanying drawings, and it should be understood that all modifications, equivalents, and substitutes included in the spirit and technical scope of the present disclosure are included.

Terms including ordinal numbers such as first, second, etc. may be used to describe various components, but the components are not limited by the terms.

The terms are used only for the purpose of distinguishing one component from another component.

When a component is referred to as being "connected" or "coupled" to another component, it should be understood that it may be directly connected or coupled to the other component, but another component may exist in between.

On the other hand, when a component is referred to as being "directly connected" or "directly coupled" to another component, it should be understood that no other component exists in between.

Singular expressions include plural expressions unless the context clearly dictates otherwise.

In the present application, terms such as "comprise" or "have" are intended to designate the existence of features, numbers, steps, operations, components, parts, or combinations thereof

described in the specification, and should be understood as not precluding in advance the possibility of the existence or addition of one or more other features, numbers, steps, operations, components, parts, or combinations thereof.

The present disclosure relates to a method and system for providing an exercise program using a large language model.

More specifically, the present disclosure relates to a method and system for providing a user-customized exercise program that reflects feedback of medical staff on an exercise program using a large language model.

Here, a "large language model (LLM)" may refer to an artificial intelligence model capable of understanding and generating natural language by learning from a vast amount of data.

An "exercise program" according to the present disclosure may refer to an exercise plan provided to a user terminal in relation to an indication of a user.

Here, an "indication" may be understood as a symptom or clinical situation requiring a specific treatment or examination, such as a disease or symptom of a user.

For example, in the present disclosure, if a user has an indication related to a specific body part (e.g., the lower back (lumbar spine)), an exercise program for rehabilitation of the indication of the user may be generated.

More specifically, an exercise program according to the present disclosure may be configured to include at least one exercise module.

Here, an "exercise module" may refer to a unit of composition of an exercise program that includes at least one exercise motion content.

In this case, "exercise motion content" may include various types of information such as a name of a specific exercise motion, exercise duration information, exercise difficulty information, exercise type information, exercise body part information, and exercise posture information.

Meanwhile, an "exercise motion" described in the present disclosure refers to a gesture (motion) performed in the course of performing an exercise, and may be used interchangeably with terms such as "movement", "action", "motion", and "gesture" of the body.

In the present disclosure, for convenience of explanation, the description focuses on "indications related to musculoskeletal disorders", but is not necessarily limited thereto.

As an example, the exercise program described in the present disclosure may relate to exercise for treatment of a user who needs rehabilitation treatment due to a musculoskeletal disorder and a user who needs treatment due to various diseases (e.g., cancer, diabetes, hypertension, etc.).

In addition, the present disclosure may also provide an exercise program necessary for health promotion in daily life, rather than a rehabilitation exercise for therapeutic purposes related to the indication of the user.

For example, the exercise according to the present disclosure is not limited in the purpose of the exercise, and may be an exercise performed for various purposes, such as rehabilitation exercise, fitness exercise, ball sports exercise, dance exercise, etc., for various purposes such as therapeutic purposes, health promotion purposes, and cosmetic purposes.

Furthermore, the exercise program according to the present disclosure may refer to a collection of exercise modules for various exercises such as rehabilitation exercise, fitness exercise, ball sports exercise, dance exercise, etc., for various purposes such as therapeutic purposes, health promotion purposes, and cosmetic purposes, and may be understood as not being limited to a specific exercise category.

That is, the type of exercise according to the present disclosure is also not limited, and the location of exercise, such as indoor exercise and outdoor exercise, is also not limited.

In the foregoing, the provision of an exercise program using a large language model according to the present disclosure has been described in general, and this may be implemented by a system for providing an exercise program using a large language model described below.

Hereinafter, a system for providing an exercise program using a large language model according to the present disclosure will be described in detail with reference to FIG. 1.

FIG. 1 is a conceptual diagram for explaining a system for providing an exercise program using a large language model according to the present disclosure.

As shown in FIG. 1, a generative model-based exercise program providing system according to the present disclosure (hereinafter referred to as "exercise program providing system") 100 may include at least one of a communication unit 110, a storage unit 120, and a controller 130.

In this case, the exercise program providing system 100 according to the present disclosure is not limited to the above-described components, and may further include

components that perform the same or similar roles as the functions described in the present specification.

Meanwhile, the exercise program providing system 100 according to the present disclosure may be implemented as an application or software.

The exercise program providing system 100 implemented as software in this way may be downloaded through a program (e.g., Play Store) capable of downloading an application on the user terminal 10 and the medical staff terminal 20, or may be implemented through an initial installation program on the user terminal 10 and the medical staff terminal 20.

In this case, the communication unit 110, the storage unit 120, and the controller 130 according to the present disclosure may be utilized as components of the user terminal 10 and the medical staff terminal 20.

In the present disclosure, the user terminal 10 may be understood as referring to an application installed on the user terminal 10.

Such an application (or software) may be understood as one component of the exercise program providing system 100 according to the present disclosure.

In the present disclosure, the user terminal 10 and the medical staff terminal 20 may also be referred to as a "mobile terminal" or an "electronic device", and the user terminal 10 described in the present specification may include a mobile phone, a smart phone, a smart TV, a laptop computer, a digital broadcasting terminal, a PDA (personal digital assistants), a PMP (portable multimedia player), a navigation device, a slate PC, a tablet PC, an ultrabook, a wearable device (e.g., a watch-type terminal (smartwatch), a glasses-type terminal (smart glass), and an HMD (head mounted display)), and the like.

More specifically, the user terminal 10 and the medical staff terminal 20 according to the present disclosure are not limited to an electronic device on which an application is activated, and may refer to an electronic device connected to an electronic device on which an application is activated.

As an example, based on the user terminal 10 according to the present disclosure being a smart phone, the user terminal 10 may refer to a smart TV connected to the smart phone.

Meanwhile, the exercise program providing system 100 may exist inside a server (hereinafter referred to as a server) built to perform a specific purpose (e.g., providing an exercise program), or may exist as a separate device from the server.

When the exercise program providing system 100 exists inside a server, the exercise program providing system 100 according to the present disclosure may provide a user-customized exercise program through at least one of the communication unit 110, the storage unit 120, and the controller 130 located inside the server, or a module performing a function similar to each of the respective components.

In this case, the application may provide an exercise program to the user terminal 10 on which the application is installed through communication with the server.

Furthermore, the exercise program providing system 100 according to the present disclosure may provide the exercise program according to the present disclosure to the user terminal 10 in conjunction with a plurality of different external servers.

A user (or patient, U) and medical staff (or doctor, D) according to the present disclosure may hold an account registered in the exercise program providing system 100 according to the present disclosure.

In the present specification, for convenience of explanation, an account of a user (or patient) is referred to as a "user account (or patient account)".

The "account" described above may be created through a page associated with the exercise program providing system 100.

Alternatively, an "account" may be created in at least one other server (e.g., a medical staff server) associated with the exercise program providing system 100 according to the present disclosure.

Accordingly, in the present specification, without distinguishing the server from which the account was issued, all accounts based on the exercise program providing system 100 according to the present disclosure are referred to as "accounts pre-registered in the exercise program providing system 100 according to the present disclosure."

Furthermore, a user (U, or patient) according to the present disclosure may receive an exercise program related to the indication of the user (U) through an application or web page provided by the exercise program providing system 100 according to the present disclosure.

Meanwhile, a doctor (Doctor) may provide feedback on the exercise program to be provided to the user (U) through the medical staff terminal 20.

In this case, the doctor (D) may hold a doctor account pre-registered in the exercise program providing system 100 according to the present disclosure.

In the present specification, a user terminal logged in with a doctor account is referred to as a medical staff terminal 20.

As an example, the exercise program providing system 100 according to the present disclosure may receive an exercise program approved by the doctor (D) for the user (U) in conjunction with a medical staff server.

Furthermore, "medical staff" described in the present disclosure refers to a person working at a medical institution (e.g., a hospital), and may include, for example, at least one of a doctor, a nurse, and a physical therapist.

In the present disclosure, for convenience of explanation, a doctor and a physical therapist are described as examples of medical staff.

However, medical staff is not limited thereto, and any user working at a medical institution to provide a user-customized exercise program may qualify as medical staff according to the present disclosure.

The exercise program providing system 100 according to the present disclosure may collect sensing information including at least one of voice data and image data based on a microphone, a camera, and a sensor unit provided in the user terminal 10.

