

Psychological Counseling and Treatment Path of Painting based on Mobile Internet Technology

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Abstract

Psychological counseling has been highly valued by all walks of life, and the way of psychological consultation has a significant impact on the effect of psychotherapy. The psychological consultation between the Internet and reality has become important in the face of psychological counseling with the deepening of the research on the Internet plus mental health. This study was performed with the following aims: (1) examine the development of psychological counseling under the Internet environment, especially based on the current situation of psychological counseling in colleges and universities; (2) explore the painting psychological test and analysis method, its implementation path, and the classification and evaluation method of painting image based on decision tree algorithm; (3) design the "painting heart sound" painting psychological software system based on mobile Internet and software engineering technology; and put the "painting heart" painting psychology software system into practice. The sound painting psychological software system was applied in four cases. The practice results showed that the Internet plus psychological counseling had a great advantage in painting therapy, which was an effective way to do psychological counseling in colleges and universities, implement the "10 major educating people" system, and maintain the mental health of college students. The findings might help enrich psychological counseling channels and improve psychological consultation results.

Keywords

Decision tree algorithm; Drawing voice software system; Mobile Internet; Painting psychological test; Psychological consultation.

1. Introduction

According to the sampling survey data of the Ministry of Health of the People's Republic of China, 20% of the population has issues regarding mental health or subhealth, of which about 5% is suffering from mental illnesses. Using the symptom checklist 90 (SCL-90), it was found that the detection rate of psychological problems among college students was between 16% and 30%. The data showed a high proportion of psychological abnormalities. A series of reports on college students' suicide, Internet addiction, online loan, and depression revealed that some students had serious psychological problems, which affected the students themselves and even the studies of others. The healthy growth of students should be promoted, and qualified talents should be better trained for the country's all-round development of morality, intelligence, physique, beauty, and labor so as to achieve timely and effective psychological counseling and treatment for them. In psychological consultation, painting psychotherapy, as an important method of "art therapy," can effectively recover interviewees from the spirit of creation. Visitors can explore their potential self, stimulate themselves, and display their personal psychology in the changes of graphics and colors through visual stimulation. The process of painting gives a clear picture of interviewees' hearts. It makes the invisible psychological state

visible through portraits, providing a more intuitive understanding and interpretation for psychological consultation.

At present, Internet technology and mobile terminal equipment have become popular among college students. The survey data showed that as of December 2018, the student group accounted for 25.4% [5]. In terms of the age structure of Chinese Internet users, young and middle-aged groups were the main groups, and the proportion of Internet users aged 20–29 years accounted for 26.8% [5]. Internet plus technology is an important technology to promote social transformation and has become the driving force of social development. It has become the platform to support the cultivation of innovative talents in universities. Therefore, integrating Internet technology and achieving Internet plus mental health is of great significance in the process of counseling, education, and treatment of college students. The psychological consultation of painting can provide psychological help for interviewees more conveniently and covertly, better protect the privacy of interviewees, and realize the psychological consultation of "anytime, anywhere," with the help of mobile Internet technology. At the same time, it can provide more valuable judgment and decision support for psychological counselors with data and image analyses of the computer.

2. Painting Psychotherapy

Studies have shown that the right hemisphere of the human brain has the ability of perception, spatial positioning, and artistic discrimination. At the same time, human emotion and other psychological functions are controlled by the right hemisphere of the brain. Activities such as painting art and people's emotional function control belong to the right hemisphere. Painting activities can effectively reflect and affect people's emotions and psychological state, providing the medical basis for the psychological treatment of painting [6].

Painting psychotherapy is a psychotherapy method based on the theory of psychological projection. This method can show the psychological characteristics of interviewees in the form of graphics and images. The psychological images of interviewees, which is an objective reflection of the free will of interviewees, is better understood through the process of painting communication. At the same time, painting is the embodiment and expression of people's emotions and the external graphic reflection of people's potential consciousness. Through painting, interviewees can project their personal emotions, psychological states, wishes, and feelings in their paintings, and the paintings become the expression of their inner subconsciousness.

Painting psychotherapy is based on the painting creation of interviewees. In the process of painting, a psychotherapist can analyze and guide interviewees to express freely in a relaxed and respected environment. The inner world of interviewees can be displayed through the color, shape, position, and other characteristics of images, which helps interviewees reduce their psychological defense lines and truly express their inner feelings and psychological conflicts. Also, the goal of psychotherapy can be achieved through painting to release pressure, vent emotions, and get rid of psychological distress. The process of painting can cause emotional resonance and make up for psychological defects of interviewees. It is an important method of clinical psychotherapy at present. It can help interviewees overcome their psychological fear, relieve their psychological anxiety, express and vent their psychological emotions, and play an active guiding role in mental health.

