

【SPECIFICATION】

【TITLE】

METHOD AND SYSTEM FOR PROVIDING COGNITIVE BEHAVIORAL THERAPY PROGRAM BASED ON LARGE LANGUAGE MODEL

【TECHNICAL FIELD】

The present disclosure relates to a method and system for providing a cognitive behavioral therapy (CBT) program based on a large language model.

【BACKGROUND】

With the rapid advancement of artificial intelligence (AI) technology in recent years, generative artificial intelligence models capable of natural conversation with humans (e.g., ChatGPT) have emerged.

In particular, a large language model (LLM), unlike conventional chatbot systems, provides human-like conversation quality based on the ability to understand diverse contexts and generate natural language, and is being rapidly introduced across various industries such as healthcare, education, and finance.

In particular, with the advancement of artificial intelligence technology, the utilization of artificial intelligence (AI) technology in the medical industry is rapidly expanding.

For example, there is growing interest in artificial intelligence technology that uses a large language model to provide a customized cognitive behavioral therapy program in a non-face-to-face manner to patients in need of cognitive behavioral therapy.

Cognitive behavioral therapy (CBT) may be understood as a psychotherapy method in which, under the premise that a person's thoughts, emotions, and behaviors are closely interconnected, the patient recognizes emotions and identifies distorted thoughts during the course of treatment, thereby changing problematic behaviors.

Recently, as the effectiveness of cognitive behavioral therapy has been scientifically proven, the number of cases utilizing cognitive behavioral therapy for mental health problems such as depression, anxiety, insomnia, and pain has been gradually increasing, and research on methods for providing cognitive behavioral therapy to patients is being actively conducted.

However, cognitive behavioral therapy requires continuous treatment, and the fact that patients must frequently visit hospitals for treatment serves as a significant burden.

Accordingly, interest in artificial intelligence technology that provides customized cognitive behavioral therapy programs in a non-face-to-face manner to patients who need cognitive behavioral therapy is further increasing.

In such non-face-to-face cognitive behavioral therapy, it is essential to provide a customized cognitive behavioral therapy program by taking into account the current condition of the user.

If a therapy program is uniformly provided without considering the user's current condition and past medical history, it may result in impeding the therapeutic effect or even worsening the symptoms.

In addition, users are more likely to disengage early due to an inability to immerse themselves in content unrelated to their condition, which may significantly reduce the therapy continuation rate and overall therapy satisfaction.

There is a need to resolve these problems of non-face-to-face cognitive behavioral therapy and to provide a customized cognitive behavioral therapy program.

【BRIEF SUMMARY】

The present disclosure is intended to provide a method and system capable of providing a customized cognitive behavioral therapy program.

Specifically, the present disclosure is intended to provide a method and system for providing a large language model-based cognitive behavioral therapy program that can generate feedback for response data for a survey provided to a user terminal by using a large language model, and update the cognitive behavioral therapy program based on the generated feedback.

More specifically, the present disclosure is intended to provide a method and system for providing a large language model-based cognitive behavioral therapy program capable of generating a plurality of prompts corresponding to different emotion types through emotion classification of natural language response data included in survey response data, and generating feedback of different emotion types based on the plurality of prompts.

Furthermore, the present disclosure is intended to provide a method and system for providing a large language model-based cognitive behavioral therapy program capable of

generating update information for updating a cognitive behavioral therapy program by using a large language model according to feedback of different emotion types.

Furthermore, the present disclosure is intended to provide a method and system for providing a large language model-based cognitive behavioral therapy program capable of predicting an emotional state of a user by using user information and response data for a survey, and providing notification information related to the predicted emotional state to a user terminal.

In order to solve the problems discussed above, the present disclosure proposes a method for providing a user-customized cognitive behavioral therapy program capable of interacting with a user in a non-face-to-face manner and performing cognitive behavioral therapy for the user by using a large language model.

A method for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may comprise providing at least one survey related to cognitive behavioral therapy to a user terminal, generating a prompt to be input to a large language model by using response data for the survey received from the user terminal, generating feedback related to a therapy program for the cognitive behavioral therapy based on natural language response data included in the response data by inputting the prompt to the large language model, updating the prompt based on the generated feedback, inputting the updated prompt to the large language model, and updating the therapy program through the large language model, and providing the updated therapy program to the user terminal.

Additionally, the generating of the prompt may comprise extracting a plurality of natural language response data from the response data for the survey, analyzing an emotion type corresponding to each of the plurality of natural language response data and grouping natural language response data corresponding to the same emotion type among the plurality of natural language response data, and generating a plurality of different prompts to be input to the large language model based on each of a plurality of natural language response data groups corresponding to different emotion types.

Furthermore, the plurality of natural language response data groups may comprise at least one of a first type natural language response data group comprising at least one natural language response data corresponding to a first emotion type among the plurality of natural language response data and at least one second type natural language response data group comprising at

least one natural language response data corresponding to a second emotion type among the plurality of natural language response data.

Moreover, the generating of the plurality of different prompts may comprise generating a plurality of prompts corresponding to each of the plurality of natural language response data groups corresponding to the different emotion types, and the plurality of prompts may comprise at least one of a first type prompt related to the first type natural language response data group and a second type prompt related to the second type natural language response data group.

Furthermore, a plurality of therapy programs respectively matched to different topics may be stored in a database, a plurality of therapy contents constituting a specific therapy program associated with the cognitive behavioral therapy of the user, among the plurality of therapy programs, may be sequentially provided to the user terminal according to a therapy week set for the specific therapy program, and the generating of the feedback may comprise inputting at least one of the first type prompt and the second type prompt to the large language model to generate the feedback for the specific therapy program through the large language model.

Additionally, the feedback may comprise at least one of a first type feedback corresponding to the first type prompt and a second type feedback corresponding to the second type prompt, and each of the first type feedback and the second type feedback may comprise different types of update information for the specific therapy program.

Moreover, the updating of the therapy program may comprise updating information related to at least one of a specific topic matched to the specific therapy program, a configuration of each of a plurality of therapy contents included in the specific therapy program, and a therapy week at which each of the plurality of therapy contents is provided, based on the different types of update information for the specific therapy program.

Furthermore, the at least one survey may comprise at least one of a multiple-choice survey comprising at least one multiple-choice query item related to the cognitive behavioral therapy and a plurality of selection items corresponding to the multiple-choice query item, and an open-ended survey capable of receiving a natural language input for at least one open-ended query item from the user terminal in relation to the cognitive behavioral therapy.

Furthermore, the response data may comprise at least one of multiple-choice survey response data for the multiple-choice survey and open-ended survey response data for the open-ended survey, the multiple-choice survey response data may comprise the natural language

response data corresponding to a specific selection item selected by a user input among the plurality of selection items, and the open-ended survey response data may comprise the natural language response data corresponding to at least one of the natural language input for the open-ended query item and a natural language answer obtained through the large language model by processing the natural language input as an input to the large language model.

Additionally, the method may further comprise predicting an emotion pattern of a user subject to cognitive behavioral therapy by using the large language model and providing notification information comprising prediction information corresponding to the emotion pattern to the user terminal according to the predicted emotion pattern, wherein the predicting of the emotion pattern of the user may comprise generating a prediction prompt for predicting the emotion pattern by using at least one of the response data for the survey, the feedback, and user information collected from a database, and generating the prediction information of a type corresponding to the emotion pattern through the large language model by processing the prediction prompt as an input to the large language model.

Meanwhile, the system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may comprise a communication unit configured to provide at least one survey related to cognitive behavioral therapy to a user terminal and a control unit configured to generate a prompt to be input to a large language model by using response data for the survey received from the user terminal, wherein the control unit inputs the prompt to the large language model to generate feedback related to a therapy program for the cognitive behavioral therapy based on natural language response data included in the response data, updates the prompt based on the generated feedback and inputs the updated prompt to the large language model, updates the therapy program through the large language model, and provides the updated therapy program to the user terminal.

Meanwhile, a program executed by one or more processes in an electronic device and stored in a computer-readable recording medium may comprise instructions for performing: providing at least one survey related to cognitive behavioral therapy to a user terminal; generating a prompt to be input to a large language model by using response data for the survey received from the user terminal; generating feedback related to a therapy program for the cognitive behavioral therapy based on natural language response data included in the response data by inputting the prompt to the large language model; updating the prompt based on the

generated feedback, inputting the updated prompt to the large language model, and updating the therapy program through the large language model; and providing the updated therapy program to the user terminal.

The method and system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may improve the efficiency of cognitive behavioral therapy and the user's level of engagement by providing a user-customized cognitive behavioral therapy program based on response data for the user's survey and user information.

Moreover, the method and system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may dynamically adjust the therapy program by being sensitively responsive to changes in the user's condition by updating the therapy program provided to the user based on feedback according to the user's current condition, thereby ensuring the continuity of long-term therapy.

Furthermore, the method and system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may enable an early intervention and prevention-oriented therapeutic approach to cognitive behavioral therapy by predicting a user's emotional state in advance and proactively providing notification information based on the predicted emotional state.