Here, the sensor unit may include at least one of an infrared sensor, a LiDAR sensor, an acceleration sensor, an illuminance sensor, a proximity sensor, a position sensor, a face recognition sensor, an iris scanner, a heart rate sensor, a touch sensor, and a pressure sensor.

The communication unit 110 according to the present disclosure may be connected to the user terminal 10, the medical staff terminal 20, an LLM server 140, a central server, a device, and at least one network through a wireless or wired network, and may be configured to receive or transmit overall data and information necessary for the operation of the exercise program providing system 100 according to the present disclosure.

Specifically, the communication unit 110 may transmit at least one questionnaire to the user terminal 10.

Furthermore, the communication unit 110 may receive response data for at least one questionnaire provided to the user terminal 10.

Here, "receiving response data" may mean receiving an input signal (or selection signal) corresponding to a user input entered through the user terminal 10.

The communication unit 110 may receive an exercise program pre-stored in a database (or DB) 200.

Furthermore, the communication unit 110 may receive patient history data from the database 200.

In addition, the communication unit 110 may receive exercise motion data of a user captured from the user terminal 10.

Here, the exercise motion data may refer to at least one of an image and a video of a user's exercise motion captured by a camera provided in the user terminal 10.

Furthermore, the communication unit 110 may receive feedback including at least one of approval and modification of the exercise program from the medical staff terminal 20.

The communication unit 110 may include at least one communication module capable of performing wireless communication and wired communication between the exercise program providing system 100 and a communication target.

In addition, the communication unit 110 may include a communication module that connects the exercise program providing system 100 to at least one network.

Meanwhile, the communication unit 110 may support various communication methods according to the communication standard of a device with which it communicates.

For example, the communication unit 110 may be configured to perform communication using at least one of WLAN (Wireless LAN), Wi-Fi (Wireless-Fidelity), Wi-Fi (Wireless Fidelity) Direct, DLNA (Digital Living Network Alliance), WiBro (Wireless Broadband), WiMAX (World Interoperability for Microwave Access), HSDPA (High Speed Downlink Packet Access), HSUPA (High Speed Uplink Packet Access), LTE (Long Term Evolution), LTE-A (Long Term Evolution-Advanced), 5G (5th Generation Mobile Telecommunication), Bluetooth™, RFID (Radio Frequency Identification), infrared communication (Infrared Data Association; IrDA), UWB (Ultra-Wideband), ZigBee, NFC (Near Field Communication), Wi-Fi Direct, and Wireless USB (Wireless Universal Serial Bus) technologies.

Next, the storage unit 120 may be configured to store various information related to the present disclosure.

In the present disclosure, the storage unit 120 may be provided in the exercise program providing system 100 itself, or alternatively, at least a part of the storage unit 120 may refer to a database (Database: DB) 200.

The storage unit 120 may include one or more non-transitory computer-readable storage media that can be read and/or accessed by at least one processor.

The one or more computer-readable storage media may include volatile and/or non-volatile storage components such as optical, magnetic, organic, or other memory or disk storage devices.

In some examples, the storage unit 120 may be implemented using a single physical device (e.g., one optical, magnetic, organic, or other memory or disk storage device), while in other examples, the storage unit 120 may be implemented using a plurality of physical devices.

The storage unit 120 may include computer-readable instructions and additional data.

The storage unit 120 may include storage necessary to perform at least a part of the methods and techniques described in the present specification and/or at least a part of the functions of devices and networks.

That is, it is sufficient for the storage unit 120 to be a space in which information necessary for providing an exercise program according to the present disclosure is stored, and the storage unit 120 may be understood as not being limited in physical space.

The storage unit 120 may store data and instructions necessary for the operation of the exercise program providing system 100 according to the present disclosure.

More specifically, the storage unit 120 may store data and instructions necessary for the operation of the motion evaluation model 132.

Here, the motion evaluation model 132 may refer to an artificial intelligence model that analyzes the exercise motion performed by the user according to the exercise performance capability evaluation provided to the user terminal and evaluates the exercise motion.

For example, the motion evaluation model 132 of the present disclosure is a posture estimation model trained using a training data set including position information on joint points, and may estimate the exercise posture of the user (U) from an exercise video to be analyzed.

Here, "joint point" may refer to a plurality of joints of the user (U) (or a part of the body of the user (U) including a joint).

And, "keypoint" may refer to a region corresponding to each of a plurality of joint points of the user (U) in an exercise motion video.

User-related information may be stored in the storage unit 120.

The user-related information may include various information related to providing an exercise program, such as i) user ID, ii) name, iii) date of birth, iv) indication of the user, v) exercise history, vi) past medical history, and vii) treatment plan, according to at least one of user account information and prescription information.

Furthermore, user authentication information included in the user account information may be stored in the storage unit 120.

Here, "user authentication information" may refer to information used in a user authentication process performed to log in to a user account on a user terminal.

As an example, the user authentication information may vary, including i) ID, ii) password, iii) password pattern, iv) fingerprint authentication information, v) face authentication information, vi) voice authentication information, vii) iris authentication information, and viii) vein authentication information set by the user.

In addition, at least one of an exercise video and an exercise description corresponding to each exercise motion may be stored in the storage unit 120.

Meanwhile, the database (DB) 200 may be configured to store various information related to providing a user-customized exercise program.

Specifically, exercise motion content (e.g., exercise name, number of repetitions, exercise timing, exercise difficulty level, etc.) corresponding to each of a plurality of pain areas related to the indication (e.g., shoulder, elbow, wrist & hand, hip & pelvis, knee, ankle & foot, neck, back, lower back, and abdomen) may be stored in the database 200.

Furthermore, at least one of an exercise video and an exercise description corresponding to each exercise motion content may be stored in the database 200.

In addition, patient history information of each of a plurality of different users may be stored in the database 200.

For example, patient history information including at least one of i) name, ii) date of birth, iii) type of indication of the user, iv) exercise history, v) past medical history, vi) prescription information, vii) response data history information for the questionnaire, and viii) exercise prognosis information of each of a plurality of users may be stored in the database 200.

In the present disclosure, the storage unit 120 is described as existing separately from the database 200, but is not limited thereto, and the storage unit 120 may include the database 200.

Next, the controller 130 may be configured to control the overall operation of the exercise program providing system 100 related to the present disclosure.

The controller 130 may include at least one of a prompt generator 131 and a motion evaluation model 132.

Furthermore, the controller 130 may process signals, data, information, and the like that are input or output through the components described above, or may provide or process appropriate information and functions to the user.

The controller 130 may control the service page for providing an exercise program to be output through a display unit (or touch screen) provided in the user terminal 10 and the medical staff terminal 20.

Such a service page may be output on the user terminal 10 and the medical staff terminal 20 through an application or a webpage installed on the user terminal 10 and the medical staff terminal 20.

The service page is a page associated with the exercise program providing system 100 according to the present disclosure, and is configured to be controlled by the exercise program providing system 100 according to the present disclosure.

Furthermore, when the service page is provided in the form of an application, the service page may be controlled by a CPU (Central Processing Unit) of the user terminal 10 on which the application is installed.

In this case, the CPU of the user terminal 10 may provide a user-customized exercise program to the user based on information provided by the exercise program providing system 100 according to the present disclosure.

Meanwhile, the controller 130 may provide at least one questionnaire on the service page provided to the user terminal 10.

Furthermore, the controller 130 may evaluate the exercise performance capability of the user using the pre-trained motion evaluation model 132.

More specifically, the controller 130 may input exercise motion data of the user captured (or sensed) using at least one of a camera and a sensor unit provided in the user terminal 10 into the motion evaluation model to generate an evaluation result of the exercise performance capability.

The controller 130 may generate a prompt to be input to the LLM server using at least one of response data for at least one questionnaire provided to the user terminal 10 and the evaluation result of the exercise performance capability.

In this case, the LLM server 140 according to the present disclosure may include at least one large language model.

For example, the LLM server 140 may include at least one large language model based on at least one of GPT (Generative Pre-trained Transformer), T5 (Text-to-Text Transfer Transformer), Vision-Language Models (e.g., CLIP, Flamingo), Multimodal Generative Models (GPT-4 Multimodal, PaLM-E), BERT (Bidirectional Encoder Representations from Transformers), and LaMDA (Language Model for Dialogue Applications).

