An Algorithm Design about Psychological Counseling Platform Using the Derivative Works

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Abstracts: The psychological counseling platform using the derivative works in this study includes four main modules and two sub modules. The first main one is a content database that stores a plurality of derivative works in which keywords are set. The second is a message input module including a request message providing unit that displays a request message input from the client terminal on the counselor's terminal, and a counseling message input unit that receives a counseling message written based on the request message from the counselor's terminal. The third main module is a keyword extraction module that extracts keywords by analyzing the counseling message. Final one is an answer providing module that provides derivative works corresponding to the extracted keyword and the consultation message to the client terminal. As the sub modules, this system consists of a region division module and a chart generation module. The region division module allows the screen of the client terminal to correspond to the central region where the counseling message is placed and the vertices of an equilateral triangle having the central point of the central region as the outer center. The chart generation module consists of a chart display unit, an expected value calculation unit, and a variable value setting unit. Based on the proposed algorithm, this system has the effect of increasing the effectiveness of psychological counseling and improving the concentration of counseling by providing recreated secondary copyrighted content using copyright-protected videos, images, music, and photos together with psychological counseling at the same time.

Keywords: Psychological Counseling Platform, Derivative Works, Algorithm Proposal, Secondary Copyright.

1. INTRODUCTION

These days, many of people are living through various forms of psychological counseling. As a part of the process of finding out comprehensive information about the individual interviewee, psychological counseling is used to detect differences among individual's unique behavioral characteristics, understand and predict human behavior by systematically and quantitatively measuring the current psychological state and psychological attributes such as the individual's intelligence, academic background, aptitude, personality, interest, and values. Conventional psychological counseling has been conducted face-to-face between a counselor and a client. However, there are many cases where people are reluctant to receive counseling due to the eyes of those around them, and the counselor's appearance and accent can become factors that make the client's psychology unstable. In the case of a client who is seemingly normal but is suffering from a serious psychological disorder such as panic disorder, in addition, they can have a problem to receive psychological counseling services normally because the process of going to see a counselor is already extremely psychologically stressful. Furthermore, there was an inconvenience that the counseling data had to be digitized again for record keeping when counseling was conducted offline.

To solve this problem, various and professional psychological counseling methods have been proposed in terms of accessibility, content, and technical aspects of counseling. These professionals tend to find that certain procedures or techniques seem to work in helping clients solve their problems and lives more effective lives (Al-Dalaeen, Alzaben, Moh'd, Zaid, & Mu'tah, 2023; Kessler, 1997). From the past, there has been a system that allows you to receive psychological counseling through online. According to the preceding system, it is possible to easily receive online psychological counseling using a mobile device or the like. In addition, since appropriate psychological tests can be performed if necessary, it is timely and effective and efficient in managing the mental health of modern people through time and place. In addition to methodological development, psychotherapy methods using various contents such as art psychotherapy have also been suggested. In the course of the development of psychological counseling, the traditional psychological counseling has been improved and adjusted on the basis of the original theory, and many new methods and means of consultation have been derived, among which the brightest one is art therapy (Chi, Ho, & Lin, 2022; Hou, 2017).

However, the preceding system only provides basic psychological counseling through online media, and there is a limitation in that it cannot provide a separate additional configuration to increase the effect of psychological counseling. Therefore, in order to solve the above-mentioned problems, secondary copyrighted contents recreated with copyrighted music, images, and images can be provided together during psychological counseling to increase the effectiveness and effectiveness of counseling (Jadir, 2022). Meanwhile, the need to develop a platform that provides psychological services using new media and contents handled in the media is emerging.

The main object of the system based on this proposed algorithm is to increase the counseling effect by enabling the counseling message and derivative works to be provided together. Derivative works are considered as variants of a masterpiece created by an existing opera that is protected by copyright or by the acts that enter into the public domain (Ahmeti, 2015; Iskandar, Susianti, Ramadhani, Ningtyas, Iriane, Dimpudus, & Aryanti, 2022). Because the derivative works can be legally permitted by the original work, psychological counseling using it in this system is basically not a legal problem. Copyright law permits copyright owners to control the creation of derivative works (Loren, 2000). From the second purpose, it relates to the construction of an algorithm for a technical approach. The second object is to add a function of controlling the position of the output derivative works. Another is to more stably reorganize the arrangement of the derivative works. It is an additional object of the system to reflect the arrangement trend for each area and the expected value according to time in setting the arrangement of the derivative works.