The technical solution of the present disclosure addresses a specific technical problem in the field of computer-implemented cognitive behavioral therapy: existing systems are incapable of automatically classifying emotion types from natural language response data and generating differentiated, emotion-type-specific prompts for input to a large language model in real time. The present disclosure provides a concrete, technical improvement to such computer-implemented systems by enabling a processor-implemented system to: (1) extract and classify natural language response data by emotion type, (2) generate a plurality of distinct prompts corresponding to different emotion types, (3) produce differentiated feedback via the large language model, and (4) dynamically restructure therapy program content and delivery schedule based on the differentiated feedback. These steps represent a technical improvement to CBT delivery systems implemented in computer technology, not merely the application of an abstract idea.

【BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS】

FIG. 1 is a conceptual diagram for explaining a system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure.

FIG. 2 is a flowchart for generally explaining a method for providing a large language model-based cognitive behavioral therapy program according to the present disclosure.

FIGS. 3A and 3B are conceptual diagrams for specifically explaining a survey provided to a user terminal according to the present disclosure.

FIG. 4A is a conceptual diagram for explaining a process of extracting natural language response data from response data for a survey according to the present disclosure.

FIG. 4B is a conceptual diagram for explaining a process of generating a natural language response data group based on an emotion type corresponding to natural language response data according to the present disclosure.

FIG. 4C is a conceptual diagram for explaining a process of generating a prompt to be input to a large language model by using natural language response data and user information according to the present disclosure.

FIG. 5A is a conceptual diagram for explaining a cognitive behavioral therapy program according to the present disclosure.

FIG. 5B is a conceptual diagram for explaining a process of generating feedback related to cognitive behavioral therapy by using a large language model according to the present disclosure.

FIGS. 6A and 6B are conceptual diagrams for explaining a process of updating a cognitive behavioral therapy program based on feedback according to the present disclosure and providing the updated therapy program to a user terminal.

FIG. 7 is a conceptual diagram for explaining a process of predicting an emotion pattern of a user according to the present disclosure and providing notification information corresponding to the predicted emotion pattern to a user terminal.

【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 drafting the specification only, and do not have meanings or roles that are distinguished from each other by themselves.

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 ideas disclosed in the present specification are 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 comprising 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 may be directly connected or coupled to the other component, but it should be understood that 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 a cognitive behavioral therapy program for a user based on a large language model.

More specifically, the present disclosure relates to a method and system capable of generating feedback according to a current state of a user and updating a cognitive behavioral therapy program based on the generated feedback.

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

As used herein, "large language model" (LLM) refers to an artificial intelligence model trained on large-scale datasets to understand and generate natural language. The term "large language model" may also be referred to as "language model," "generative AI model," "foundation model," "neural language model," or "LLM," and all such expressions are intended to refer to the same concept as "large language model" as used herein.

As used herein, "therapy program" refers to a user-customized cognitive behavioral therapy program comprising at least one therapy content provided to a user terminal. The term "therapy program" may also be referred to as "CBT program," "treatment program," "cognitive behavioral therapy program," "therapeutic program," or "personalized therapy program," and all such expressions are intended to refer to the same concept as "therapy program" as used herein.

As used herein, "emotion type" refers to a classification category assigned to natural language response data based on the affective or emotional content of the response. The term "emotion type" may also be referred to as "affective type," "sentiment type," "emotional category," "feeling type," or "emotional classification," and all such expressions are intended to refer to the same concept as "emotion type" as used herein.

"Cognitive Behavioral Therapy (CBT)" according to the present disclosure may refer to a psychotherapy method that, by understanding and regulating the interaction between thoughts (cognition) and behavior, enables patients themselves to recognize emotions, identify distorted thoughts, and change problematic behaviors during the course of treatment.

In the present disclosure, a survey related to cognitive behavioral therapy is provided, and a user-customized cognitive behavioral therapy program (hereinafter referred to as a "therapy program") may be generated by using response data for the survey.

Here, the survey according to the present disclosure may include questions related to cognitive behavioral therapy for checking at least one of a user's level of pain, degree of cognitive distortion, duration of pain, severity of pain, mood when experiencing pain, degree of negative emotions toward pain, degree of stress toward pain, physical health condition, and mental health condition.

Here, "level of pain" may be understood as a measure indicating the intensity or severity of pain experienced by an individual.

Pain is a subjective and personal experience, and the way each person feels and interprets pain may differ, and pain may involve physical discomfort, emotional discomfort, distress, and the like.

Various methods may be used to assess such a level of pain.

For example, a numeric scale (Numerical Rating Scale, NRS) may be provided to a patient to assess the intensity of pain felt by the patient (e.g., no pain, mild pain, severe pain, etc.).

Furthermore, the "pain patient" described in the present disclosure may refer to a patient who experiences pain associated with a medical indication, and in the present disclosure, a pain patient may be used interchangeably with "patient" or "user".

The therapy program according to the present disclosure may be configured to include at least one therapy content (or therapy module).

Here, "therapy content" may refer to content related to a detailed category (or sub-topic) for cognitive behavioral therapy on a specific topic.

Such therapy content may be understood as a structural unit of a therapy program matched to a specific topic.

For example, "therapy content" may include worksheets, educational materials, assignments, activities, and the like, each composed of at least one of text, audio, image, and video related to a specific topic.

Additionally, a plurality of therapy contents constituting a therapy program may be sequentially provided to the user terminal according to a therapy week (or treatment week) preset in the therapy program.

The "therapy week" described in the present disclosure may be understood as an order (or period) in which therapy content is provided (or activated) through the user terminal 10 so that a user performs cognitive behavioral therapy according to the therapy program.

In the present disclosure, a "total number" of therapy weeks and a "treatment period per week" corresponding to each therapy week may be preset and exist in advance.

And, in the present disclosure, it may be understood that a "total treatment period" is predefined.

The total treatment period may be determined by a product of a preset total number and a preset treatment period per week.

For example, if the total number is "8" and the treatment period per week is one week (7 days), the preset total treatment period may be "8 weeks".

In the present disclosure, a large language model may be used to generate feedback based on response data for a survey provided to the user terminal 10, and the therapy program may be updated based on the feedback.

For example, in the present disclosure, information related to at least one of a topic matched to the therapy program, a configuration of each of a plurality of therapy contents included in the therapy program, and a therapy week at which each of the plurality of therapy contents is provided may be updated.

More specifically, in the present disclosure, the emotion type of the response data may be classified (or analyzed) to generate different types of feedback, and the therapy program may be updated based on the emotion type corresponding to the feedback.

Moreover, it may be provided to the user terminal so that the therapy program updated according to the current emotional state of the user may be provided to the user terminal.

In addition, in the present disclosure, by analyzing natural language response data comprising survey response data received from the user terminal, an emotion pattern of the user may be predicted, and notification information related to a warning, advice, or emotional support corresponding to the predicted emotion pattern may be generated.

Furthermore, in the present disclosure, by providing the generated notification information to the user terminal, the user may be supported to recognize his or her emotional and psychological state in advance and to actively take necessary measures.

In the present disclosure, for convenience of explanation, the description focuses on "cognitive behavioral therapy for pain patients due to musculoskeletal indications," but is not necessarily limited thereto.

Here, "indication" may be understood as a symptom or clinical situation requiring a specific treatment or examination, and may be understood as a user's indication or symptom.

Additionally, an indication may refer to a symptom related to a specific area of a physically impaired user.

As an example, the therapy program described in the present disclosure may relate to cognitive behavioral therapy of a user due to various indications (e.g., cancer, diabetes, hypertension, etc.).

In addition, in the present disclosure, a program necessary for mental health in daily life, rather than a therapy program for therapeutic purposes related to a user's indication, may also be generated.

In the foregoing, the method for providing a large language model-based cognitive behavioral therapy program according to the present disclosure has been described in general, and this may be implemented by the system for providing a large language model-based cognitive behavioral therapy program described below.

Hereinafter, the system for providing a large language model-based cognitive behavioral therapy program 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 a large language model-based cognitive behavioral therapy program according to the present disclosure.

As shown in FIG. 1, the system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure (hereinafter referred to as a "therapy program providing system", 100) may include at least one of a communication unit 110, a storage unit 120, and a control unit 130.

In this case, the therapy 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.

In addition, the therapy program providing system 100 according to the present disclosure may be configured as a device that performs learning and inference described in the present disclosure.

For example, the therapy program providing system 100 according to the present disclosure may be one or more machine learning model(s) trained on training data by one or more machine learning algorithms.

Moreover, in the therapy program providing system 100, the machine learning model(s) learned in the inference stage may receive input data comprising one or more inference/prediction requests.

In this case, the machine learning algorithm or machine learning model(s) according to the present disclosure may include a deep learning algorithm or model using a neural network.

Furthermore, the learned machine learning model(s) according to the present disclosure may provide one or more inferences and/or prediction(s) as output in response to an inference/prediction request.