In the present disclosure, the LLM server 140 is described as existing separately from the exercise program providing system 100, but is not limited thereto, and the exercise program providing system 100 may be configured to include the LLM server 140.

That is, the exercise program providing system 100 and the LLM server 140 according to the present disclosure may exist separately, or the LLM server 140 may exist as included in the exercise program providing system 100.

Hereinafter, for convenience of description, the LLM server 140 and the large language model are used interchangeably, and the use of the large language model by the controller 130 may be understood as using at least one large language model included in the LLM server 140.

In addition, in the present disclosure, the controller 130 is described as including the prompt generator 131, but is not limited thereto, and the controller 130 and the prompt generator 131 may exist separately.

In this case, the controller 130 may generate a prompt in conjunction with the prompt generator 131.

The controller 130 according to the present disclosure may generate a user-customized exercise program corresponding to the prompt using the large language model 140.

Furthermore, the controller 130 may review the exercise program according to the feedback received from the medical staff terminal 20 in conjunction with the large language model 140.

Here, "feedback" may refer to a user input related to at least one of modification (or update) and approval of the exercise program by the medical staff.

For example, it may refer to a user input for modifying the exercise program using a response of the large language model according to a medical staff query input to the medical staff terminal 20.

Furthermore, the controller 130 may provide a specified exercise program (or a final exercise program) to the user terminal 10 in response to the exercise program being specified at the medical staff terminal 20.

Meanwhile, the exercise program providing system 100 may include one or more processors, and such processors may include one or more general-purpose processors and/or one or more special-purpose processors (e.g., a digital signal processor, a tensor processing unit (TPU), a graphics processing unit (GPU), a neural network processing unit (NPU), an application-specific integrated circuit, an application-specific semiconductor (ASIC), etc.).

The one or more processors may be configured to execute instructions stored (or included) in the storage unit 120, computer-readable instructions, and/or other instructions described in the present specification.

In such an exercise program providing system 100, a memory and at least one processor may cooperate to perform the data processing described below.

The processor may perform a series of operations and data processing using data and information stored in the memory.

Here, "memory" may be a component of the storage unit 120, and "processor" may be used interchangeably with the controller 130.

In the above, the exercise program providing system 100 of the present disclosure has been described, and this may be implemented based on the method for providing an exercise program using a large language model described below.

Hereinafter, with reference to FIG. 2 together with FIGS. 3a, 3b, 4a, 4b, 5, 6, 7, 8a to 8c, 9a, and 9b, the method for providing an exercise program using a large language model according to the present disclosure will be described in more detail.

FIG. 2 is a flowchart for explaining a method for providing an exercise program using a large language model according to the present disclosure, and FIGS. 3a and 3b are conceptual diagrams for explaining a questionnaire process according to the present disclosure.

FIGS. 4a and 4b are conceptual diagrams for explaining an exercise performance capability evaluation process according to the present disclosure, and FIG. 5 is a conceptual diagram for explaining a prompt generation process according to the present disclosure.

FIG. 6 is a conceptual diagram for explaining a process of generating an exercise program using a large language model according to the present disclosure, and FIGS. 7, 8a to 8c, 9a, and 9b are conceptual diagrams for explaining a process of generating a final exercise program using a large language model at a medical staff terminal according to the present disclosure and providing it to a user terminal.

In the present disclosure, a process of providing at least one questionnaire related to an indication of a user to a user terminal may proceed (S210, see FIG. 2).

As shown in FIG. 3(a), the controller 130 may provide a pre-consultation 300 on the service page 1000 provided to the user terminal 10 for inputting a body part (or musculoskeletal area) in pain in relation to the indication of the user.

In this case, the pre-consultation 300 may include a selection-type questionnaire for selecting a body part in pain in relation to the indication of the user.

Specifically, the controller 130 may provide body icons corresponding to each body part in a body diagram to the user terminal 10.

Furthermore, the controller 130 may provide guidance information (e.g., "Please select the area in pain.

") to prompt the user to select at least one body part.

As an example, the controller 130 may display body icons corresponding to each of a plurality of body parts (e.g., "neck (cervical spine)", "shoulder", "back (thoracic spine)", "lower back (lumbar spine)", "elbow", "wrist", "knee", "ankle", etc.) in the body diagram provided to the user terminal 10.

The user (U) may specify a body part in pain through a selection-type questionnaire for selecting a pain area.

Specifically, the controller 130 may specify a body part (e.g., lower back (lumbar spine)) corresponding to the specific icon as the pain area of the user, based on a user input 312 being applied to a specific icon 311 among the plurality of body icons provided to the user terminal 10 by the user (U).

As shown in FIG. 3(b), when the pain area is specified, the controller 130 may provide a pre-consultation 300 on the service page 1000 provided to the user terminal 10 for inputting the degree of pain.

In this case, the pre-consultation 300 may include a selection-type questionnaire for inputting the degree of pain of the user with respect to the specified pain area.

Specifically, the controller 130 may provide a selection item 320 to the user terminal 10 for inputting the degree of pain of the user (U) with respect to the specified pain area.

Here, "degree of pain" may refer to a Numerical Rating Scale (NRS) and may consist of numbers from 0 to 10.

Specifically, the controller 130 may provide a selection-type questionnaire including a selection item 320 for expressing the degree of pain felt by the user (U) in numbers.

Furthermore, in response to the user (U) inputting the degree of pain 322 in the selection item 320 for inputting the degree of pain, the controller 130 may provide at least one selection-type questionnaire (or selection-type questionnaire item) configured for the user (U) to directly make a selection regarding the health condition of the user (U).

Here, the "selection-type questionnaire" may consist of a question related to the indication of the user and a plurality of selection items corresponding to each of a plurality of different responses to the question.

The storage unit 120 stores selection-type questionnaires for confirming the symptoms of the user with respect to each of a plurality of pain areas.

Such selection-type questionnaires may be configured differently depending on the pain area specified by the user.

The controller 130 may refer to the storage unit 120 and provide a selection-type questionnaire for a specified pain area among a plurality of body parts to the user terminal 10 to understand the indication status of the user with respect to the specific pain area.

As shown in FIG. 3b, the controller 130 may provide, to the user terminal 10, a plurality of selection-type questionnaires 331, 332, 333, 334 and selection items corresponding to each of a plurality of different responses to each question related to the indication of the user included in the plurality of selection-type questionnaires, so as to conduct the questionnaire on the indication of the user from multiple angles.

For example, the controller 130 may conduct a questionnaire on exercise equipment that can be used in an exercise program by using a selection-type questionnaire 334 including a question related to exercise equipment.

Furthermore, the controller 130 may conduct an AI-based interactive questionnaire.

Here, the "interactive questionnaire" may refer to a questionnaire capable of receiving a natural language input from the user terminal in relation to the indication of the user.

In this case, the interactive questionnaire may be conducted using at least one of at least one large language model 140 and a chatbot.

Here, the at least one large language model 140 may refer to a large language model 140 based on at least one of GPT (Generative Pre-trained Transformer), T5 (Text-to-Text Transfer Transformer), Vision-Language Models (e.g., CLIP, Flamingo), Multimodal Generative Models (GPT-4 Multimodal, PaLM-E), BERT (Bidirectional Encoder Representations from Transformers), and LaMDA (Language Model for Dialogue Applications).

In addition, the "chatbot" according to the present disclosure may be implemented to receive input of information that is difficult to obtain from selection-type questionnaires in relation to the indication of the user.

For example, the "chatbot" according to the present disclosure may include at least one of a rule-based chatbot, an artificial intelligence chatbot, a natural language processing chatbot, and a hybrid chatbot.

As shown in FIG. 3b(b), the controller 130 may conduct an interactive questionnaire 340 with the user regarding the indication of the user.

More specifically, the controller 130 may conduct an interactive questionnaire 340 in order to collect information related to the indication that is difficult to confirm in detail through a selection-type questionnaire.

For example, the controller 130 may generate and provide an interactive questionnaire item 341 related to the indication of the user on the service page 1000 provided to the user terminal 10.

In this case, the controller 130 may provide the interactive questionnaire 340 through at least one of the large language model 140 and a chatbot so that the user can freely respond to the interactive questionnaire item 341.

In the present disclosure, a process of receiving response data for the questionnaire from the user terminal may proceed (S220, see FIG. 2).

The controller 130 may receive, from the user terminal 10, selection-type questionnaire response data including a response matched to an item selected by a user input among a plurality of selection items.