The purpose of this study is to create an optimal situation for psychological counseling using secondary works for both counselors and counselors through the legal safeguards of derivative works and the technical approach of the algorithm in the system.

2. MATERIALS & METHODS

Basically, psychological counseling platform using the derivative works includes a client terminal 2, a counselor terminal 3, and a main server 1. The client terminal 2 and the counselor terminal 3 are terminals possessed by clients and counselors participating in psychological counseling. The client terminal 2 is a terminal owned by the client, and the counselor terminal 3 is owned by the counselor. The psychological counseling of the system can be preferably performed online, so that the client terminal 2 and the counselor terminal 3 can be connected by communication to enable online psychological counseling, such as a smartphone or tablet PC, a desktop computer, and a notebook computer. Figure 1 is a conceptual diagram showing the schematic configuration of this system.

The main server 1 provides to the counselor terminal 3 possessed by the counselor a request message for the content requesting counseling input from the client terminal 2 possessed by the client. In addition, it receives the counseling message input from the counselor terminal 3, analyzes the input counseling message to extract keywords, and provides derivative works corresponding to the keyword along with the counseling message to the counselor terminal 3 to perform the provided function.

It can be said that the subject of the psychological counseling platform providing system becomes the main server 1, in other words, the main server 1 becomes the system. Namely, the subject implementing the system can be called the main server 1, and the system and the main server 1 are regarded as the same in this study. The main server 1 is a series of subjects for realizing the system, and includes a server PC and a network communication together. In addition, the main server 1 can execute software as a program that can be executed on the central processing unit (CPU) and the hardware base having storage means such as memory and hard disk. A series of specific components for such software are named as 'modules' and 'parts' and 'parts'.

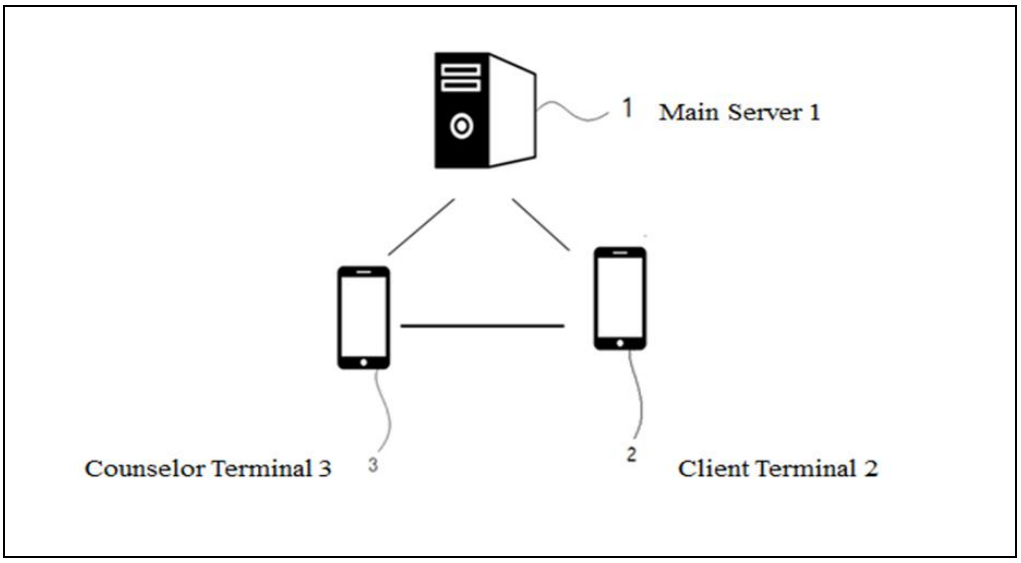

Figure 1. Conceptual Diagram for the overall system.

Based on the configuration of the main server 1, this 'modules', 'parts', 'interfaces' or 'parts' means the software or hardware like FPGA or ASIC that is installed and stored in the storage means of the main server 1 and executed via the CPU and memory. In this case, the configuration of 'module', 'unit', and 'interface' is not limited to hardware, and may be configured to be in an addressable storage medium or may be configured to reproduce one or more processors. As an example, the 'module', 'part', or 'interface' includes components such as software components, object-oriented software components, class components and task components, processes, functions, properties, procedures, subroutines, segments of program code, drivers, firmware, microcode, circuitry, data, databases, data structures, tables, arrays and variables. The functionality provided by them may be combined into a smaller number of components and 'parts' or 'modules' or further. They can be also divided into additional components and 'parts' or 'modules'. In addition, the main server 1 means all kinds of hardware devices including at least one processor, and may be understood as encompassing software configurations operating in the corresponding hardware devices according to embodiments. For instance, a computing device as a server may be understood as meaning to include a smartphone, a tablet PC, a desktop, a notebook computer, and a user client and an application running on each device. Also, it is not limited to all of these devices.