Accordingly, the trained machine learning model(s) according to the present disclosure may include one or more models of one or more machine learning algorithms.

In one embodiment, the trained machine learning model(s) according to the present disclosure may use output inference(s) and/or prediction(s) as input feedback.

Furthermore, the trained machine learning model(s) may use past inferences as input for generating new inferences.

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

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

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

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

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

Meanwhile, the therapy program providing system may exist inside a server (hereinafter referred to as a "server") built to perform a specific purpose (e.g., a function related to providing a therapy program for cognitive behavioral therapy) separately from the user terminal, or may exist as a system separate from the server.

When the therapy program providing system 100 exists inside the server, various services related to the present disclosure (e.g., a therapy program for cognitive behavioral therapy, notification information for cognitive behavioral therapy, etc.) may be provided through at least one component located inside the server or configuration modules performing functions similar to those components.

In this case, the application may provide various services related to the present disclosure on the user terminal on which the application is installed through communication with the server.

In addition, the therapy program providing system 100 may interwork with a central server or an external server to implement the method for providing a cognitive behavioral therapy program according to the present disclosure and to provide the therapy program to the user terminal.

Meanwhile, a patient may diagnose his or her own level of pain and degree of cognitive distortion through an application or webpage provided by the therapy program providing system 100 according to the present disclosure, and may be provided with a therapy program according to his or her level of pain and degree of cognitive distortion.

In addition, by being provided with various services related to cognitive behavioral therapy (e.g., notification information for cognitive behavioral therapy), at least one of mental health and physical health conditions may be managed.

In this case, the patient may hold a user account registered in the therapy program providing system 100.

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

The "account" described above may be created through a page linked to the therapy program providing system 100 described above.

Alternatively, an "account" may also be created in at least one other system linked to the therapy program providing system 100.

Accordingly, in the present specification, without separately distinguishing the system in which the account was issued, all accounts based on the therapy program providing system 100 according to the present disclosure are referred to as "accounts previously registered in the therapy program providing system 100 according to the present disclosure."

In the present specification, for convenience of explanation, the description will be made in accordance with an embodiment in which the therapy program providing system 100 according to the present disclosure is implemented as an application on the user terminal 10.

In the present disclosure, the user terminal 10 may also be referred to as a "mobile terminal" or "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), navigation, a slate PC, a tablet PC, an ultrabook, a wearable device (e.g., a watch-type terminal (smartwatch), a glass-type terminal (smart glass), an HMD (head mounted display)), and the like.

More specifically, the user terminal 10 according to the present disclosure is 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 fact that the user terminal 10 on which the application according to the present disclosure is activated is a smart phone, the user terminal 10 may also refer to a smart TV connected to the smart phone.

That is, the user terminal 10 according to the present disclosure may refer to at least one of an electronic device owned by a user (or on which a user account is logged in), an electronic device owned by medical staff (or on which a medical staff account is logged in), and an electronic device used publicly.

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

When the therapy program providing system 100 exists inside the server, the therapy program providing system 100 according to the present disclosure may update the therapy program and provide the updated therapy program to the user terminal through at least one of the communication unit 110, the storage unit 120, and the control unit 130 located inside the server, or a module performing functions similar to those of each of the respective components.

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

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

A user (or patient, U) and medical staff (or a doctor) according to the present disclosure may hold accounts registered in the therapy program providing system 100 according to the present disclosure.

In the present specification, for convenience of explanation, the 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 linked to the therapy program providing system 100.

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

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

Meanwhile, the communication unit 110 according to the present disclosure may be connected to the user terminal 10, 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 therapy program providing system 100 according to the present disclosure.

Specifically, the communication unit 110 may transmit at least one survey related to cognitive behavioral therapy for a user to the user terminal 10.

For example, the communication unit 110 may transmit at least one survey related to cognitive behavioral therapy to the user terminal 10 on which a user account is logged in.

Furthermore, the communication unit 110 may receive response data (or survey response data) for at least one survey 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.

According to the present disclosure, the response data may include at least one of text, an image (or video), and voice.

In this case, the therapy program providing system 100 may further include a module for converting voice into text.

The communication unit 110 may receive user information from the database 200.

Furthermore, the communication unit 110 may receive a plurality of therapy contents pre-stored in a database (or DB, 200) comprising a therapy program DB.

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

In addition, the communication unit 110 may include a communication module that connects the therapy 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 the 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) technology.

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 therapy program providing system 100 itself, or alternatively, at least a portion 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 for performing at least a portion of the methods and techniques described in the present specification and/or at least a portion 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 generating a therapy program for cognitive behavioral therapy and updating the generated therapy program according to the present disclosure is stored, and the storage unit 120 may be understood as not being limited to a physical space.

Data and instructions necessary for the operation of the therapy program providing system 100 according to the present disclosure may be stored in the storage unit 120.

More specifically, data and instructions necessary for the operation of the emotion analysis module 132 may be stored in the storage unit 120.

Here, the emotion analysis module 132 may refer to a module that performs a function of analyzing linguistic expressions included in natural language response data among response data for the survey provided to the user terminal, and classifying an emotion type (e.g., positive or negative) of the user based thereon.

For example, the emotion analysis module 132 may include at least one artificial intelligence model among BERT (Bidirectional Encoder Representations from Transformers), RoBERTa (Robustly optimized BERT approach), KoBERT, KorBERT, DistilBERT, ELECTRA, and ALBERT.

In addition, the emotion analysis module 132 may include at least one classifier among LSTM (Long Short-Term Memory), GRU (Gated Recurrent Unit), and Transformer-based classifiers (e.g., BERT, Classification head), and may increase precision by ensembling with a CNN-based text classifier when necessary.

In addition, the emotion analysis module 132 may calculate an emotion intensity score in parallel or derive a probability value for each emotion using a Softmax or Sigmoid activation function in order to account for subtle differences in emotional expressions.

The emotion analysis module 132 according to the present disclosure may be pre-trained or fine-tuned based on large-scale emotion labeling datasets (e.g., KoNLPy, AIHub emotional dialogue corpus) or actual clinically-based emotion response data.

Furthermore, a domain-specific learning strategy may be applied to the emotion analysis module 132 to reflect differences in emotional expression according to the user's age and cultural expression characteristics.

The methods for classifying (or analyzing) an emotion type (or class) corresponding to natural language response data according to the present disclosure may vary widely, and the present specification does not limit the method for classifying the emotion type corresponding to natural language response data.

In the present disclosure, the emotion analysis module 132 is not limited in its type or method as long as it is a module capable of classifying an emotion type corresponding to natural language response data.

The storage unit 120 according to the present disclosure may further store instructions for performing operations of at least one of a module and an algorithm that perform the same function as the emotion analysis module 132.

User authentication information included in 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 the user terminal.

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

Meanwhile, the database (DB, 200) may be configured to store various information related to providing a therapy program for the user's cognitive behavioral therapy.

Specifically, the database 200 may store a plurality of therapy contents (e.g., worksheets, assignments, educational materials, etc.) matched to a specific topic related to the user's cognitive behavioral therapy.

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

For example, user information comprising at least one of i) a name, ii) a date of birth, iii) the user's cognitive behavioral therapy history, iv) medical records, v) surgical records, vi) past medical history, vii) prescription information, and viii) past response data of the user 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 control unit 130 may be configured to control the overall operation of the therapy program providing system 100 related to the present disclosure.

The control unit 130 may include at least one of a prompt generation unit 131 and an emotion analysis module 132.

Furthermore, the control unit 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 for the user.

The control unit 130 may control a service page for cognitive behavioral therapy to be output through a display unit (or touch screen) provided in the user terminal 10.

Such a service page may be output on the user terminal 10 through an application installed on the user terminal 10 or a web page.

The service page is a page linked to the therapy program providing system 100 according to the present disclosure, and may be configured to be controlled by the therapy 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 generate a therapy program and update the generated therapy program based on information provided by the therapy program providing system 100 according to the present disclosure.

Meanwhile, the control unit 130 may provide at least one survey related to cognitive behavioral therapy for the user on a service page provided to the user terminal 10.

Furthermore, the control unit 130 may extract natural language response data from response data for at least one survey received through the user terminal 10.

Furthermore, the control unit 130 may analyze (or classify) an emotion type (or emotion class) corresponding to each of a plurality of natural language response data by using the emotion analysis module 132.

Specifically, the emotion analysis module 132 may pre-process the natural language response data (e.g., stopword removal, sentence-level tokenization, etc.) and embed the pre-processed text data to convert it into semantic vectors.

Furthermore, the emotion analysis module 132 may classify an emotion type (or class) of the embedded semantic vector by using at least one classifier.

In this case, it may be understood that both multi-class classification and multi-label classification methods are applicable to the at least one classifier.

For example, the emotion type (or emotion class) according to the present disclosure may be defined in various types such as "positive," "negative," "depression," "anxiety," "anger," "sadness," "helplessness," "joy," "calm," and "confusion," and the present specification does not limit the types of emotion types.