As shown in FIG. 3b(a), the controller 130 may receive, as selection-type response data, a response matched to a selection item selected by a user input among a plurality of selection items for a question related to the indication of the user included in a specific selection-type questionnaire 331 (e.g., "Are you currently experiencing difficulties in daily life or exercise due to pain?").

As shown in FIG. 3b(b), the controller 130 may receive, from the user terminal 10, interactive questionnaire response data for the interactive questionnaire item 340.

Specifically, the controller 130 may provide at least one interactive questionnaire item 341 on the service page 1000 to the user terminal 10 and receive a natural language input 342 of the user for the interactive questionnaire item 341 in a manner of conversing with the user.

Furthermore, the controller 130 may process the natural language input 342 received from the user terminal 10 as an input to at least one of the large language model 140 and a chatbot.

For example, the controller 130 may process the natural language input 342 entered in the interactive questionnaire 340 as an input to the large language model 140 to receive interactive questionnaire response data from the large language model 140.

As another example, the controller 130 may process the natural language input 342 entered in the interactive questionnaire 340 as an input to a chatbot to receive interactive questionnaire response data from the chatbot.

Furthermore, the controller 130 may provide a preset number of interactive questionnaire items to the user terminal 10 and receive interactive questionnaire response data of the user for each of the interactive questionnaire items.

In this case, the controller 130 may provide, together with the interactive questionnaire item 341, a sample answer for the interactive questionnaire item 341 so that important information is entered for the interactive questionnaire item 341.

In the present disclosure, a process of evaluating an exercise performance capability of the user from exercise motion data received from the user terminal may proceed using a pre-trained motion evaluation model (S230, see FIG. 2).

The controller 130 may collect exercise motion data of the user and evaluate the current exercise performance capability of the user using at least one of a camera and a sensor unit provided in the user terminal 10.

Here, "exercise motion data" may include at least one of an image and a video of a motion of the user performed for evaluation of the exercise performance capability provided to the user terminal.

For example, the controller 130 may receive exercise motion data for a specific posture of the user captured by a camera provided in the user terminal 10.

Specifically, the controller 130 may activate at least one sensor provided in the user terminal 10 in order to evaluate the exercise performance capability of the user.

For example, when the exercise performance capability evaluation is executed from the user terminal 10, the controller 130 may activate a sensor unit including a microphone, a camera, and a plurality of different sensors provided in the user terminal 10.

Furthermore, the controller 130 may receive sensing information based on at least one of a microphone, a camera, and a sensor unit provided in the user terminal 10 being activated.

For example, the controller 130 may receive exercise motion data including at least one of an exercise motion image and an exercise motion video of the user from the camera, based on at least one of the camera and the microphone being activated.

In this case, a video received through the camera may be output in real time on the display unit of the user terminal 10.

Furthermore, the controller 130 may analyze at least one of a static posture, a joint range of motion, a balance capability, and a core muscle strength of the user using the pre-trained motion evaluation model 132.

Here, the motion evaluation model 132 may refer to an artificial intelligence model trained to estimate a motion of the user (U) from exercise motion data, as a pose estimation model trained using a learning data set including position information on joint points.

Here, a "joint point" may refer to a plurality of joints of the user (U) (or a part of the body of the user (U) including the joints).

And, a "keypoint" may refer to a region corresponding to each of a plurality of joint points of the user (U) in at least one of an image and a video including a motion of the user.

The controller 130 may evaluate the motion of the user (U) by extracting keypoints corresponding to the joint points of the user from the exercise motion data of the user using the pre-trained motion evaluation model 132, and based on analysis of the positional relationship between the extracted keypoints.

In the present disclosure, a series of processes of evaluating an exercise performance capability of the user from exercise motion data using the keypoints extracted through the motion evaluation model 132 may be referred to as an "exercise performance capability evaluation process."

In the present disclosure, the exercise performance capability evaluation process may be described as being performed in the exercise program providing system 100 without separately distinguishing the physical space and subject in which the exercise performance capability evaluation process is performed.

The exercise performance capability evaluation process may be performed using the keypoints extracted from the motion evaluation model 132.

More specifically, the controller 130 may analyze exercise motion data received from the camera on a frame-by-frame basis to extract keypoints corresponding to joint points corresponding to the motion of the user.

For example, the motion evaluation model 132 may include various object detection algorithms.

For example, the motion evaluation model 132 may include an algorithm (Weighted Box Fusion, WBF) that ensembles a plurality of bounding boxes.

However, it is natural that the controller 130 is not limited to the above-described object detection algorithms and may use various object detection algorithms capable of detecting an object corresponding to the user (U) from an image or a video.

In the present disclosure, learning data on which the motion evaluation model 132 performs learning may be stored in a database 200, and a part of such database 200 may also be referred to as a "learning data DB."

Details on the learning data will be described later.

Furthermore, the controller 130 may perform learning for the motion evaluation model 132 based on a learning data set present in the learning data DB.

As described above, the learning data set may include position information of joint points matched to the joint points of the user.

The controller 130 may train the motion evaluation model 132 to extract keypoints corresponding to joint points of the user from exercise motion data using a learning data set.

As shown in FIG. 4a(a), the controller 130 may perform a motion analysis evaluation 410 on the user.

Here, "motion analysis evaluation 410" may include at least one of a static posture evaluation (or body shape analysis) and a joint range of motion evaluation.

Specifically, the controller 130 may perform a motion analysis evaluation 410 for each of a plurality of different body parts in order to evaluate the exercise performance capability of the user at the user terminal 10.

For example, the controller 130 may analyze the body shape of the user from an image (or video) of the static posture of the user captured from the user terminal 10 using the pre-trained motion evaluation model 132.

Specifically, the controller 130 may analyze the alignment state of body parts of the user (e.g., head, neck, shoulders, pelvis, knees, etc.) from the image (or video) of the static posture using the pre-trained motion evaluation model 132.

Furthermore, the controller 130 may perform a joint range of motion evaluation for each of a plurality of different body parts in order to evaluate the exercise performance capability of the user at the user terminal 10.

Specifically, the controller 130 may perform analysis on at least one of a range of motion of a joint, a movement speed (or acceleration) of a joint, a physical balance of the user included in a motion video subject to analysis, and a body alignment state (e.g., axial alignment state of legs, spinal alignment state, etc.) using the pre-trained motion evaluation model 132.

For example, the controller 130 may capture a motion of the user based on a plurality of shooting topics for joint range of motion evaluation using a camera provided in the user terminal 10.

In this case, among the plurality of shooting topics (first shooting topic to fourth shooting topic), a first shooting topic 411 may be related to "static posture," a second shooting topic 412

may be related to "joint range of motion (shoulder)," a third shooting topic 413 may be related to "joint range of motion (elbow)," and a fourth shooting topic 414 may be related to "joint range of motion (torso)."

Meanwhile, at least one of a scene to be captured (or a scene), a shooting method, and a shooting order may be matched to each of a plurality of shooting items corresponding to the plurality of shooting topics 411 to 414, respectively.

The controller 130 may receive user exercise motion data according to a shooting method and a shooting order matched to a shooting topic selected at the user terminal 10, and perform a motion analysis evaluation 410 of the user from the exercise motion data.

As shown in FIGS. 4a(b) and 4a(c), the controller 130 may perform a balance capability evaluation and a core muscle strength evaluation 420, 430 of the user using the pre-trained motion evaluation model 132.

Specifically, the controller 130 may evaluate at least one of a balance capability and a core muscle strength of the user from exercise motion data of the user performing a preset exercise motion (e.g., a one-leg standing motion, a plank motion, a squat motion, etc.).

In this case, the controller 130 may provide a sample video of the preset exercise motion to the user terminal 10 and induce the user to perform the preset exercise motion according to the provided sample video.

The controller 130 may measure a time during which the user performs and maintains a preset exercise motion (e.g., a one-leg standing posture, a plank posture) in a correct posture, and perform at least one of a balance capability evaluation and a core muscle strength evaluation 420 of the user based on the maintenance time.

For example, the controller 130 may evaluate the measured maintenance time according to a preset time interval to perform a balance capability evaluation and a core muscle strength evaluation of the user.

Here, the "preset time interval" may include a plurality of different time intervals.

The controller 130 may evaluate the balance capability and core muscle strength of the user as at least one of "insufficient (or low)" based on the measured maintenance time falling within a first time interval (e.g., less than 1 minute) among a plurality of different intervals, "average (or medium)" based on falling within a second time interval (e.g., 1 minute to 3

minutes), and "good (or high)" based on falling within a third time interval (e.g., more than 3 minutes).