The algorithm proposed for a system for providing a psychological counseling platform using secondary work content is characterized by including four main modules and two sub modules. The first main one is a content database that stores a plurality of derivative works in which keywords are set. The second is a message input module including a request message providing unit that displays a request message input from the client terminal on the counselor's terminal, and a counseling message input unit that receives a counseling message written based on the request message from the counselor's terminal. The third main module is a keyword extraction module that extracts keywords by analyzing the counseling message. Final main module is an answer providing module that provides derivative works corresponding to the extracted keyword and the consultation message to the client terminal. The content of derivative works mentioned in this study is characterized in that it is at least one of video, music, and photos. In addition, the derivative work is any one of an image and a photo, and the answer providing module is characterized in that it includes a location control unit for controlling the position of the displayed derivative works. As the sub modules, this system consists of a region division module and a chart generation module. The region division module allows the screen of the client terminal to correspond to the central region where the counseling message is placed and the vertices of an equilateral triangle having the central point of the central region as the outer center. It also divides into 1st, 2nd, 3rd areas where the derivative works are placed. The chart generation module consists of a chart display unit, an expected value calculation unit, and a variable value setting unit. The chart display unit expresses a change in the number of cumulative arrangements of the derivative works for each area according to the consultation progress time in a chart. The expected value calculation unit calculates an expected value of the cumulative number of arrangements for each area for a future time in the chart display unit and the chart. Finally, the change value setting unit sets the change value by giving the expected value a weight that is reflected according to the upward trend and the sideways trend of the chart. The position control unit is characterized in that it controls the position of the displayed derivative works based on the change value. The detailed configuration with overall system is in shown in the figure 2.

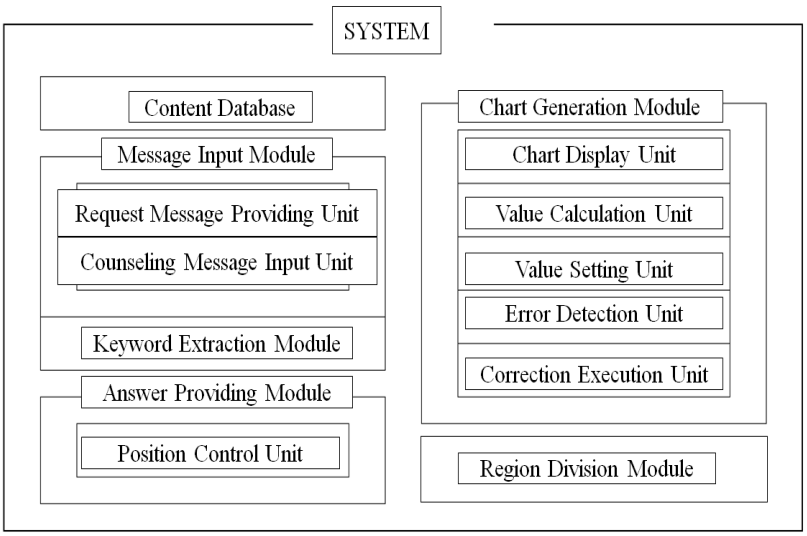

Figure 2. Configuration with overall system.

3. RESULTS

The content database stores a plurality of derivative works in which keywords are set. In addition, the derivative works may be at least one of images, music, and photos. These derivative works are protected as original works as original works created by translation, arrangement, transformation, adaptation, video production, and other methods. Currently, the derivative works right covers the preparation of new works based upon the copyrighted work, including a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted (Bohannon, 2009). Accordingly, the contents in this system obtained by translating, arranging, transforming, adapting, or staging at least one of the original works among video, music, and photos becomes derivative works.