In the following description, prompts to be input to the large language model are generated based on two different emotion types; however, the present disclosure is not limited thereto, and prompts corresponding to each emotion type may be further generated according to various emotion type classifications.

The control unit 130 may group natural language response data corresponding to the same emotion type (or class) based on the analysis (or classification) result of each of the plurality of natural language response data.

Furthermore, the control unit 130 may generate a prompt to be input to the large language model by using a natural language response data group corresponding to each of the different emotion types and user information collected from the database 200.

Specifically, the control unit 130 may generate different types of prompts respectively corresponding to emotion types associated with the plurality of natural language response data groups.

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 therapy program providing system 100; however, the present disclosure is not limited thereto, and the therapy program providing system 100 may be configured to include the LLM server 140.

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

In the following description, for convenience of explanation, the LLM server 140 and the large language model are used interchangeably, and the control unit 130 using the large language model may be understood as using at least one large language model included in the LLM server 140.

In addition, in the present disclosure, the control unit 130 is described as including the prompt generation unit 131; however, the present disclosure is not limited thereto, and the control unit 130 and the prompt generation unit 131 may exist separately.

In this case, the control unit 130 may generate a prompt in conjunction with the prompt generation unit 131.

The control unit 130 according to the present disclosure may generate feedback for the user's cognitive behavioral therapy through the large language model 140 according to a plurality of prompts corresponding to different types input thereto.

Specifically, the large language model 140 may generate each of different types of feedback based on the type corresponding to the prompt.

Furthermore, the control unit 130 may update the prompt to be input to the large language model 140 by using the natural language response data, the user information, and the generated feedback.

The large language model may update the therapy program for the user's cognitive behavioral therapy based on the updated prompt.

In the present disclosure, the control unit 130 is described as generating feedback corresponding to natural language response data in conjunction with the large language model 140, updating the prompt according to the generated feedback, generating a therapy program, and updating the therapy program; however, the present disclosure is not limited thereto, and the control unit 130 itself may generate a therapy program and update the therapy program by including the functions of the large language model 140 or performing the same functions.

Therefore, in the present specification, the control unit 130 generating a therapy program and updating the therapy program, and the large language model 140 generating a therapy program and updating the therapy program may be expressed interchangeably.

Meanwhile, the therapy 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 herein.

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

The processor may perform a series of operations and data processing by 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 control unit 130.

In the foregoing, the therapy program providing system 100 of the present disclosure has been described, and the therapy program providing system 100 may be implemented based on

the method for providing a large language model-based cognitive behavioral therapy program described below.

In the following, the method for providing a large language model-based cognitive behavioral therapy program according to the present disclosure will be described in more detail with reference to FIG. 2 together with FIGS. 3A, 3B, 4A to 4C, 5A, 5B, 6A, and 6B.

FIG. 2 is a flowchart for generally explaining the method for providing a large language model-based cognitive behavioral therapy program according to the present disclosure, and FIGS. 3A and 3B are conceptual diagrams for specifically explaining surveys provided to a user terminal according to the present disclosure.

FIG. 4A is a conceptual diagram for explaining a process of extracting natural language response data from response data for a survey according to the present disclosure, FIG. 4B is a conceptual diagram for explaining a process of generating a natural language response data group based on an emotion type corresponding to natural language response data according to the present disclosure, and FIG. 4C is a conceptual diagram for explaining a process of generating a prompt to be input to a large language model by using natural language response data and user information according to the present disclosure.

FIG. 5A is a conceptual diagram for explaining a cognitive behavioral therapy program according to the present disclosure, and FIG. 5B is a conceptual diagram for explaining a process of generating feedback related to cognitive behavioral therapy by using the large language model according to the present disclosure.

FIGS. 6A and 6B are conceptual diagrams for explaining a process of updating a cognitive behavioral therapy program based on feedback according to the present disclosure and providing the updated therapy program to a user terminal.

In the present disclosure, a process of providing at least one survey related to cognitive behavioral therapy to a user terminal may be performed (S210, see FIG. 2).

The control unit 130 may provide at least one survey related to cognitive behavioral therapy on a service page 1000 output on the user terminal 10.

Here, the at least one survey may comprise a multiple-choice survey comprising at least one multiple-choice query item related to cognitive behavioral therapy and a plurality of selection items corresponding to the multiple-choice query item.

As shown in FIG. 3A, the control unit 130 may provide a survey page (or service page, 1000) comprising a plurality of surveys on the user terminal 10.

In this case, a page comprising a plurality of surveys may be output through the touch screen (or display) of the user terminal 10.

Here, the survey (or question, or problem, or item, or test) provided on the page may comprise a survey for relative evaluation of factors related to pain.

In the present disclosure, factors related to pain may vary.

For example, factors related to pain may comprise various elements for evaluating the condition of a patient related to pain, such as the degree of pain, the duration of pain, mental health, and physical health.

However, the factors described above are merely examples, and it is sufficient that the factors related to pain described in the present disclosure comprise all elements for evaluating the condition of a patient.

Such factors related to pain may comprise credible surveys actually utilized in psychiatry for diagnosing the condition of a patient.

In addition, the control unit 130 may periodically update surveys by additionally collecting surveys for diagnosing the condition of a patient through a central server, an external server, or a website.

More specifically, the control unit 130 may provide a plurality of multiple-choice surveys according to attributes corresponding to at least one pain-related factor on the service page 1000 output on the user terminal 10.

For example, the multiple-choice survey may comprise at least one of a first multiple-choice survey corresponding to a first attribute (e.g., pain) and a second multiple-choice survey corresponding to a second attribute (e.g., sense of competence) different from the first attribute.

In this case, the attributes of the multiple-choice survey provided to the user terminal 10 in the present disclosure are not limited to the examples described and may vary widely.

As shown in FIGS. 3A and 3B, the control unit 130 may provide a first multiple-choice survey 310 corresponding to the first attribute and a second multiple-choice survey corresponding to the second attribute on the service page 1000, and may receive a response to at least one multiple-choice query item 311, 312 related to the first attribute and a response to at least one multiple-choice query item 321, 322 related to the second attribute.

Specifically, the multiple-choice survey may be configured by pairing a multiple-choice query item related to cognitive behavioral therapy with a plurality of selection items respectively corresponding to a plurality of different responses to the multiple-choice query item.

In this case, the format of at least one multiple-choice query item constituting the multiple-choice survey according to the present disclosure may vary widely.

As an example, a first type query item 311, 321 may be configured by pairing a question related to cognitive behavioral therapy (e.g., "How is your pain today?") with a plurality of selection items respectively corresponding to a plurality of different responses to the question (e.g., "no pain," "almost minimal pain," "moderate," "slightly severe pain," "terrible pain").

In this case, different scores related to cognitive behavioral therapy may be respectively matched to the plurality of different responses.

For example, among the plurality of different responses (e.g., "no pain," "almost minimal pain," "moderate," "slightly severe pain," "terrible pain") configured in the first type query item 311, 321, a first score related to cognitive behavioral therapy (e.g., "points") may be matched to a first response (e.g., "no pain"), and a fifth score related to cognitive behavioral therapy (e.g., "points") may be matched to a fifth response (e.g., "almost minimal pain").

As another example, a second type query item 312, 322 may be configured by pairing a query item related to cognitive behavioral therapy (e.g., "Please select all symptoms at the current pain site?") with a plurality of selection items respectively corresponding to a plurality of different responses to the query item (e.g., "stiffness in movement," "pain during specific movements," "decreased muscle strength," etc.).

In this case, the plurality of different responses may comprise selection items expressed in different natural languages related to cognitive behavioral therapy.

Accordingly, a user may, as a response to at least one query item constituting the multiple-choice survey, select a specific selection item among a plurality of selection items respectively corresponding to a plurality of different responses that the user considers most suitable (or appropriate, or accurate) for the user's condition.

Meanwhile, the control unit 130 may provide at least one open-ended survey (or short-answer survey, subjective survey, free-text survey, descriptive survey) related to cognitive behavioral therapy on the service page 1000 output on the user terminal 10.

Specifically, the at least one survey provided on the service page may further comprise an open-ended survey capable of receiving a natural language input for at least one open-ended query item from the user terminal in relation to the cognitive behavioral therapy.

As shown in FIG. 3B, the control unit 130 may provide at least one open-ended survey 331, 334, 335 corresponding to different attributes to the user terminal 10.

For example, the control unit 130 may provide a first open-ended survey 331 corresponding to a first attribute (e.g., pain) to the user terminal 10.

In this case, the first open-ended survey 331 may provide an open-ended query item related to the first attribute (e.g., “Please freely describe in your own words the nature or characteristics of the pain you are currently feeling,” 332) and an input area in which a natural language response to the open-ended query item can be entered.

Here, the input area may refer to an interface capable of receiving a natural language response from at least one of text and voice.

The control unit 130 according to the present disclosure may further comprise a module for converting voice input in the input area into text.