In this case, the preset time interval according to the present disclosure is not limited to the described examples and may be variously set by the exercise program providing system 100.

As another example, the controller 130 may measure the number of times the user performs a preset exercise motion (e.g., a squat motion) in a correct posture for a preset time (e.g., 30 seconds), and perform at least one of a balance capability evaluation and a core muscle strength evaluation 420 of the user based on the number of performances.

For example, the controller 130 may evaluate the measured number of performances according to a preset count interval to perform a balance capability evaluation and a core muscle strength evaluation of the user.

Here, the "preset count interval" may include a plurality of different count intervals.

The controller 130 may evaluate the balance capability and core muscle strength of the user as at least one of "insufficient (or low)" based on the measured number of performances falling within a first count interval (e.g., fewer than 10) among a plurality of different intervals, "average (or medium)" based on falling within a second count interval (e.g., 10 to 20), and "good (or high)" based on falling within a third count interval (e.g., more than 20).

In this case, the preset count interval according to the present disclosure is not limited to the described examples and may be variously set by the exercise program providing system 100.

As shown in FIG. 4b, the controller 130 may receive exercise motion data 440 using at least one of a camera and a sensor unit provided in the user terminal 10.

Furthermore, the controller 130 may process the exercise motion data 440 as an input to the pre-trained motion evaluation model 132 to generate an evaluation result of the exercise performance capability 450 of the user.

Specifically, the evaluation result of the exercise performance capability 450 may include at least one of a motion analysis evaluation result 451, a balance capability evaluation result 452, and a core muscle strength evaluation result 453 of the user.

Furthermore, the controller 130 may comprehensively evaluate the exercise performance capability of the user based on the motion analysis evaluation result 451, the balance capability evaluation result 452, and the core muscle strength evaluation result 453 of the user based on a preset evaluation criterion.

Here, the "preset evaluation criterion" may refer to a criterion by which the medical staff evaluates the exercise performance capability of the user according to the evaluation of the static posture, joint range of motion, balance capability, and core muscle strength of the user.

The controller 130 may generate an evaluation result of the exercise performance capability 450 further including a comprehensive evaluation result 454 for the comprehensive evaluation.

In the present disclosure, a process of generating a prompt to be input to a large language model may proceed using at least one of response data for the questionnaire and the evaluation result of the exercise performance capability (S240, see FIG. 2).

As shown in FIG. 5, the controller 130 may generate a prompt 520 to be input to the large language model 140 from questionnaire response data 510 including selection-type questionnaire response data 511 and interactive questionnaire response data 512, and the evaluation result of the exercise performance capability 450, using the prompt generator 131.

Specifically, the prompt generator 131 may generate the prompt 520 to include a response matched to an item selected by a user input among the plurality of selection items for a question related to the indication of the user included in the selection-type questionnaire.

For example, the prompt generator 131 may generate the prompt 520 to include information such as a pain area, a degree of pain, and exercise equipment possessed, which are specified in relation to the indication of the user included in the selection-type questionnaire response data 511.

Furthermore, the prompt generator 131 may generate the prompt 520 to include a natural language input of the user included in the interactive questionnaire response data 512 and a response of the large language model 140 to the natural language input.

In addition, the prompt generator 131 may generate the prompt 520 to include a motion analysis evaluation result 451 of the user included in the evaluation result of the exercise performance capability 450 of the user.

Specifically, the controller 130 may specify a body part for which the joint range of motion of the user satisfies a preset condition, based on the motion analysis evaluation result 451.

Here, the "preset condition" may refer to a condition that is satisfied based on the joint range of motion of the user not falling within a normal reference range or being limited to a specific threshold value or below.

In this case, the "normal reference range" and the specific threshold value may be set by at least one of the medical staff terminal 20 and the exercise program providing system 100.

Furthermore, the controller 130 may generate the prompt such that exercise motion content related to the specified body part is included in the exercise program.

As described above, "exercise motion content" according to the present disclosure may include various information such as a name of a specific exercise motion, a number of repetitions, an exercise method, and an exercise motion video.

For example, the controller 130 may generate the prompt such that exercise motion content related to "lower back (lumbar spine)" is included in the exercise program, based on the joint range of motion of "lower back (lumbar spine)" not falling within the normal reference range in the motion analysis evaluation result 451 and thus satisfying the preset condition.

In addition, the controller 130 may generate a prompt 520 including a balance capability evaluation result 452 and a core muscle strength evaluation result 453.

Furthermore, the controller 130 may generate a prompt 520 including a comprehensive evaluation result 454 of the exercise performance capability of the user.

In the present disclosure, a process of inputting the prompt to the large language model to generate an exercise program related to the indication of the user through the large language model may proceed (S250, see FIG. 2).

The controller 130 according to the present disclosure may input a prompt 520 generated based on at least one of the questionnaire response data and the evaluation result of the exercise performance capability to the large language model 140.

The large language model 140 according to the present disclosure may generate an exercise program to be provided to the user based on the input prompt 520.

Here, the "exercise program" is configured to include a plurality of exercise modules, and each of the plurality of exercise modules is matched to a different exercise type and may include at least one exercise motion content related to the exercise type matched to each of the exercise modules.

In this case, the different exercise types may refer to at least one of a warm-up exercise type, a main exercise type, and a cool-down exercise type.

In the present disclosure, the generation of an exercise program by the large language model 140 may also be understood as the controller 130 generating an exercise program using the large language model 140.

Hereinafter, the generation of an exercise program by the controller 130 using the large language model 140 and the generation of an exercise program by the large language model 140 may be used interchangeably.

As shown in FIG. 6, the controller 130 may extract a plurality of different exercise motion contents from a database 200 including an exercise program DB 610, using at least one of the questionnaire response data and the evaluation result of the exercise performance capability, based on prompt engineering.

Here, prompt engineering may refer to a technique of designing and optimizing input text (prompt) to effectively utilize a natural language processing (NLP) model.

In the exercise program DB 610 according to the present disclosure, a plurality of different exercise motion contents 611 to 613 related to each of various body parts (or pain areas) of a person may be stored.

As described above, "exercise motion content" may include various information such as a name of a specific exercise motion, exercise time information, exercise difficulty information, exercise type information, exercise area information, exercise posture information, and exercise equipment information.

In this case, a preset attribute value may be labeled (or tagged) on each piece of information (e.g., a name of a specific exercise motion, exercise time information, exercise difficulty information, exercise type information, exercise area information, exercise posture information, and exercise equipment information) included in the plurality of exercise motion contents 611 to 613 stored in the exercise program DB 610.

For example, based on exercise type information matched to the plurality of exercise motion contents 611 to 613 stored in the exercise program DB 610, a first type attribute value (e.g., "1") may be labeled on exercise motion content of the "warm-up exercise" exercise type, and a second type attribute value (e.g., "2") may be labeled on exercise motion content of the "main exercise" exercise type.

As another example, exercise difficulty information included in the plurality of exercise motion contents 611 to 613 stored in the exercise program DB 610 may be labeled with a preset attribute value based on the exercise type matched to the exercise motion content.

Specifically, at least one of a first difficulty attribute value (e.g., "1"), a second difficulty attribute value (e.g., "2"), and a third difficulty attribute value may be labeled as the difficulty attribute value for exercise motion content matched to the "warm-up exercise" exercise type.

On the other hand, at least one of a first difficulty attribute value (e.g., "1"), a second difficulty attribute value (e.g., "2"), a third difficulty attribute value, a fourth difficulty attribute value (e.g., "4"), and a fifth difficulty attribute value (e.g., "5") may be labeled as the difficulty attribute value for exercise motion content matched to the "main exercise" exercise type.

The description of the attribute values described above is merely one embodiment, and the attribute values labeled on information constituting the exercise motion content are not limited to the described examples and may be variously set.

Furthermore, the large language model 140 may extract an attribute value of each of a plurality of pieces of information included in the exercise motion content in order to extract at least one exercise motion content to be included in the exercise program.

The large language model 140 may receive attribute values corresponding to each of the extracted plurality of pieces of information and extract exercise motion content including information corresponding to the extracted attribute values from the exercise program DB 610.