At this time, keywords using in the system are set in all kinds of the derivative works. Therefore, when keywords including the subject or content of the corresponding image are set in a visual image including an emoticon, a photo, a picture, an icon, and so on, all of them can be said to be visual content. In addition, a keyword can basically include a meaning, and it can be said that a noun, an adjective, or a verb is a keyword. Namely, Nouns, adjectives, and verbs that can contain meaning and can be visualized can be keywords except for words that do not contain meaning. Therefore, the subject of the content of the derivative work can become a keyword. For example, if the derivative works are a gif file that shows a person smiling, the keyword of the derivative works may be 'smile' or 'fun'. Furthermore, the content of derivative works may include some videos or images containing advice from a doctor or a professional counselor on a specific keyword, or a voice for the content. There is no restriction on the keyword setting method of the derivative works or the keyword set for all derivative works, which may be set by the system administrator.

The message input module receives a request message from the client, delivers it to the counselor, and receives a counseling message as an answer to the request message from the counselor terminal 3. For this process, a request message providing unit and a consultation message input unit are included.

The request message providing unit receives a text request message from the client terminal 2 possessed by the client who wants to receive counseling. It performs a function of providing the input request message to the display of the counselor terminal 3 possessed by the counselor who is the person performing the consultation. This can be said to be similar to the message passing function in chat.

The counseling message input unit performs a function of receiving a counseling message based on the request message from the counselor terminal 3 while the request message is provided to the counselor terminal 3. In this case, the consultation message may be a response of the counselor to the consultation request message, which is the content of the consultation request. In addition, the text in response to performing consultation on the request message may be referred to as a consultation message. This consultation message may also be preferably input in the form of text. Accordingly, a text-based request message input from the client is provided to the counselor, the counselor confirms the provided request message, and the counselor terminal 3 receives a counseling message as an answer as a medium.

The keyword extraction module performs a function of extracting at least one keyword from the counseling message by analyzing the input text-based counseling message. In this case, the keyword may include a noun, an adjective, or a verb that is a word that can basically express a meaning as described above. Therefore, it can be said that a root with meaning is extracted from the counseling message in the form of text, and the extracted root becomes a keyword. For example, in the case of “It is helpful to smile even on purpose”; keywords such as 'smile', 'to smile', 'helpful' and 'it is helpful' can be extracted.

The answer providing module provides derivative works corresponding to the keyword extracted from the counseling message and the counseling message input from the counselor terminal 3. Accordingly, the client receives not only the counselor's counseling message through the client terminal 2 but also the derivative works corresponding to the keyword included in the counseling message. This has the effect of further enhancing the counseling effect. Furthermore, the above-mentioned derivative works may include some videos or images containing advice from a doctor or advice on a specific keyword by a professional counselor, or a voice for the contents. When a doctor's advice or prescription, or a video or audio of a professional counselor is provided as

derivative contents along with the counseling message, more professional psychological counseling-related content can be delivered and the reliability of counseling can be further improved.

In addition, when the derivative works is anyone of an image and a photo, the answer providing module may control the position of the derivative works displayed and output together with the consultation message. To enable this, the answer providing module may include a position control unit, and the position control unit performs a function of controlling the location of the derivative works displayed together with the consultation message. This can be said to be the same function as the multi-window of the smartphone, and it can be said that it is the same as the function that can output images or photos in a pop-up using other functions as in the multi-window currently used in smartphones. This can also be referred to as moving the position of the derivative works such as displayed images and photos within the screen on which the consultation message is output through a drag-and-drop method or the like. In this case, the location movement of the derivative works may be performed by the client through the client terminal 2, through the counselor terminal 3 possessed by the counselor, or by a system administrator. Therefore, by making it possible to easily move the location of the derivative works to a desired location, it is possible to move the derivative works to a position where the client can see it more easily without obscuring the counseling message.

Figure 3 is a conceptual diagram illustrating a screen divided into first, second, and third regions. Referring to the figure 3, this system divides the screen 10 on which the consultation message and the derivative works are output, but it can be divided so that the consultation message and the derivative works have a stable composition within the screen (10). For this purpose, basically, the system algorism may include a region division module. The area division module divides the area where the consultation message and the derivative works are arranged. In this case, the area where the consultation message is placed is generally the central area (11) located at the center of the screen (10), and the area where the derivative works are placed is at the vertex of an equilateral triangle having the center area (11) as the outer center. The first, second, and third regions (12, 13, and 14) are corresponding to each other.