At present, painting psychotherapy has been applied to the mental health consultation for college students. It is an important means of psychological crisis intervention and an important communication mode of mental health consultation. It has advantages of strong operability and varied forms. At present, the main methods of painting psychotherapy include Fang Shuren psychological test, drawing tree test, jigsaw puzzle test, and additional drawing test. It has

become an innovative mode of mental health consultation for college students due to its wide adaptability.

3. Path Study of Internet Plus Painting Psychological Test and Analysis

The psychological test and analysis of painting based on Internet technology is carried out through the network, which can effectively record the process of painting through computer technology. At the same time, the use of mobile Internet and image analysis technologies can realize the feature extraction and analysis of painting images, establish the relationship between image features and psychological characteristics, and provide technical means for later automatic psychotherapy. The collection and decision analysis of mental health data can be realized, psychotherapy data and image features can be effectively summarized and analyzed, painting types can be automatically classified and judged, and the effect of psychological testing and analysis of painting can be improved using big data technology and decision tree analysis method. The test and analysis of painting psychology based on Internet technology is an innovative means of current painting psychological test and analysis.

The process of psychological test and analysis of painting generally includes "thinking creation review confirmation comparative judgment rethinking" and other links. The emotional trauma of interviewees can be effectively alleviated and the self-awareness, self-respect, and soul sublimation can be enhanced through the psychological test and analysis of painting. The process of psychological test and analysis of painting based on Internet technology enables interviewees to express their personal psychological state freely in an undisturbed environment, which is not limited by the environment and time and has good flexibility. It is an innovative way to test and analyze painting psychology. The process of psychological test and analysis of painting based on Internet technology is shown in Figure 1.

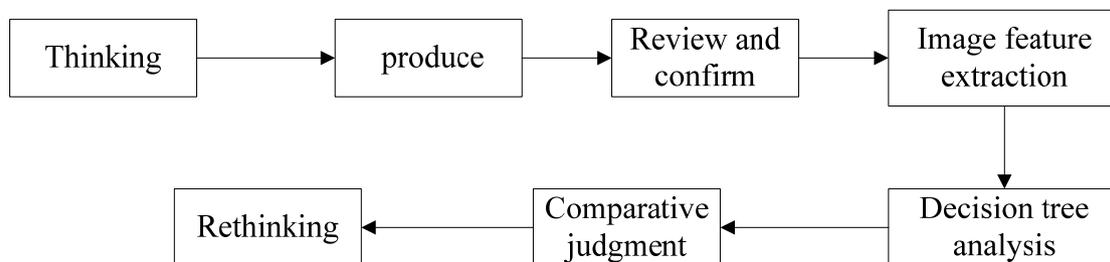


Figure 1. Process of psychological test and analysis of painting based on Internet technology

It is important to classify and test images in computer-based and automatic image analyses. In this study, the decision classification mechanism based on the random forest algorithm was investigated. The algorithm comprised N decision trees. In the set T of M painting image samples, X painting image samples with the same capacity were selected by random sampling, the decision analysis tree was constructed for the sample set t , and the classification results of painting images were output according to the branches of the decision tree [12]. The algorithm construction steps are shown in Figure 2.

In the process of painting psychological test and analysis based on Internet technology, the specific implementation steps of painting image classification were as follows [12]:

Step 1: Calculate Gini coefficient according to Formula 1.