The controller 130 may extract a plurality of different exercise motion contents from the exercise program DB 610 using the large language model 140, and generate at least one exercise module based on the exercise type matched to each of the extracted plurality of exercise motion contents.

For example, the controller 130 may specify exercise motion content related to a pain area of the user based on information on the pain area of the user included in the prompt 520 among a plurality of different exercise motion contents 611 to 613 from the exercise program DB 610.

In addition, the controller 130 may specify exercise motion content related to a body part for which the joint range of motion of the user satisfies a preset condition, based on a motion analysis evaluation result of the user included in the prompt 520 among a plurality of different exercise motion contents 611 to 613 from the exercise program DB 610.

Furthermore, the controller 130 may generate a plurality of different exercise modules based on the exercise type matched to each of the specified exercise motion contents.

For example, the controller 130 may generate an exercise module such that exercise motion contents of the "warm-up exercise" exercise type among the specified exercise motion contents (e.g., "bilateral hip flexion 1 621", "right hip external rotation 1 622") are included in the warm-up exercise module 620.

As another example, the controller 130 may generate an exercise module such that exercise motion contents of the "main exercise" exercise type among the specified exercise motion contents (e.g., "straight leg raise 1 631", "straight leg raise 2 632") are included in the main exercise module 630.

In this case, the controller 130 may generate an exercise program 600 composed in the order of the warm-up exercise module 620, the main exercise module 630, and the cool-down exercise module 640 using the large language model 140.

Furthermore, the large language model 140 may generate an exercise program that allows the user to continuously perform exercise motions of the same posture based on exercise posture information included in the exercise motion content, in order to ensure continuity of motion postures within a specific exercise module.

Specifically, the large language model 140 may extract a plurality of exercise motion contents including the same exercise posture information and generate an exercise program in which the plurality of exercise motion contents are consecutively arranged by a preset number (e.g., 3).

Meanwhile, the controller 130 may generate an exercise program including exercise motion content that can be performed using exercise equipment 650 possessed by the user, using the large language model 140.

Specifically, the large language model 140 may extract at least one exercise motion content including specific exercise equipment information using response data of the user for a question related to exercise equipment from the questionnaire response data included in the prompt 520.

For example, the large language model 140 may extract at least one exercise motion content including exercise equipment information corresponding to a "foam roller" and a

"stretching band" based on the user's response in the questionnaire response data indicating that the user has a "foam roller" and a "stretching band."

Furthermore, the large language model 140 may generate an exercise program including the extracted at least one exercise motion content.

Furthermore, the controller 130 may set a difficulty level 660 of the exercise program based on at least one of the questionnaire response data and the evaluation result of the exercise performance capability.

Here, the "difficulty level 660 of the exercise program" may refer to an intensity level for the exercise program provided in relation to the indication of the user.

In this case, the difficulty level 660 of the exercise program according to the present disclosure may be set to any one of a plurality of preset levels (e.g., level A to level F).

As one example, in the difficulty level 660 of the exercise program, "level A" may refer to the lowest intensity, and "level F" may refer to the highest intensity.

More specifically, in each of the plurality of levels according to the present disclosure, the difficulty of exercise motion content constituting each of the warm-up exercise module, the main exercise module, and the cool-down exercise module may be set and present.

For example, when the difficulty level 660 of the exercise program is set to "level C," the warm-up exercise module and the cool-down exercise module may include exercise motion content including difficulty information of at least one of "1," "2," and "3" as the difficulty of the exercise motion content.

On the other hand, the main exercise module may include exercise motion content including difficulty information of at least one of "2" and "3" as the difficulty of the exercise motion content.

In this way, in each of the plurality of levels (e.g., level A to level F) according to the present disclosure, the difficulty of exercise motion content constituting each of the warm-up exercise module, the main exercise module, and the cool-down exercise module may be set and present.

In the present disclosure, the difficulty of exercise motion content included in different exercise modules according to the difficulty level set in the exercise program is not limited to the described examples and may be variously set.

Furthermore, the large language model 140 may generate the exercise program 600 such that each of the different exercise modules includes exercise motion content satisfying a preset difficulty condition, based on the difficulty level 660 set in the exercise program.

Here, the "preset difficulty condition" may refer to a condition that is satisfied when the difficulty of at least one exercise motion content included in a specific exercise module corresponds to the difficulty of exercise motion content according to the difficulty level set in the exercise program.

Meanwhile, the controller 130 may generate an exercise program corresponding to the preset total exercise time, based on a total exercise time 670 preset in advance in the medical staff terminal 20, using the large language model 140.

More specifically, the large language model 140 may cause a plurality of exercise motion contents to be included in different exercise modules so as to correspond to the preset total exercise time, based on exercise time information included in the exercise motion content.

As one example, when the total exercise time preset in the medical staff terminal 20 is "20 minutes," the controller 130 may set an exercise time of 5 minutes for each of the warm-up exercise module and the cool-down exercise module, and set an exercise time of 10 minutes for the main exercise module.

Furthermore, the large language model 140 may combine a plurality of exercise motion contents to satisfy the exercise time set for each exercise module, and generate an exercise program reflecting the preset total exercise time 670 in the exercise program.

In the present disclosure, a process of transmitting a review request for the exercise program generated through the large language model to the medical staff terminal may proceed (S260, see FIG. 2).

As shown in FIG. 7, the controller 130 may transmit a review request 710 for the generated exercise program 600 to the medical staff terminal 20 for approval of the medical staff for the generated exercise program 600.

Here, the "review request" may refer to a request to perform one of approval and modification for the generated exercise program.

The controller 130 may provide a service page 1000 associated with the review request 710 to the medical staff terminal 20 in order to receive feedback of the medical staff on the review request 710.

Furthermore, the controller 130 may display information 720 associated with the exercise program on the service page 1000.

Here, the "information 720 associated with the exercise program" may include an exercise module list for the plurality of exercise modules constituting the exercise program.

In this case, the exercise module list (not shown) may include at least one of at least one exercise motion content included in each of the plurality of exercise modules and a review icon indicating whether the medical staff has reviewed each of the plurality of exercise modules.

In this case, the medical staff may input the medical staff feedback 730 through the service page 1000 provided to the medical staff terminal 20.

Although the information 720 associated with the exercise program and the feedback 730 of the medical staff shown in FIG. 7 are expressed in text, this may be understood as merely one embodiment.

That is, the representation is not limited to that of FIG. 7, and the information 720 associated with the exercise program and the feedback 730 of the medical staff may be provided in other formats (e.g., tables, images, lists, etc.).

The information 720 associated with the exercise program and the feedback 730 of the medical staff will be described in more detail below with reference to related drawings.

In the present disclosure, a process of receiving feedback on the exercise program from the medical staff terminal in response to the review request may proceed (S270, see FIG. 2).

The controller 130 may receive the feedback 730 of the medical staff on the exercise program through the service page 1000.

Here, the feedback may be at least one of a first feedback approving the exercise program and a second feedback requesting modification of the exercise program.

Specifically, the controller 130 may approve the exercise program according to the review request provided to the medical staff terminal 20, based on an approval event for the exercise program having occurred.

Specifically, an "approval event" according to the present disclosure may be generated by the first feedback of the medical staff on the exercise program at the medical staff terminal 20 of the medical staff (D).

Here, the "first feedback" may include at least one of a first approval input meaning a user input for an approval icon provided on the service page associated with the review request

provided to the medical staff terminal 20, and a second approval input based on natural language text input to the large language model 140.

In this case, the "user input" may refer to a selection input for a specific icon displayed on the service page.

For example, the "user input" may be performed in at least one of the following ways: Tap, Double Tap, Long Press, Click, Swipe, Drag, Pinch In, Pinch Out, and Rotate.

The controller 130 may specify the generated exercise program based on the occurrence of the approval event, and provide the specified exercise program to the user terminal 10 as a final exercise program 740.

The specifying and providing of the exercise program according to the present disclosure will be described in detail below with reference to related drawings.

Meanwhile, the controller 130 may modify the exercise program according to the review request provided to the medical staff terminal 20, based on a modification event for the exercise program having occurred.

Specifically, a "modification event" according to the present disclosure may be generated by the second feedback of the medical staff on the exercise program at the medical staff terminal 20 of the medical staff (D).

Here, the "second feedback" may include at least one of a first modification input meaning a user input for a modification icon provided on the service page associated with the review request provided to the medical staff terminal 20, and a second modification input based on natural language text corresponding to a medical staff query input to the large language model 140.