Accordingly, the positions of the first, second, and third regions (12, 13, and 14) may vary depending on the position of the central region (11). In other words, when the area where the counseling message is to be output is set as the central area (11) on the screen (10) of the client terminal 2, an equilateral triangle is created with the center, which is the center point of the central area (11), as the outer center. In addition, the center point (center) of each vertex of the equilateral triangle becomes the center point of each of the first, second, and third regions (12, 13, and 14). In this case, the sizes of the first, second and third regions (12, 13, and 14) and the central region (11) are not limited. In addition, there is no restriction limiting also in the size of the equilateral triangle which makes the center area region (11) the outer center. In this point, if the center points of the first, second, and third regions (12, 13, and 14) are connected, an equilateral triangle is formed. Because the outer center of the equilateral triangle becomes the central point of the central region (11), the distances from the central region (11) to the central points of the first, second, and third regions (12, 13, and 14) are the same. Furthermore, each vertex of the equilateral triangle becomes the center point of each of the first, second, and third regions (12, 13, and 14), since there is no limitation in the setting direction of the equilateral triangle at this time. This is because a virtual equilateral triangle with the set central region (11) as the outer center is created when the central region (11) is set by the client terminal 2 in a state where the size of the equilateral triangle and the arrangement direction of the equilateral triangle are set by the system administrator. By implementing a triangular arrangement centered on the counseling message, it is possible to provide derivative content in a more stable composition, providing a more visually comfortable stability.

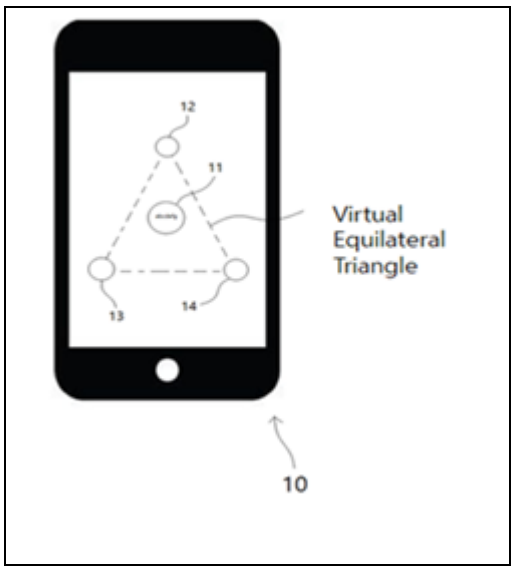

Figure 3. Conceptual Diagram illustrating a screen divided into first, second, and third regions.

Figure 4 is a conceptual diagram illustrating an example of a chart on the system. When described with reference to Figure 4, this system differentially sets the arrangement positions of the counseling message and derivative works to the central area (11) and the first, second, and third areas (12, 13, and 14).

Through this setting, it is possible to prevent the derivative works from being biased in only a specific area through comparison processing of the first, second, and third areas (12, 13, and 14) in which the derivative works are arranged. This may provide a composition of the screen (10) that forms a more psychological stability and better user interface (UI). For this purpose, the system can express the change in the number of arrangements of the derivative works for each area according to the consultation progress time in the form of a chart, including a chart generation module, and calculate an expected value for a future time point. The chart generation module basically includes a chart display unit, an expected value calculation unit, and a variable value setting unit.

The chart display unit performs a function of expressing a change in the number of cumulative arrangements of the derivative works for each area according to the consultation progress time in a chart. It is to determine how many derivative works are accumulated in each area as the consultation process takes time in the first, second, and third areas (12, 13, and 14) and the consultation starts and proceeds.

Among the charts, it is displayed in the form of a line graph, the x-axis is the consultation progress time, and the y-axis is the cumulative number of arrangements, and a line in each first, second, and third areas (12, 13, and 14) is generated to form a chart. As the consultation proceeds and the input of the request message and the provision of the consultation message are repeated, a plurality of derivative works may also be provided along with the consultation message. Therefore, it is possible to easily grasp through the chart how many derivative works are accumulated in each of the first, second, and third areas (12, 13, and 14) in the counseling process in which a request message is input by the client and a counseling message is provided.

Furthermore, at this time, the cumulative number of arrangements gradually increases as the counseling process time increases. For example, assuming that the start time of the counseling process time is 0 and the total counseling process time is 60 minutes, the end point of the graph is 60 minutes in time. As the number of cumulative arrangements increases with the increase of the x-axis(time), it is also possible to perform comparison of the cumulative assigned number for each section by segmenting the time at a preset time interval, for example, every 5 minutes or 10 minutes.