For example, the control unit 130 may input voice data received from the user terminal 10 into a voice conversion module.

Specifically, the voice conversion module may comprise at least one speech recognition model based on a Speech-To-Text (STT) algorithm that converts voice data into text.

As an example, the voice conversion module may comprise at least one speech recognition model among a Hidden Markov Model (HMM), a Hidden Markov Model-Gaussian Mixture Model (HMM-GMM), a Connectionist Temporal Classification (CTC)-based model, a Beam Search-based model, a Deep Neural Network (DNN)-based model, a Recurrent Neural Network (RNN)-based model, a Sequence-to-Sequence (Seq2Seq) model, and a Transformer-based model.

The control unit 130 may convert voice (or voice data) into text based on a Speech-to-Text (STT) algorithm, and process the converted text as response data for an open-ended query item.

As shown in FIG. 3B, the control unit 130 may conduct an interactive open-ended survey 340.

Here, the "interactive open-ended survey" may be configured to perform a conversation related to cognitive behavioral therapy by using at least one of at least one large language model 140 and a chatbot, and to collect response data input through the conversation process.

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 information that is difficult to obtain from a multiple-choice survey in relation to cognitive behavioral therapy.

For example, the "chatbot" according to the present disclosure may comprise 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, the control unit 130 may conduct an interactive open-ended survey 340 in order to collect information related to cognitive behavioral therapy.

For example, the control unit 130 may generate and provide an interactive open-ended query item 341 related to cognitive behavioral therapy on the service page 1000 provided to the user terminal 10.

In this case, the control unit 130 may provide the interactive open-ended survey 340 through at least one of the large language model 140 and a chatbot so that the user may freely respond to the interactive open-ended query item 341.

Furthermore, the control unit 130 may receive a user's response (or natural language input, 342) to the interactive open-ended query item 341 through the service page 1000.

In this case, the user's response may refer to a natural language input entered in at least one of text and voice for the open-ended query item.

Meanwhile, the at least one survey according to the present disclosure is not limited to the examples of surveys (or questions) described above, and may comprise at least one of a multiple-choice survey and an open-ended survey, and the at least one survey may comprise various surveys (or questions) related to cognitive behavioral therapy.

In the present disclosure, the control unit 130 may receive response data for at least one survey provided to the user terminal 10.

Specifically, the control unit 130 may receive multiple-choice survey response data corresponding to a multiple-choice survey included in at least one survey.

The control unit 130 may receive response data for a multiple-choice survey (or multiple-choice survey response data) comprising a response matched to an item selected by a user input among a plurality of selection items from the user terminal 10.

In this case, the multiple-choice survey response data may comprise natural language response data corresponding to a specific selection item selected by a user input among a plurality of selection items.

For example, as shown in FIGS. 3A and 3B, the control unit 130 may receive, as selection-type response data, a natural language response (e.g., "I recognized the importance of health through pain") corresponding to a selection item selected by a user input among a plurality of selection items for a question related to the user's indication included in the multiple-choice surveys (310, 320) (e.g., "What thought is closest to the impact of the current pain on your daily life?").

Furthermore, the control unit 130 may receive open-ended survey response data for an open-ended survey included in at least one survey.

In this case, the open-ended survey may comprise natural language response data corresponding to at least one of a natural language input for an open-ended query item and a natural language answer obtained through the large language model by processing the natural language input as an input to the large language model.

As an example, as shown in FIG. 3B, the control unit 130 may receive a natural language input (e.g., "Daily life is difficult. I feel depressed because I cannot do anything," 342) for an open-ended query item (or an interactive open-ended query item, an short-answer query item, a free-text query item, or a descriptive item 341) as open-ended survey response data.

In the foregoing, receiving open-ended survey response data has been described using the interactive open-ended survey 340 as an example; however, in the present disclosure, a natural language input entered in an input area in which a response to the open-ended query item 332 provided in the open-ended survey 330 can be entered may also be received as open-ended survey response data.

Furthermore, the control unit 130 may provide a preset number of open-ended survey items (or interactive open-ended survey items) to the user terminal 10 and receive open-ended survey response data for each of the open-ended survey items.

In this case, the control unit 130 may provide sample answers to the open-ended survey items together with the open-ended survey items.

In the present disclosure, a process of generating a prompt to be input to a large language model may be performed by using response data for the survey received from the user terminal (S220, see FIG. 2).

As shown in FIG. 4A, the control unit 130 may extract a plurality of natural language response data 430 from response data 400 for the survey received from the user terminal.

Specifically, the control unit 130 may extract natural language response data 430 from at least one of multiple-choice survey response data 410 and open-ended survey response data 420 included in the response data.

For example, the control unit 130 may, with respect to an open-ended query item included in an open-ended survey (e.g., "Please freely describe the pain you are currently feeling."), receive open-ended survey response data from the user terminal 10 (e.g., "Daily life is difficult. I feel depressed because I cannot do anything.") and extract it as first natural language response data 431.

As another example, the control unit 130 may, with respect to a multiple-choice query item included in a multiple-choice survey (e.g., "What thought is closest to the impact of the current pain on your daily life?"), receive multiple-choice survey response data corresponding to a selection item selected through a user input among a plurality of selection items (e.g., "I rather recognized the importance of health through pain.") and extract it as second natural language response data 432.

Furthermore, the control unit 130 may perform emotion analysis (or classification) on a plurality of natural language response data 430 extracted from the response data 400 by using an emotion analysis module 132.

Specifically, the emotion analysis module 132 may identify an emotion type (or class) corresponding to each of the extracted plurality of natural language response data.

Here, the emotion type may be identified as at least one of "positive" and "negative."

The method for identifying an emotion type (or class) corresponding to each of the extracted plurality of natural language response data according to the present disclosure may vary widely, and the present specification does not limit the method for identifying an emotion type (or class) corresponding to each of the extracted plurality of natural language response data.

In the present disclosure, the emotion analysis module 132 is not limited in type or manner as long as it is a module capable of identifying an emotion type (or class) corresponding to each of the extracted plurality of natural language response data.

The control unit 130 according to the present disclosure may further comprise at least one of a module and an algorithm that performs the same function as the emotion analysis module 132.

In this case, the emotion analysis module may identify an emotion type (or class) corresponding to each of the extracted plurality of natural language response data through at least one algorithm.

For example, the emotion analysis module 132 may perform a preprocessing process for emotion analysis on natural language response data.

Specifically, the emotion analysis module 132 may be configured to perform word segmentation, part-of-speech tagging, stopword removal, and spelling and spacing refinement using a morphological analyzer (e.g., KoNLPy-based Okt, Mecab, etc.).

Through this process, a token sequence suitable for emotion analysis may be constructed.

Furthermore, the emotion analysis module 132 may input the preprocessed natural language response data into an artificial intelligence-based emotion classification model.

In this case, the emotion classification model may be configured based on a pre-trained large language model 140.

For example, the emotion classification model may use at least one of a Korean-specialized BERT model (KoBERT), an emotion analysis-tuned KLUE-BERT, and a GPT-series language model.

The emotion analysis module 132 may embed the preprocessed natural language response data by using an emotion classification model and generate a semantic vector reflecting the contextual meaning of the natural language response data.

Furthermore, the emotion analysis module 132 may input the semantic vector into a classifier that performs emotion type classification corresponding to the semantic vector.

Here, the classifier may refer to at least one of an artificial intelligence model and an algorithm capable of identifying an emotion type (or emotion class) of each of a plurality of natural language response data by using a semantic vector corresponding to each of the plurality of natural language response data.

For example, the classifier may comprise at least one of machine learning-based classifiers such as Naive Bayes, Support Vector Machine (SVM), Random Forest, and Logistic Regression; deep learning-based classifiers such as LSTM (Long Short-Term Memory), GRU (Gated Recurrent Unit), and CNN (for text classification); Korean-specialized models such as BERT (Bidirectional Encoder Representations from Transformers), RoBERTa, KoBERT, and KLUE-BERT; and large language model-based classifiers such as GPT and T5.

The classifier according to the present disclosure is not limited to the algorithms or models described above, and may further comprise at least one of models and algorithms that perform the same function as the classifier according to the present disclosure.

As an example, the classifier according to the present disclosure may input a semantic vector into at least one of a multi-layer perceptron (MLP) and a recurrent neural network (RNN)-series structure (e.g., BiLSTM), and calculate a probability distribution for each emotion type through a softmax function in the last output layer.

The emotion type may be configured as, for example, "positive" and "negative," and the type (or class) with the highest probability may be identified as the emotion type corresponding to the natural language response data.

As shown in FIG. 4B, the control unit 130 may analyze an emotion type corresponding to each of a plurality of natural language response data and group natural language response data corresponding to the same emotion type among the plurality of natural language response data.

Specifically, the control unit 130 may generate a first type natural language response data group 440 comprising at least one natural language response data corresponding to a first emotion type among a plurality of natural language response data.

For example, the control unit 130 may generate, among a plurality of natural language response data, first natural language response data corresponding to a first emotion type (e.g., negative) (e.g., "Daily life is difficult.