$$Gini(p) = \sum_{x=1}^X p_x(1 - p_x) = 1 - \sum_{x=1}^X p_x^2 \quad (1)$$

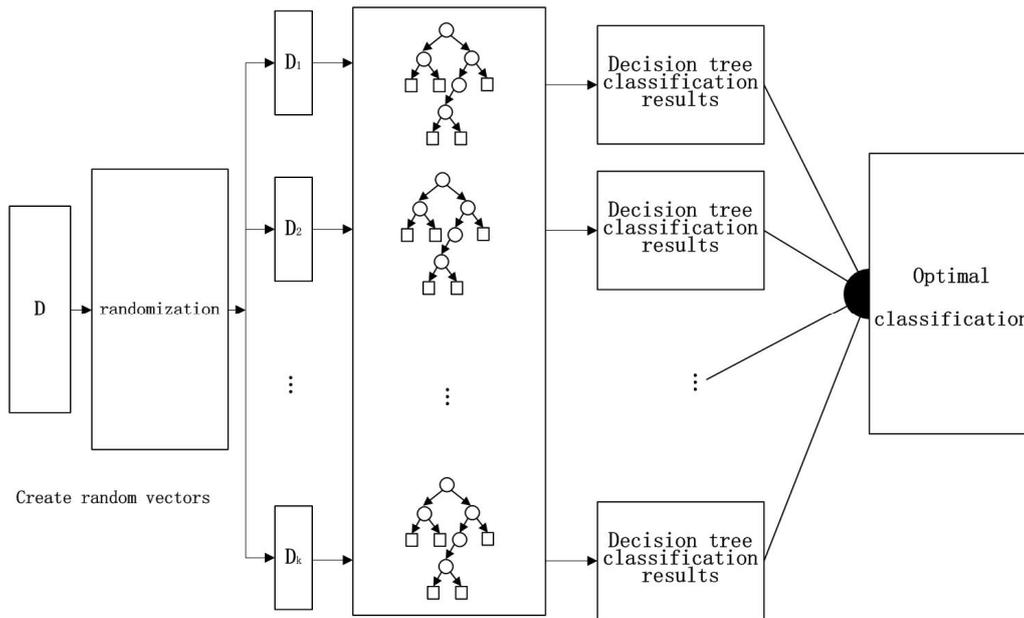


Figure 2. Construction steps

In formula (1), X is the number of categories and p_x is the corresponding probability of categories.

Step 2: Calculate the Gini coefficient of probability distribution according to formula (2) and make a second classification:

$$Gini(p) = 2p(1 - p) \tag{2}$$

In formula 2, p is the output probability of the first sample.

Step 3: Calculate the Gini coefficient of sample d according to formula (3).

$$Gini(T) = 1 - \sum_{x=1}^X \left(\frac{|C_x|}{|T|} \right)^2 \tag{3}$$

In formula (3), T is the sample, $|T|$ is the number of samples, X is the number of categories, and $|C_x|$ is the number of the k th category.

Step 4: Calculate the Gini coefficient of sample T under the condition of characteristic A according to formula (4).

$$Gini(T, A) = \frac{|T_1|}{|T|} Gini(T_1) + \frac{|T_2|}{|T|} Gini(T_2) \tag{4}$$

In formula (4), T is sample T , $|T|$ is the number of samples, A is a certain eigenvalue of characteristic A , and $|T_1|$ and $|T_2|$ are two parts of T .

Step 5: Construct the decision classification tree.

(1) Set the initial value. T is the data set of the current node, t is the threshold, and X is the number of samples; if $(X < t)$, the decision subtree is returned and the recursive calculation is stopped.

(2) Calculate the Gini coefficient of sample set T according to formula (3). If $Gini(d) < t$, the decision subtree is returned and recursive calculation is stopped.

(3) According to formula (4), calculate $Gini(T, A)$ of the data set T for each eigenvalue of the current node and deal with the missing value.

(4) In the $Gini(T, A)$ of the calculation results, the characteristic A with the smallest Gini coefficient and the corresponding eigenvalue A are selected. According to the optimal characteristic and the optimal eigenvalue, the data set is divided into two parts T_1 and T_2 . At the same time, the left and right nodes of the current node are established. The data set T of the left node is T_1 , and the data set T of the right node is T_2 .

(5) Continue to operate the left and right sub-nodes of the decision analysis tree and use a recursive algorithm to execute steps 1–4 until the decision tree is generated.