Since there is no limit in the time interval for setting the section, the section can be set by the system administrator, and thus, it is also possible to compare the expected values for each section. At this time, the cumulative assigned number value of the corresponding section becomes the cumulative assigned number value at

the end of the corresponding section. Between 0 and 5 minutes (1 section), 5 derivative works are arranged in the first area (12), so that the cumulative arrangement number is 5. If we calculate the case where 4 derivative works are placed in the first area (12) between 5 and 10 minutes (2 sections) and the cumulative number of arrangements is 9, the rate of change from section 1 to section 2 is as follows:

$$\text{The Rate of Change} = \frac{9-5}{5} = 0.8$$

The expected value calculating unit performs a function of calculating an expected value of the cumulative number of arrangements for each area for a future time in the chart. This is to check the shape of the line graph in the chart, figure out the cumulative number of arrangements for each area, and calculate the expected value for the future time. In this case, the expected value may be calculated according to each of the first (12), second (13), and third region (14).

This can be calculated according to the shape of the line graph for each area up to the present time, and the upward trend and the sideways trend, which is calculated through the technology of calculating the expected value of the graph for the future time based on the past data by analysis. However, it is based on the fact that there is no particular limitation in the calculation method. This expected value is an expected value of the cumulative number of arrangements for each of the first, second, and third areas (12, 13, and 14) for a future time point on the chart, and therefore it can be referred to as a coordinate of the chart for a future time point.

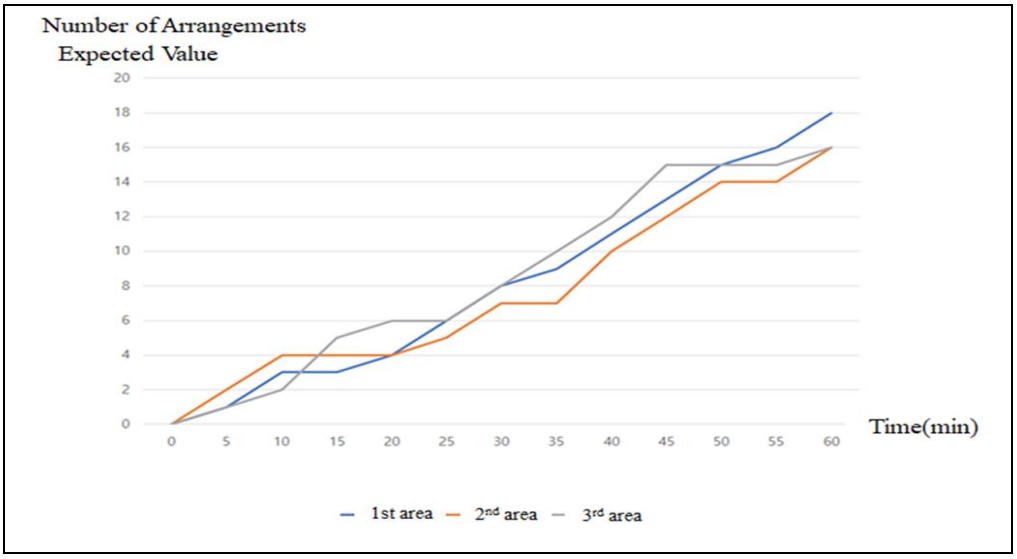

Figure 4. Conceptual Diagram illustrating an example of a chart.

Figure 5 is a conceptual diagram illustrating a graph in which variation values and errors are reflected.