I feel depressed because I cannot do anything," 431) and fourth natural language response data (e.g., "I felt helpless and had a mind to give up," 434) as a first type natural language response data group 440.

Alternatively, the control unit 130 may generate a second type natural language response data group (450) comprising at least one natural language response data corresponding to a second emotion type among a plurality of natural language response data.

For example, the control unit 130 may generate a second type natural language response data group 450 comprising second natural language response data (e.g., "I rather recognized the importance of health through pain," 432) and third natural language response data (e.g., "There was some pain, but I finished what I had to do today," 433) corresponding to a second emotion type (e.g., positive) different from the first emotion type among a plurality of natural language response data.

Furthermore, the control unit 130 may generate a plurality of different prompts to be input to the large language model based on each of a plurality of natural language response data groups corresponding to different emotion types.

As shown in FIG. 4C, the control unit 130 may generate a plurality of prompts 470 corresponding to each of a plurality of natural language response data groups corresponding to different emotion types by using a prompt generation unit 131.

Specifically, the prompt generation unit 131 may generate a plurality of prompts 470 of different types by using natural language response data comprising at least one of the first type natural language response data group 440 and the second type natural language response data group 450, and user information 460 collected from the database 200.

Here, "user information 460" may comprise at least one of i) the user's name, ii) date of birth, iii) the user's cognitive behavioral therapy history, iv) medical records, v) surgical records, vi) past medical history, vii) prescription information, and viii) past response data.

For example, the prompt generation unit 131 may generate a plurality of different prompts 470 comprising at least one of a first type prompt related to the first type natural language response data group and a second type prompt related to the second type natural language response data group.

Specifically, the prompt generation unit 131 may generate a first type prompt 480 by using at least one of at least one natural language response data corresponding to the first

emotion type included in the first type natural language response data group 440 and user information 460.

Alternatively, the prompt generation unit 131 may generate a second type prompt 490 by using at least one of at least one natural language response data corresponding to the second emotion type included in the second type natural language response data group 450 and user information 460.

In the present disclosure, a process of generating feedback related to a therapy program for cognitive behavioral therapy based on natural language response data included in the response data may be performed by inputting the prompt to the large language model (S230, see FIG. 2).

Meanwhile, a plurality of therapy programs respectively matched to different topics may be matched and stored in the database 200 according to the present disclosure.

The control unit 130 may sequentially provide a plurality of therapy contents constituting a specific therapy program to the user terminal 10 according to a therapy week set for the specific therapy program associated with the cognitive behavioral therapy of the user, among a plurality of therapy programs.

Here, "therapy content" may refer to content related to a detailed category (or sub-topic) for cognitive behavioral therapy of a pain patient regarding a specific topic, and may comprise worksheets, educational materials, and assignments composed of at least one of text, audio, images, and videos related to a specific topic.

The "therapy week" described in the present disclosure may be understood as the order (or period) in which therapy content is provided (or activated) through the user terminal 10 so that the user performs cognitive behavioral therapy according to the therapy program. The therapy week may refer to a treatment week, and the terms may be used interchangeably.

In the present disclosure, a "total number" of therapy weeks and a "per-week treatment period" corresponding to each therapy week may be preset and exist.

In addition, in the present disclosure, an "overall treatment period" may be understood to be predefined.

Hereinafter, for convenience of explanation, a description will be given using as an example that different therapy weeks arrive "8 times" for every one-week treatment period.

That is, in the present disclosure, a first therapy week may arrive in a first treatment session, and a second therapy week may arrive in a second treatment session.

Accordingly, in the present disclosure, "therapy week" may be used interchangeably with "treatment session," "treatment round," "treatment period," and "treatment order."

As shown in FIG. 5A, in the present disclosure, a total number (e.g., 8) of therapy weeks for a specific therapy program 500 may be predefined and exist.

Here, assuming that the specific therapy program comprises "first therapy content through eighth therapy content," in this case, each of the first therapy content through eighth therapy content 503 may have any one of the first therapy week through the eighth therapy week set therein.

Furthermore, a plurality of topics 502 may each be associated with (or matched to) each of a plurality of therapy contents (e.g., first therapy content through eighth therapy content).

For example, the first therapy content may refer to content for training or therapy related to a first topic (e.g., motivation enhancement), and the second therapy content may refer to content for training or therapy related to a second topic (e.g., emotion identification).

In the present disclosure, a plurality of therapy contents constituting a specific therapy program 500 may be sequentially provided to the user terminal 10 in accordance with the therapy week set for the specific therapy program.

For example, the control unit 130 may sequentially provide the first therapy content among a plurality of therapy contents 503 constituting a specific therapy program 500 to the user terminal 10 during the first therapy week.

As shown in FIG. 5B, the control unit 130 may generate feedback 510 for cognitive behavioral therapy corresponding to the prompt 470 by using the large language model 140.

Specifically, the control unit 130 may generate a plurality of feedback of different types corresponding to each of a plurality of prompts by using the plurality of prompts of different types.

For example, the control unit 130 may generate feedback for a specific therapy program through the large language model 140 by inputting at least one of the first type prompt 480 and the second type prompt 490 to the large language model 140.

Specifically, the control unit 130 may generate a first type feedback 520 corresponding to the first type prompt 480 and a second type feedback 530 corresponding to the second type prompt 490 by using the large language model 140.

Here, the first type feedback 520 may comprise first type update information 521 for a specific therapy program provided to the user terminal 10 according to the first type prompt 480 comprising first type natural language response data corresponding to the first emotion type.

As an example, when the first emotion type corresponds to a "negative" type, the large language model 140 may analyze the first type natural language response data and generate a first analysis result (e.g., "In the current user's responses, recurring feelings of helplessness, loss of meaning, and skepticism about change are evident. This is a common response seen in users with a high level of cognitive exhaustion and depression.").

Furthermore, the large language model 140 may generate a first type feedback 520 comprising first type update information 521 for updating a specific therapy program based on the first analysis result.

Alternatively, the second type feedback 530 may comprise second type update information 532 for a specific therapy program provided to the user terminal 10 according to the second type prompt 490 related to the second type natural language response data group corresponding to the second emotion type.

As an example, when the second emotion type corresponds to a "positive" type, the large language model 140 may analyze the second type natural language response data and generate a second analysis result (e.g., "The user is demonstrating autonomy and continuity in behavioral activation and emotion regulation during the recovery process, which is a very positive indicator. In particular, a reduction in emotional variability, restoration of life rhythm, and improvement in self-awareness are evident.").

Furthermore, the large language model 140 may generate a second type feedback 530 comprising second type update information 531 for updating a specific therapy program based on the second analysis result.

That is, in the present disclosure, each of the first type feedback 520 and the second type feedback 530 may comprise different types of update information for a specific therapy program.

Through this, the control unit 130 may perform different types of updates for a specific therapy program provided to the user terminal 10 based on the different types of update information.

In the present disclosure, a process of updating the prompt based on the generated feedback, inputting the updated prompt to the large language model, and updating the therapy program through the large language model may be performed (S240, see FIG. 2).

As shown in FIG. 6A, the control unit 130 may update the prompt 600 to be input to the large language model 140 by using at least one of natural language response data 430 comprising natural language response data groups 440, 450 of different types, user information 460, and feedback 510 for cognitive behavioral therapy comprising a plurality of feedback 520, 530 of different types.

Specifically, the control unit 130 may update the prompt based on the different types of update information for a specific therapy program included in the feedback 510.

The methods for updating the prompt based on the different types of update information according to the present disclosure may vary widely, and the present specification does not limit the methods for updating the prompt based on the different types of update information.

In the present disclosure, the prompt generation unit 131 is not limited in type or manner as long as it is a module (or unit) capable of updating the prompt based on the different types of update information.

The control unit 130 according to the present disclosure may further comprise at least one of modules and algorithms that perform the same function as the prompt generation unit 131.

In this case, the prompt generation unit 131 may update the prompt based on the different types of update information through at least one algorithm.

For example, the control unit 130 may update the prompt by analyzing update information included in the user feedback 510 for a specific therapy program so as to repeatedly provide or omit at least one therapy content whose satisfaction score for the therapy content constituting the specific therapy program satisfies a preset satisfaction criterion.

Here, the "satisfaction score" may be included in response data of the user for therapy content provided in a previous therapy week, based on therapy history information included in the user information.

Specifically, when performing the "3rd session" of a specific therapy program, the control unit 130 may provide a survey related to the satisfaction of therapy content performed in the "2nd session" and receive information related to the satisfaction score from the user terminal 10 as response data.

In this case, the "preset satisfaction criterion" according to the present disclosure may be set in various ways, and the present disclosure does not limit the preset satisfaction criterion.

As another example, when the control unit 130 receives natural language response data of a specific type (e.g., positive type) for a specific therapy content (user's meditation, walking, attention redirection techniques) included in a specific therapy program, the control unit 130 may update the prompt to add a list of therapy contents similar to the specific therapy content to the specific therapy program.