Furthermore, the controller 130 may perform modification (or review) of the generated exercise program based on the large language model 140, based on the occurrence of the modification event.

As shown in FIG. 8a, the controller 130 may perform modification (or review) of the exercise program through the service page associated with the review request for the exercise program, using the large language model 140.

Specifically, the large language model 140 may perform a question-and-answer with the medical staff based on questionnaire response data 510 including at least one of patient history data 810 stored in the database 200, selection-type questionnaire response data 511, and

interactive questionnaire response data 512, and an evaluation result of the exercise performance capability 450.

Here, the "patient history data 810" may include various history information related to the indication of the user, such as i) name, ii) date of birth, iii) type of indication of the user, iv) exercise history, v) past medical history, vi) prescription information, vii) response data history information for the questionnaire, and viii) exercise prognosis information, for a plurality of different users (or patients).

The controller 130 may receive medical staff queries 821, 823 requesting modification (or review) of the exercise program on the service page provided to the medical staff terminal 20.

Furthermore, the controller 130 may generate a prompt corresponding to the medical staff query 821 using the prompt generator 131, and process the generated prompt as an input to the large language model 140 to generate a response to the medical staff query 821.

The controller 130 may provide a response to the generated medical staff query 821 on the service page provided to the medical staff terminal 20 to perform a question-and-answer with the medical staff.

In the present disclosure, a process of specifying the exercise program based on the feedback may proceed (S280, see FIG. 2).

And, in the present disclosure, a process of providing the specified exercise program to the user terminal may proceed (S290, see FIG. 2).

As described above, the controller 130 may receive, from the medical staff terminal 20, at least one of a first feedback approving the exercise program and a second feedback requesting modification of the exercise program, in response to the review request for the exercise program.

In this case, the controller 130 may perform different data processing processes for the exercise program according to the feedback received from the medical staff terminal 20.

Specifically, the different data processing processes may include at least one of a first process of specifying the generated exercise program based on receiving the first feedback from the medical staff terminal and providing the specified exercise program to the user terminal, and a second process of modifying the exercise program based on receiving the second feedback from the medical staff terminal.

As described above, the controller 130 may specify the exercise program as a final exercise program according to the first process, based on an approval event generated from receiving the first feedback from the medical staff terminal 20.

Furthermore, the controller 130 may provide the specified exercise program to the user terminal 10.

Meanwhile, the controller 130 may modify the exercise program according to the second process, based on a modification event generated from receiving the second feedback from the medical staff terminal 20.

For example, in the second process, a medical staff query related to at least one specific exercise module among the plurality of exercise modules constituting the exercise program may be received from the medical staff terminal 20 through the service page associated with the review request.

As shown in FIG. 8a, the controller 130 may receive a medical staff query 823 corresponding to the second feedback from the medical staff terminal 20 for modification of the exercise program.

As one example, the controller 130 may receive a medical staff query requesting modification of the exercise program from the medical staff terminal 20, such as a medical staff query requesting addition of specific exercise motion content to the warm-up exercise module and a medical staff query requesting modification of the difficulty of the main exercise module.

The controller 130 may process information on the specific exercise module for which the medical staff query 823 has been received and the medical staff query 823 as input to the large language model 140 to obtain a response of the large language model 140 related to the specific exercise module.

Furthermore, the controller 130 may modify the specific exercise module using the response of the large language model related to the specific exercise module.

As shown in (a) and (b) of FIG. 8b, the controller 130 may display information associated with the exercise program on the service page related to the review request.

Here, the "information associated with the exercise program" may include an exercise module list 831 for the plurality of exercise modules constituting the exercise program.

In this case, the exercise module list 831 may include at least one of at least one exercise motion content included in each of the plurality of exercise modules 620 to 640 and a review

icon 832, 833 indicating whether the medical staff has reviewed each of the plurality of exercise modules.

Specifically, the controller 130 may provide at least one candidate exercise motion content 841 to 843 associated with the specific exercise module 840 that is subject to modification to the medical staff terminal 20, based on a medical staff query 834 related to the specific exercise module 840.

Furthermore, the controller 130 may specify, from the medical staff terminal 20, a specific candidate exercise motion content 842, 843 to replace a specific exercise motion content included in the specific exercise module 840 among the at least one candidate exercise motion content 841 to 843.

For example, the controller 130 may specify the specific candidate exercise motion content 842, 843 based on a user input 850 for a motion change icon 844 displayed on the service page being input from the medical staff terminal 20.

The controller 130 may receive a selection signal for the user input 850 and update the prompt to be input to the large language model 140.

Specifically, the prompt generator 131 may generate, in response to the selection signal, an updated prompt such that the specific candidate exercise motion content 842, 843 is included in the specific exercise module 840 in the prompt.

Furthermore, the controller 130 may change the specific exercise motion content included in the specific exercise module 840 to the specific candidate exercise motion content 842, 843.

Specifically, the controller 130 may process the updated prompt as an input to the large language model 140 to generate a modified exercise program through the large language model 140.

Meanwhile, the controller 130 may propose modification of specific exercise motion content that uses exercise equipment not possessed by the user, based on exercise equipment information included in the questionnaire response data received from the medical staff terminal 20.

As shown in FIG. 8c, the controller 130 may provide an exercise equipment list 650 among the information associated with the exercise program provided on the service page to the medical staff terminal 20 using the questionnaire response data.

In this case, the exercise equipment list 650 may include a plurality of exercise equipment 651 to 653 required for performing exercise motion content included in the exercise program.

In addition, the exercise equipment list 650 may include possession icons 861, 862 indicating whether the user possesses each of the plurality of exercise equipment.

The controller 130 may receive a medical staff query 863 requesting modification of exercise motion content that requires exercise equipment not possessed by the user among the plurality of exercise equipment.

As described above, the controller 130 may update the prompt using the medical staff query received from the medical staff terminal and process the updated prompt as an input to the large language model 140.

Furthermore, the controller 130 may output, to the medical staff terminal 20, a plurality of candidate exercise motion content 871 to 873 corresponding to a response to the medical staff query 863 using the large language model 140.

Furthermore, the controller 130 may specify, from the medical staff terminal 20, a specific candidate exercise motion content 872, 873 to replace a specific exercise motion content that requires exercise equipment not possessed by the user among the plurality of candidate exercise motion content 871 to 873.

For example, the controller 130 may specify the specific candidate exercise motion content 872, 873 based on a user input 880 for a motion change icon 874 displayed on the service page being input from the medical staff terminal 20.

The controller 130 may receive a selection signal for the user input 880 and update the prompt to be input to the large language model 140.

Specifically, the prompt generator 131 may generate, in response to the selection signal, an updated prompt such that the specific candidate exercise motion content 872, 873 in the prompt is replaced with the specific exercise motion content that requires exercise equipment not possessed by the user.

Furthermore, the controller 130 may change the specific exercise motion content that requires exercise equipment not possessed by the user to the specific candidate exercise motion content 872, 873.

Specifically, the controller 130 may process the updated prompt as an input to the large language model 140 to generate a modified exercise program through the large language model 140.

Furthermore, the controller 130 may perform a modification request according to the medical staff query using the large language model and provide the modified exercise program to the user terminal 10.

Specifically, the controller 130 may specify the modified exercise program, provide it to the medical staff terminal 20, and specify the modified exercise program as the final exercise program.

As shown in FIG. 9a, the controller 130 may provide a response 911 to the result of the modification request to the medical staff terminal 20.

Furthermore, the controller 130 may receive a medical staff query 912 requesting generation of the modified exercise program.

The controller 130 may specify the exercise program modified through the large language model 140 as the final exercise program.

As shown in FIG. 9b, the controller 130 may provide information associated with the final exercise program 900 to the medical staff terminal 20.

Specifically, the controller 130 may provide a plurality of exercise modules 920, 930, 940, 950 constituting the final exercise program 900 to the medical staff terminal 20.

In this case, each of the plurality of exercise modules 920, 930, 940, 950 may include modified exercise motion content 921, 922, 931, 932 based on the medical staff query.

Furthermore, the controller 130 may provide a final exercise program 900 including at least one of a difficulty level 960 and total exercise time information 970 of the final exercise program, based on the modified exercise motion content 921, 922, 931, 932.

Furthermore, the controller 130 may perform either the first process or the second process for at least one of the approval icon 981 and the modification icon 982 provided on the service page associated with the review request, according to a user input applied to the medical staff terminal 20.