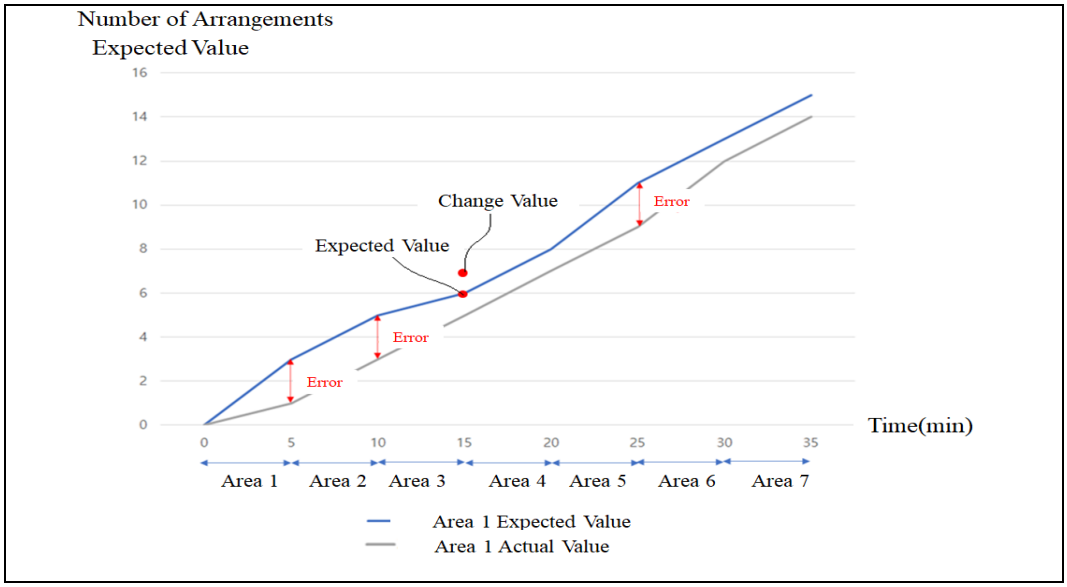

Figure 5. Conceptual diagram illustrating a graph in which variation values and errors are reflected.

Referring to figure 5, the variation value setting unit performs a function of setting the variation value by assigning a weight to the expected value. The weight basically follows the flow of the waveform on the graph. The algorithm predicts the expected value for the future according to the uptrend and the sideways trend. In the case of an uptrend, the cumulative number of arrangements is highly likely to increase in the future, and in the case of a sideways trend, the cumulative arranged count is likely to show similar values in the future. This is to set a weight for the trend. In this case, the weight setting value is not particularly limited, but when the trend of the cumulative number of arrangements for each region is an upward trend, the weight can be set in the range of 1.0 to 1.6, and in the case of a sideways trend, the weight can be set in the range of 0.8 to 1.2. In other words, in the case of an upward trend, the weight is set in the range of 1.0 to 1.6 so that the change value is set larger than the expected value. Calibration is made in a line where the values do not differ significantly. Accordingly, the change value is set by adding or multiplying the calculated weight to the expected value, and it is possible to set the change value by multiplying the estimated value by the calculated weight. Alternatively, it is possible to calculate the variation value in another method. In this case, the variation value may be preferably set according to the equation 1 below.

$$\text{Equation 1,} \qquad S = O \times \sinh^{-1}(\alpha\sqrt{(b+c)})$$

(The S is the change value, O is the calculated expected value, α is 0.8≤α<1.6 that is the weight set according to the trend of the chart, b is the lowest value of the rate of change of the cumulative arranged number expected value in a specific area, c is the cumulative arranged number expected value in the specific area means the highest value of the rate of change.)

The weight refers to the above-described weight, and may be determined according to the trend of the cumulative number of arrangements according to time for each area shown on the chart. If the cumulative arranged number is an upward trend, the weight may be set in the range of 1.0 to 1.6, and in the case of a sideways trend, the weight may be set in the range of 0.8 to 1.2. Furthermore, the rate of change for each section shown through variables b and c means that the cumulative number of arrangements increases with the increase of time. It refers to a section in which arranged number comparison can be performed. Therefore, in determining the consultation progress time from the consultation start time to the consultation end time, it is possible to obtain the rate of change for each period by comparing the accumulated count values identified at the end of the set period. The lowest and highest values are compared to each other to set a variation value. In addition, because the chart is calculated separately for each area at this time, it is based on the basis that the expected value and the change value are also calculated separately for each area. To give an example for the first region (12), if the calculated expected value is 15, the chart shows an upward trend, the weight represents a value of 1.2, the lowest value of the change rate for each section is 0.2, and the highest value is 1, it can be corrected as follows.

$$S = 15 \times \sinh^{-1}\left(1.2\sqrt{(0.2+1)}\right) = 16.30 \fallingdotseq 16$$

At this time, the value after the decimal point is corrected at the first decimal place, so that the change value can be expressed as an integer by making it possible to compute the value of an integer. The change value reflects the change rate of the expected value of the cumulative count for each section and the weight set based on the chart trend in the expected value. In order to compare the lowest and highest values of the rate of change of the cumulative expected value, each value was added and the square root was applied to standardize the rate of change that does not appear linearly. Furthermore, in calculating the change value based on the weight and the rate of change, the normalized value of the rate of change is multiplied by the weight, and then the inverse function of the hyper-sign is taken to enable the calculation of the change value with a relatively gentle value compared to a general linear graph. In this way, it was possible to emphasize the characteristics of the variation value, which was supplemented with the expected value. Therefore, the position control unit controls the position of the displayed derivative works based on the calculated variation value, when the variation value is set as described above. If the change value of a specific area is the same as the current time, the derivative works are not displayed in that area. If the change value of a specific area is higher than the current time point, the derivative works are displayed in the corresponding area to increase the cumulative number of arrangements.