Furthermore, the control unit 130 may update the prompt for updating a specific therapy program based on at least one of the natural language response data 430, user information 460, and feedback 510 for cognitive behavioral therapy.

In this way, the control unit 130 may generate an updated prompt 600 for updating the structure and response method of the therapy program for cognitive behavioral therapy based on the user's state changes and feedback.

The control unit 130 may update the therapy program for the user's cognitive behavioral therapy by processing the updated prompt 600 as an input to the large language model 140.

For example, the control unit 130 may update information related to at least one of a specific topic matched to a specific therapy program, a configuration of each of a plurality of therapy contents included in the specific therapy program, and a therapy week at which each of the plurality of therapy contents is provided, based on the updated prompt 600.

As shown in FIG. 6B, the control unit 130 may update a specific therapy program for cognitive behavioral therapy by using the large language model 140.

Specifically, the control unit 130 may update a specific therapy program based on at least one of natural language response data, a plurality of feedback of different types, and user information included in the updated prompt 600.

For example, the control unit 130 may change a specific therapy content sequentially provided to the user terminal 10 according to a specific therapy program based on a specific type of feedback included in the updated prompt.

In this case, the control unit 130 may receive, from the database, a changed therapy content to be changed with the specific therapy content among a plurality of therapy contents stored in advance.

As an example, the control unit 130 may update a specific therapy program 610 by changing a specific therapy content in a specific treatment session to a first therapy content according to the first type feedback (e.g., "small change initiation behavioral restructuring," 620) based on the first type feedback included in the updated prompt.

As another example, the control unit 130 may update a specific therapy program 610 by changing a specific therapy content in a specific treatment session to a second therapy content according to the second type feedback (e.g., "recovery strategy design practice," 630) based on the second type feedback included in the updated prompt.

That is, the control unit 130 may update a specific topic matched to the specific therapy program, a configuration of each of a plurality of therapy contents, and a therapy week at which each of the plurality of therapy contents is provided, in order to provide a specific therapy program comprising the first therapy content and the second therapy content.

For example, when the first type feedback comprises content indicating that the first therapy content should be provided in a specific therapy week (e.g., 3rd session), the control unit 130 may update (or change) the therapy week at which a plurality of therapy contents constituting the specific therapy program are sequentially provided, in order to provide the first therapy content in the specific therapy week.

Furthermore, the control unit 130 may update a delivery method (e.g., an example presentation method, an emotional tone of feedback, a degree of empathy, etc.) of a plurality of therapy contents constituting the specific therapy program.

For example, the control unit 130 may update a specific therapy program to provide, together with a specific therapy content related to a first emotion type (e.g., negative type), a response related to the first emotion type (e.g., "How about taking just a 5-minute walk or drinking a glass of water today?") based on the first type feedback.

In the present disclosure, a process of providing the updated therapy program to the user terminal may be performed (S250, see FIG. 2).

As described above, the control unit 130 may update a specific therapy program to be provided to the user terminal 10 in a user-customized manner by using the large language model 140.

Furthermore, the control unit 130 may provide the updated specific therapy program to the user terminal 10.

The control unit 130 may provide a user environment that enables a user who is undergoing cognitive behavioral therapy to continuously perform cognitive behavioral therapy.

For example, the control unit 130 may provide a GUI (Graphical User Interface) that allows the user to access a specific therapy program, together with recommendation information for the updated specific therapy program.

The user may select the GUI (e.g., "Start Right Now") to access a screen for proceeding with the updated specific therapy program related to the recommendation information, and perform cognitive behavioral therapy through the updated specific therapy program.

The control unit 130 may provide a page on which a specific therapy program can be proceeded, based on the GUI being selected from the user terminal 10.

The control unit 130 may provide a page comprising the updated specific therapy program on the user terminal 10.

In the foregoing, the method for providing a large language model-based cognitive behavioral therapy program according to the present disclosure has been described in detail.

Hereinafter, a method of predicting an emotion pattern of a user and providing prediction information corresponding to the emotion pattern of the user to the user terminal 10 by using the method for providing a large language model-based cognitive behavioral therapy program will be described.

FIG. 7 is a conceptual diagram for explaining a process of predicting an emotion pattern of a user according to the present disclosure and providing notification information corresponding to the predicted emotion pattern to the user terminal.

Meanwhile, the control unit 130 may predict an emotion pattern of a user subject to cognitive behavioral therapy by using the large language model, and provide notification information corresponding to the predicted emotion pattern to the user terminal.

As shown in FIG. 7, the control unit 130 may generate a prediction prompt for predicting the emotion pattern by using at least one of response data 400 for the survey, feedback 510 for cognitive behavioral therapy, and user information 460 collected from the database 200.

As described above, the response data 400 for the survey comprises at least one of multiple-choice survey response data 410 and open-ended survey response data 420, and the control unit 130 may extract natural language response data from at least one of the multiple-choice survey response data 410 and the open-ended survey response data 420.

The control unit 130 may generate a prediction prompt for predicting an emotion pattern of the user based on a plurality of natural language response data respectively corresponding to different emotion types included in at least one of the multiple-choice survey response data 410 and the open-ended survey response data 420, and feedback 520, 530 of different types.

In addition, the control unit 130 may infer an emotion pattern (or psychological pattern, behavioral tendency, emotional state, etc.) exhibited by the user based on at least one of natural language response data, user information 460, and feedback 510 for cognitive behavioral therapy.

For example, the control unit 130 may analyze each of the natural language response data of different types to extract repeatedly mentioned keywords (or sentences (e.g., "I always fail," "Nobody likes me"))).

Specifically, the control unit 130 may extract repeated keywords and sentences corresponding to different emotion types by using the emotion analysis module 132.

The methods for extracting repeated keywords and sentences corresponding to different emotion types according to the present disclosure may vary widely, and the present specification does not limit the methods for extracting repeated keywords and sentences corresponding to different emotion types.

In the present disclosure, the emotion analysis module 132 is not limited in type or manner as long as it is a module capable of extracting repeated keywords and sentences corresponding to different emotion types.

The control unit 130 according to the present disclosure may further comprise at least one of modules and algorithms that perform the same function as the emotion analysis module 132.

In this case, the emotion analysis module 132 may extract repeated keywords and sentences corresponding to different emotion types through at least one algorithm.

For example, the emotion analysis module 132 may comprise at least one keyword extraction algorithm.

Specifically, the emotion analysis module 132 may extract repeated keywords and sentences corresponding to different emotion types through at least one of TF-IDF, Count Vectorizer-based frequency-based keyword extraction, TextRank, KeyBERT-based key expression extraction, and BERT-based attention weight analysis.

In addition, the control unit 130 may infer an emotion pattern (e.g., social avoidance, helplessness, excessive self-blame) by reflecting at least one of age, gender, underlying indication information, and treatment history included in the user information 460.

For example, the control unit 130 may predict a behavioral tendency based on individual user characteristics by using a pre-trained behavioral pattern model related to user information.

Here, the pre-trained behavioral pattern model may refer to a predictive model constructed by learning statistical correlations of thought, emotion, and behavioral patterns repeatedly observed according to a specific user group (age, gender, diagnosis name, treatment history, etc.).

Specifically, the pre-trained behavioral pattern model may be trained based on training data comprising large-scale clinical records, response data for surveys, and data sets collected during the cognitive behavioral therapy process.

As an example, the pre-trained behavioral pattern model may be implemented as a supervised learning-based classifier, a clustering-based type classification model, or a time-series analysis-based predictive model by using the training data.

For example, "age" information may be related to avoidant regression behavior or a tendency toward decreased self-efficacy in adolescents, "gender" information may be associated with suppression of emotional expression or increased expression of anger in male users, and "underlying indication information" indicating a medical history of depression, panic disorder, PTSD, or the like may be understood to have a high association with specific emotional and behavioral patterns such as helplessness, insomnia, and excessive self-blame.

The control unit 130 may generate a prediction prompt for generating notification information comprising prediction information corresponding to the predicted emotion pattern by using at least one of response data 400 for the survey, feedback 510 for cognitive behavioral therapy, and user information 460 collected from the database 200.

Furthermore, the control unit 130 may generate the prediction information of a type corresponding to the emotion pattern through the large language model by processing the prediction prompt as an input to the large language model.

For example, the control unit 130 may generate prediction information corresponding to the predicted emotion pattern (e.g., possibility of future emotional deterioration, accumulated fatigue state, repeated negative emotions, etc.) through the large language model 140 by processing the prediction prompt as an input to the large language model 140.

As a more specific example, the large language model 140 may generate first type prediction information corresponding to a first emotion pattern (e.g., “Responses such as ‘I don’t want to do anything’ and ‘I have no energy’ have recently been repeated for two consecutive instances. If this sense of lethargy continues, decreased activity and depressive feelings may worsen. How about taking even a 5-minute walk or drinking a glass of water today?”, 720) based on a prediction prompt configured to generate prediction information corresponding to the first emotion pattern associated with a first emotion type (e.g., a “negative” type).