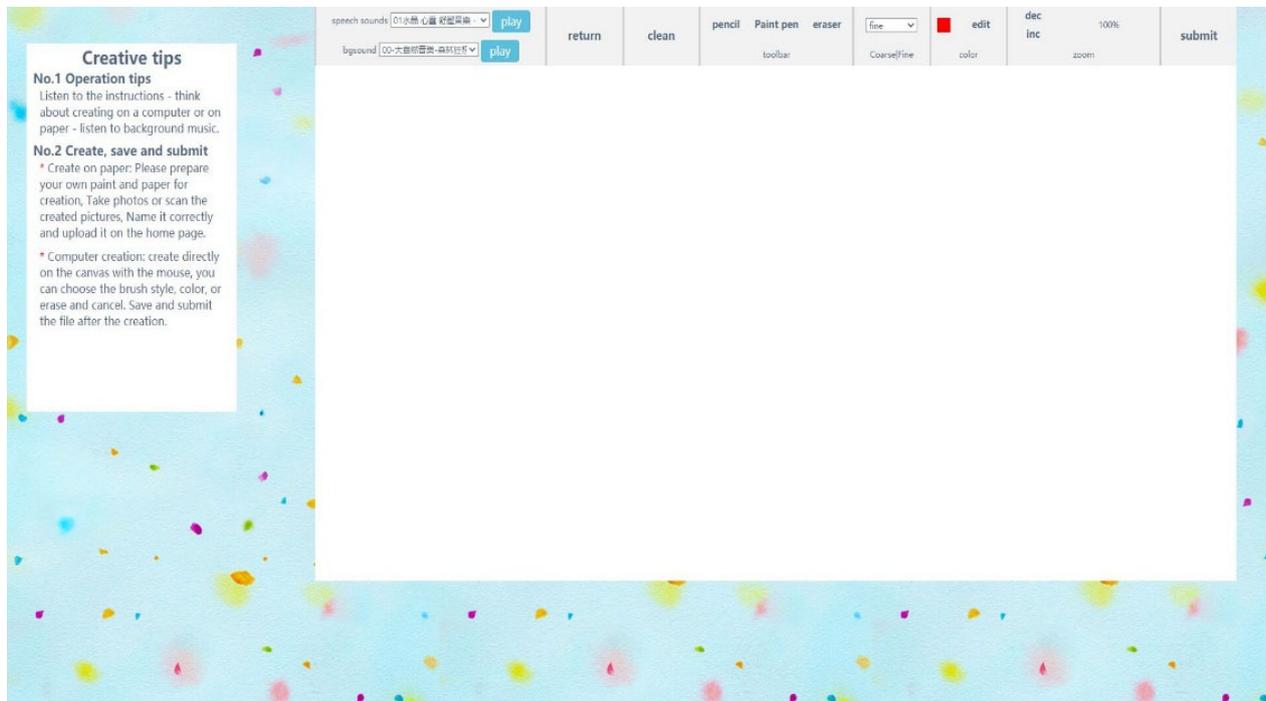
During the prediction of decision tree, if sample A in the test set falls on a leaf node, multiple training samples are present in the node. Then, the class with the largest probability in this leaf node is used for a class prediction.

This study explored the effective connection and integration of Internet technology and psychological counseling. The proposed method could effectively solve the problem of insufficient psychological counselors in colleges and universities, timely intervene and help students with psychological obstacles through Internet technology, and effectively solve the current situation of inactive and inactive psychological consultation, which was conducive to overcoming psychological barriers and solving psychological difficulties through the network. At the same time, the psychological test and analysis of painting based on Internet technology did not need a fixed place and was not interfered by the people around. With the help of the network, interviewees could feel that no other person was around, and they could express their inner state more freely, reflect their psychological characteristics better, and improve the effect of psychotherapy.