In this way, the cumulative assigned number of derivative works for each of the first, second, and third areas (12, 13, and 14) for a future time point is predicted. In addition, the position of the derivative works is controlled by enabling correction of the value based on the upward trend and the sideways trend for the graph values of the first, second, and third areas (12, 13, and 14). Through this, it is possible to control the position of the derivative works to represent a more balanced and stable composition. In this case, the position control of derivative works may be performed automatically on the system, but may be performed by a system administrator, or may be controlled by the client terminal 2 possessed by the client. Therefore, mechanical control can be performed according to the trend of the chart or the predicted value at a future time, when control is performed on the system. However, when position control is performed by the system administrator or client, it may be relatively difficult to predict because the intention of the system administrator or client is reflected rather than mechanical control.

In order to compensate for the fact that human psychology is reflected and errors may occur, the chart generation module of the present system may further include an error detection unit and a correction performing unit. The error determiner compares the expected value for each area calculated at a past time point with the value of the accumulated number of arrangements for each area at the current time point to determine the number of errors occurring beyond a preset range. In other words, for each of the first, second, and third regions (12, 13, and 14), the estimated value of the cumulative count calculated at a time in the past rather than the current time point and the value of the actual cumulative number of each area identified at the current time point , and determine the number of errors generated. However, in the case of an error within the preset allowable range, the number of errors exceeding the previously set range is not recognized as the number of errors because it is within the range. When the preset error range is ±1, for example, it is recognized as the number of errors only when an error out of the corresponding range occurs.

When an error is detected through the error determining unit as described above, the correction performing unit performs a function of once again correcting the variation value set in the above-described variation value based on the number of detected errors. Therefore, by slightly increasing or decreasing the change value by reflecting the error, for example, by adding, subtracting, multiplying, or dividing a specific value from the change value by reflecting the incoming difference, additional correction is performed on the change value to minimize the error occurrence probability and make more accurate predictions possible. The corrected variation value may be set by the equation 2 below.

$$\text{Equation 2,} \qquad S = O \times \sinh^{-1}(n \times \beta \times \alpha\sqrt{(b+c)})$$

(The S is the change value, O is the calculated expected value, α is 0.8≤α<1.6 that is the weight set according to the trend of the chart, b is the lowest value of the rate of change of the cumulative arranged number expected value in a specific area, c is the cumulative arranged number expected value in the specific area means the highest value of the rate of change. n is the number of detected errors, β is 0<β<1 which is the error weight.)

This equation is a further reflection of the number of errors and the weight of the errors identified in Equation 1 above, wherein the weight of the error is a value that can be set according to the importance of the error, and is preferably a value that can be set by a system administrator. The error weight range may be set between 0 and 1. To give an example for the first region (12), if the calculated expected value is 15, the chart shows an upward trend, the weight represents a value of 1.2, the lowest value of the change rate for each section is 0.2, the highest value is 1, the number of errors is 3 and the error weight is 0.28, it can be corrected as follows.

$$S = 15 \times \sinh^{-1}\left(3 \times 0.28 \times 1.2\sqrt{(0.2+1)}\right) = 15.76 \fallingdotseq 16$$

All sub-conditions such as decimal values and change values were set as in the first case described above. In the second case, the accuracy of the value was improved by correcting the variation value once more by reflecting the error, but the importance of the error was compared and processed by reflecting the error weight rather than simply multiplying the error.

5. DISCUSSIONS

The following effects can be expected through the algorithm design for constructing a system for providing a psychological counseling platform using derivative works. 1) By enabling the content of recreated derivative works based on copyright-protected images, music, and photos to be provided together during psychological counseling, it enhances the effectiveness of psychological counseling and improves the concentration of counseling at the same time. 2) The output position of derivative works can be freely controlled, enabling a harmonious arrangement with text. 3) The content of derivative works can be arranged in a triangular composition centered on the counseling message in the text to provide psychological stability. 4) The expected value for each divided area was calculated and based on this, derivative work content arrangement was made possible. Through this, there is an effect of correcting the value by reflecting the upward trend and the sideways trend, and controlling the position of the derivative works accordingly to represent a more balanced and stable composition.

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