In contrast, the large language model 140 may generate second type prediction information corresponding to a second emotion pattern (e.g., “Recent responses repeatedly included statements such as ‘I feel better’ and ‘I started taking walks again.’ This is clearly a sign of recovery. These small changes you have made are becoming a great source of strength. Please continue taking time to observe your emotions and care for yourself as you are doing now. You are doing very well!”, 730) based on a prediction prompt configured to generate prediction information corresponding to the second emotion pattern associated with a second emotion type (e.g., a “positive” type).

That is, the control unit 130 may generate notification information 710 comprising prediction information 720, 730 of different types based on the type of the predicted emotion pattern.

Furthermore, the control unit 130 may provide notification information generated through the large language model 140 to the user terminal.

Specifically, the control unit 130 may provide notification information comprising prediction information corresponding to the emotion pattern to the user terminal 10 according to the predicted emotion pattern.

In addition, the control unit 130 may provide notification information comprising prediction information corresponding to the emotion pattern to the user terminal 10.

Here, the notification information may be provided to the user terminal 10 in the form of a pop-up, a notification window, an interactive message, or the like.

As described above, the method and system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may improve the efficiency of cognitive behavioral therapy and the engagement of the user by providing a user-customized cognitive behavioral therapy program based on response data for the survey and user information of the user.

Furthermore, the method and system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may update the therapy program provided to the user based on feedback according to the current state of the user, thereby responding sensitively to changes in the user's state, dynamically adjusting the therapy program, and ensuring long-term continuity of treatment.

Furthermore, the method and system for providing a large language model-based cognitive behavioral therapy program according to the present disclosure may enable an early intervention and preventive-centered therapeutic approach to cognitive behavioral therapy by predicting the emotional state of the user in advance and proactively providing notification information based on the predicted emotional state.

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), ROM, RAM, CD-ROM, magnetic tape, floppy disk, optical data storage devices, and the like.

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

In this case, the computer may download the program according to the present disclosure from a 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 changes within the equivalent scope of the present disclosure are included in the scope of the present disclosure.

The embodiments disclosed herein are for illustrative purposes only. Various modifications, adaptations, and combinations of the various features of the described embodiments will be apparent to those skilled in the art without departing from the scope of the claims set forth below. Accordingly, no single embodiment described herein should be considered limiting, as the claims may be drawn to some combination of features of the disclosed embodiments.

Technical improvements provided by the present disclosure over the prior art include: (1) dynamically updating a cognitive behavioral therapy program through real-time emotion classification of user-generated natural language response data using a large language model, thereby providing a technically improved feedback loop that is not achievable by mental processes or conventional static CBT delivery systems; (2) generating emotion-type-specific prompts that enable the large language model to produce differentiated feedback corresponding to distinct emotional states of the user, representing a concrete technical improvement over prior art uniform prompt-based systems; and (3) predicting an emotion pattern of a user based on multi-source data including survey response data, feedback, and user information, thereby enabling proactive therapeutic intervention in a technically improved manner beyond mere abstract idea implementation.

The technical improvements of the present disclosure are further supported by evidence of the state of the art at the time of filing. Prior to the present disclosure, conventional non-face-to-face cognitive behavioral therapy systems relied on static, pre-authored therapy content delivered uniformly without real-time adaptation to user emotional state. Such systems lacked the capability to: (i) automatically classify emotion types from natural language response data, (ii) generate emotion-type-specific prompts for input to a large language model, and (iii) dynamically update therapy program structure, content configuration, and delivery schedule based on generated feedback. The present disclosure addresses these technical deficiencies by providing a specific, concrete technical solution implemented through a novel combination of

emotion classification, prompt engineering, and large language model-based feedback generation, which together constitute a technical improvement to computer-implemented cognitive behavioral therapy systems rather than the mere application of an abstract idea.

【CLAIMS】

【CLAIM 1】

A method for providing a large language model-based cognitive behavioral therapy program, the method comprising:

- providing at least one survey related to cognitive behavioral therapy to a user terminal;
- generating a prompt to be input to a large language model by using response data for the survey received from the user terminal;

- generating feedback related to a therapy program for the cognitive behavioral therapy based on natural language response data included in the response data by inputting the prompt to the large language model;

- updating the prompt based on the generated feedback, inputting the updated prompt to the large language model, and updating the therapy program through the large language model; and
- providing the updated therapy program to the user terminal.

【CLAIM 2】

The method of claim 1, wherein generating the prompt comprises:

- extracting a plurality of natural language response data from the response data for the survey;

- analyzing an emotion type corresponding to each of the plurality of natural language response data, and grouping natural language response data corresponding to the same emotion type among the plurality of natural language response data; and

- generating a plurality of different prompts to be input to the large language model based on each of a plurality of natural language response data groups corresponding to different emotion types.

【CLAIM 3】

The method of claim 2, wherein the plurality of natural language response data groups comprise at least one of: a first type natural language response data group comprising at least one natural language response data corresponding to a first emotion type among the plurality of natural language response data; and at least one second type natural language response data group

comprising at least one natural language response data corresponding to a second emotion type among the plurality of natural language response data.

【CLAIM 4】

The method of claim 3, wherein generating the plurality of different prompts comprises generating a plurality of prompts corresponding to each of the plurality of natural language response data groups corresponding to the different emotion types, and

wherein the plurality of prompts comprise at least one of a first type prompt related to the first type natural language response data group and a second type prompt related to the second type natural language response data group.

【CLAIM 5】

The method of claim 4, wherein a plurality of therapy programs respectively matched to different topics are stored in a database;

wherein a plurality of therapy contents constituting a specific therapy program associated with the cognitive behavioral therapy of the user, among the plurality of therapy programs, are sequentially provided to the user terminal according to a therapy week set for the specific therapy program; and

wherein generating the feedback comprises inputting at least one of the first type prompt and the second type prompt to the large language model to generate the feedback for the specific therapy program through the large language model.

【CLAIM 6】

The method of claim 5, wherein the feedback comprises at least one of a first type feedback corresponding to the first type prompt and a second type feedback corresponding to the second type prompt, and

wherein each of the first type feedback and the second type feedback comprises different types of update information for the specific therapy program.

【CLAIM 7】

The method of claim 6, wherein updating the therapy program comprises updating information related to at least one of a specific topic matched to the specific therapy program, a configuration of each of a plurality of therapy contents included in the specific therapy program,

and a therapy week at which each of the plurality of therapy contents is provided, based on the different types of update information for the specific therapy program.

【CLAIM 8】

The method of claim 1, wherein the at least one survey comprises at least one of: a multiple-choice survey comprising at least one multiple-choice query item related to the cognitive behavioral therapy and a plurality of selection items corresponding to the multiple-choice query item; and an open-ended survey configured to receive a natural language input for at least one open-ended query item from the user terminal in relation to the cognitive behavioral therapy.

【CLAIM 9】

The method of claim 8, wherein the response data comprises at least one of multiple-choice survey response data for the multiple-choice survey and open-ended survey response data for the open-ended survey,

wherein the multiple-choice survey response data comprises the natural language response data corresponding to a specific selection item selected by a user input among the plurality of selection items, and

wherein the open-ended survey response data comprises the natural language response data corresponding to at least one of the natural language input for the open-ended query item and a natural language answer obtained through the large language model by processing the natural language input as an input to the large language model.

【CLAIM 10】

The method of claim 1, further comprising:

predicting an emotion pattern of a user subject to cognitive behavioral therapy by using the large language model; and providing notification information comprising prediction information corresponding to the emotion pattern to the user terminal according to the predicted emotion pattern,

wherein predicting the emotion pattern of the user comprises:

generating a prediction prompt for predicting the emotion pattern by using at least one of the response data for the survey, the feedback, and user information collected from a database; and

generating the prediction information of a type corresponding to the emotion pattern through the large language model by processing the prediction prompt as an input to the large language model.

【CLAIM 11】

A system for providing a large language model-based cognitive behavioral therapy program, the system comprising:

a communication unit configured to provide at least one survey related to cognitive behavioral therapy to a user terminal; and

a control unit configured to generate a prompt to be input to a large language model by using response data for the survey received from the user terminal,

wherein the control unit is configured to: input the prompt to the large language model to generate feedback related to a therapy program for the cognitive behavioral therapy based on natural language response data included in the response data; update the prompt based on the generated feedback and input the updated prompt to the large language model; update the therapy program through the large language model; and provide the updated therapy program to the user terminal.

【CLAIM 12】

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

providing at least one survey related to cognitive behavioral therapy to a user terminal; generating a prompt to be input to a large language model by using response data for the survey received from the user terminal;

generating feedback related to a therapy program for the cognitive behavioral therapy based on natural language response data included in the response data by inputting the prompt to the large language model;

updating the prompt based on the generated feedback, inputting the updated prompt to the large language model, and updating the therapy program through the large language model; and providing the updated therapy program to the user terminal.