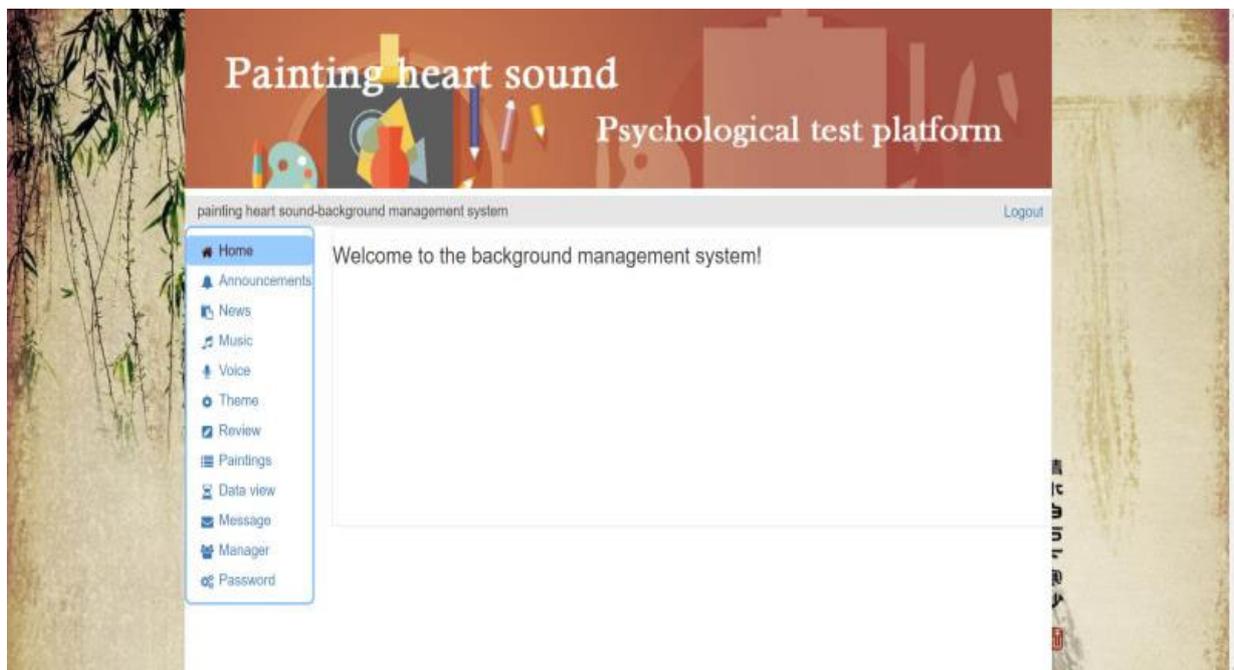
In this study, a software system named "voice of the heart" was designed and developed for testing and analyzing the painting psychology of Fang Shuren based on Internet technology. The software system aimed at a group of college students. Fang Shuren's painting test had good operability through the mobile Internet terminal equipment.

Users of the "voice of painting" software system included tourists, visitors, consultants, and administrators. The main functions of the system were announcement and notice, news reading, work upload, historical painting management, and other basic functions. Meanwhile, a painting function module was designed. Interviewees could create and upload works using color, graphics, and function buttons in the canvas area. In addition, the system had designed functions such as reviewing the paintings assigned under the account number, writing conclusions, and so forth. It also designed the audio-visual function module, which could select the voice and music and view the text description in the prompt box. The software system also had a statistical function, which could perform statistical analysis on the number of paintings, sex and age, and the number of reviews. It could also make statistics and save the creation of painting works and review records. The software system implementation is shown in Figure 3. Through the hierarchical channel of "mental health center + department + class + dormitory," the psychological test and analysis of painting based on Internet technology realized the combination of network platform and offline studio, adopted the way of combining virtual and reality scientifically, and pertinently conducted psychological health education for college students, which improved the convenience and effect of psychological test and analysis of painting. At the same time, the system designed the encryption protection function, encrypted the user's basic data, encrypted the front-end and background four identities, and used password and verification code for security authentication and data encryption processing so as to better protect the personal privacy of interviewees, relieve their concerns about

psychological counseling, and create a better environment for psychotherapy. Color and graphic selection functions were set up in the software system of "picture voice" to facilitate the operation of interviewees. Selection functions of color board, color bar, and basic shape box were realized, and selection and deployment functions of importing personalized graphics and common graphics configuration were performed.



(a) Drawing function interface of "drawing heart sound."



(b) Function selection interface of "drawing heart sound"

Figure 3. Software system design of "drawing heart sound."

4. Practice of Internet Plus Painting Psychological Test and Analysis

The development of the painting psychology test and analysis software system based on Internet technology has been completed and applied to college students. This study involved a comparative analysis of offline questionnaire consultation and online painting psychological consultation.

(1) Psychological counseling questionnaire survey

Questionnaires were distributed to 176 participants; then, all the 176 filled questionnaires collected were valid. Further, 10 students and 2 student associations in science and engineering were surveyed. Also, 10 subjects were mainly designed through psychological counseling, school psychological counseling center, Internet plus psychological counseling, and painting. The title design is shown in Table 1.