For example, in response to a user input 990 for the approval icon 981 for the final exercise program 900 provided on the service page being input from the medical staff terminal

20, the controller 130 may specify the modified exercise program as the final exercise program according to the first process.

Furthermore, the controller 130 may provide the specified exercise program to the user terminal 10.

The method and system for providing an exercise program using a large language model according to the present disclosure may generate a user-customized exercise program using response data for the questionnaire provided to the user terminal and the evaluation result of the exercise performance capability of the user.

Through this, the present disclosure may generate an exercise program with a difficulty level that takes into account the current condition of the user, thereby maximizing the rehabilitation effect for the indication of the user.

Furthermore, the method and system for providing an exercise program using a large language model according to the present disclosure may provide an exercise program with guaranteed expertise and stability by reflecting the feedback of the medical staff on the modules constituting the exercise program using the large language model.

Furthermore, the method and system for providing an exercise program using a large language model according to the present disclosure may provide the generated exercise program to the user terminal based on the feedback of the medical staff.

Through this, a patient may receive rehabilitation treatment without directly visiting a hospital located at a long distance, thereby enabling easy access to rehabilitation treatment, and the medical staff may conveniently monitor the rehabilitation exercise of the patient through an electronic device and provide monitoring-based feedback to enhance the therapeutic effect of the exercise treatment of the patient.

Meanwhile, a computer-readable medium includes all types of recording devices in which data that can be read by a computer system is stored.

Examples of the computer-readable medium include a Hard Disk Drive (HDD), a Solid State Disk (SSD), a Silicon Disk Drive (SDD), a ROM, a RAM, a CD-ROM, a magnetic tape, a floppy disk, an optical data storage device, and the like.

Furthermore, the computer-readable medium may be a server or cloud storage that includes storage and that an electronic device can access through communication.

In this case, the computer may download the program according to the present disclosure from the server or cloud storage through wired or wireless communication.

Furthermore, in the present disclosure, the computer described above is an electronic device equipped with a processor, that is, a CPU (Central Processing Unit), and no particular limitation is placed on the type thereof.

Meanwhile, the detailed description above should not be construed as restrictive in all respects and should be considered as illustrative.

The scope of the present disclosure should be determined by reasonable interpretation of the appended claims, and all modifications within the equivalent scope of the present disclosure are included in the scope of the present disclosure.

【CLAIMS】

【CLAIM 1】

A method for providing an exercise program using a large language model, the method comprising:

providing at least one questionnaire related to an indication of a user to a user terminal;
receiving, from the user terminal, response data for the questionnaire;

evaluating an exercise performance capability of the user from exercise motion data received from the user terminal, using a pre-trained motion evaluation model;

generating a prompt to be input to a large language model, using at least one of the response data for the questionnaire and a result of the exercise performance capability evaluation;

inputting the prompt to the large language model to generate an exercise program related to the indication of the user through the large language model;

transmitting a review request for the exercise program generated through the large language model to a medical staff terminal;

receiving, in response to the review request, feedback on the exercise program from the medical staff terminal; specifying the exercise program based on the feedback; and

providing the specified exercise program to the user terminal.

【CLAIM 2】

The method of claim 1, wherein the exercise program is configured to include a plurality of exercise modules, and each of the plurality of exercise modules is matched to a different exercise type and includes at least one exercise motion content related to the exercise type matched to each of the exercise modules.

【CLAIM 3】

The method of claim 2, wherein the receiving of the feedback comprises: providing a service page associated with the review request to the medical staff terminal; displaying information associated with the exercise program on the service page; and receiving the feedback of the medical staff on the exercise program through the service page.

【CLAIM 4】

The method of claim 3, wherein the information associated with the exercise program includes an exercise module list for the plurality of exercise modules constituting the exercise program, and the exercise module list includes at least one of at least one exercise motion content included in each of the plurality of exercise modules and a review icon indicating whether the medical staff has reviewed each of the plurality of exercise modules.

【CLAIM 5】

The method of claim 3, wherein the feedback is at least one of a first feedback approving the exercise program and a second feedback requesting modification of the exercise program.

【CLAIM 6】

The method of claim 5, wherein specifying the exercise program comprises performing different data processing processes for the exercise program according to the feedback received from the medical staff terminal, and the different data processing processes comprise at least one of a first process of specifying the generated exercise program based on receiving the first feedback from the medical staff terminal and providing the specified exercise program to the user terminal, and a second process of modifying the exercise program based on receiving the second feedback from the medical staff terminal.

【CLAIM 7】

The method of claim 6, wherein in the second process, the method comprises:
receiving, through the service page, a medical staff query related to at least one specific exercise module among the plurality of exercise modules constituting the exercise program from the medical staff terminal;

processing information on the specific exercise module for which the medical staff query has been received and the medical staff query as input to the large language model to obtain a response of the large language model related to the specific exercise module; and

modifying the specific exercise module using the response of the large language model related to the specific exercise module.

【CLAIM 8】

The method of claim 7, wherein the modifying the specific exercise module comprises:

providing, based on the medical staff query related to the specific exercise module, at least one candidate exercise motion content associated with the specific exercise module that is subject to modification to the medical staff terminal;

specifying, from the medical staff terminal, a specific candidate exercise motion content to replace a specific exercise motion content included in the specific exercise module among the at least one candidate exercise motion content; and

changing the specific exercise motion content included in the specific exercise module to the specific candidate exercise motion content.

【CLAIM 9】

The method of claim 2, wherein the different exercise types are at least one of a warm-up exercise type, a main exercise type, and a cool-down exercise type.

【CLAIM 10】

The method of claim 1, wherein the at least one questionnaire includes at least one of a selection-type questionnaire consisting of a question related to the indication of the user and a plurality of selection items corresponding to each of a plurality of different responses to the question, and an interactive questionnaire capable of receiving a natural language input from the user terminal in relation to the indication of the user.

【CLAIM 11】

The method of claim 10, wherein the receiving of the response data for the questionnaire comprises:

receiving, from the user terminal, the selection-type questionnaire response data including a response matched to an item selected by a user input among the plurality of selection items; and

receiving the interactive questionnaire response data from the large language model by processing the natural language input entered in the interactive questionnaire as an input to the large language model.

【CLAIM 12】

The method of claim 1, wherein the evaluating of the exercise performance capability of the user comprises:

receiving the exercise motion data for a specific posture of the user captured by a camera provided in the user terminal; and

analyzing at least one of a static posture, a joint range of motion, a balance capability, and a core muscle strength of the user using the pre-trained motion evaluation model.

【CLAIM 13】

The method of claim 12, wherein the generating of the prompt to be input to the large language model comprises:

specifying a body part for which the joint range of motion of the user satisfies a preset condition; and

generating the prompt such that exercise motion content related to the specified body part is included in the exercise program.

【CLAIM 14】

A system for providing an exercise program using a large language model, the system comprising:

a controller configured to provide at least one questionnaire related to an indication of a user to a user terminal; and

a communication unit configured to receive, from the user terminal, response data for the questionnaire,

wherein the controller evaluates an exercise performance capability of the user from exercise motion data received from the user terminal using a pre-trained motion evaluation model,

generates a prompt to be input to a large language model using at least one of the response data for the questionnaire and a result of the exercise performance capability evaluation,

inputs the prompt to the large language model to generate an exercise program related to the indication of the user,

transmits a review request for the exercise program generated through the large language model to a medical staff terminal,

receives, in response to the review request, feedback on the exercise program from the medical staff terminal, specifies the exercise program based on the feedback, and

provides the specified exercise program to the user terminal.

【CLAIM 15】

A program executed by one or more processors in an electronic device and stored in a computer-readable recording medium, the program comprising instructions for performing:

providing at least one questionnaire related to an indication of a user to a user terminal;
receiving, from the user terminal, response data for the questionnaire;

evaluating an exercise performance capability of the user from exercise motion data received from the user terminal, using a pre-trained motion evaluation model;

generating a prompt to be input to a large language model, using at least one of the response data for the questionnaire and a result of the exercise performance capability evaluation;

inputting the prompt to the large language model to generate an exercise program related to the indication of the user through the large language model;

transmitting a review request for the exercise program generated through the large language model to a medical staff terminal;

receiving, in response to the review request, feedback on the exercise program from the medical staff terminal; specifying the exercise program based on the feedback; and

providing the specified exercise program to the user terminal.