Table 1. Questionnaire topics

Serial number	Title	Option
1	Have you ever participated in Fang Shuren's painting creation?	Yes, No
2	What is your intention to draw software system based on the Internet platform?	Very willing, willing, unwilling, it does not matter
3	What is your favorite part of this painting?	Houses, trees, people, others
4	What is the easiest part in this painting?	House, tree, character, decoration
5	What is the most difficult part in this painting?	House, tree, character, decoration
6	Operate when listening to the voice instructions?	Play normally, repeat, pause, slow down
7	Types of music played during painting:	Classical, popular, pure music, not played
8	What's your mood when painting a house tree?	Happy, peaceful, anxious, unclear
9	What's your feeling after this painting?	Good, good, average, poor
10	How long did you take to complete this painting?	0-5 min, 6-10 min, 11-30 min, more than 31 minutes

The statistical analysis of the offline psychological counseling questionnaire showed that 89.2% of the students accepted psychological counseling, and 85.23% accepted the "Internet platform" psychological counseling. The questionnaire survey showed that students had a positive attitude toward psychological counseling based on Internet technology. It also revealed that 73.3% of the respondents knew about the psychological counseling of painting therapy. The statistical results of the questionnaire indicated that college students accepted online psychological painting therapy based on the Internet platform.

(2) Practice analysis of online painting psychological test

In the online painting psychological test and analysis practice, the respondents' "Internet plus painting psychological test and analysis" software system was tested and compared. Two tests were carried out. In the first test, two students failed the test, and the remaining 63 chose Fang Shuren's painting psychological test. The test showed that 95.24% of the student works had complete structure and content, had a clear understanding of the voice guidance and text explanation, and were more proficient in the operation of mobile Internet devices; the overall quality of the interviewees was better. In the second test, 59 people chose Fang Shuren's painting psychological test, 5 chose Datura painting psychological test, and 1 chose Taiji drawing psychological test. The interviewees had a good understanding of the test process and

achieved good results. The psychological painting images were classified and output according to the decision tree analysis algorithm. The four kinds of "house tree person" images are shown in Figure 4.

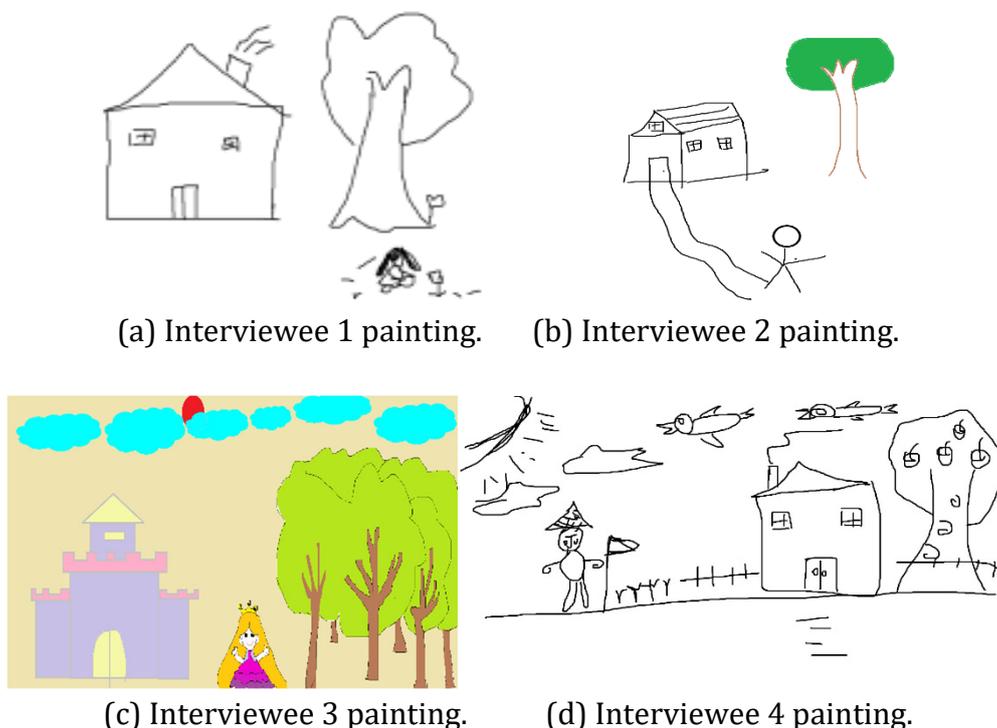


Figure 4. Interviewees drew treatment pictures

Figure 4a shows the painting works of Fang Shuren of interviewee 1. In this figure, the interviewee said that the idea of painting was that a child was playing happily in the lawn outside his home, and a house was located nearby, where cooking smoke was burning.

Figure 4b shows the painting works of Fang Shuren of interviewee 2. In this figure, the interviewee expressed the idea of painting that people who had a busy day in summer walked toward their homes, and their homes and trees always waited for the return of the characters.

Figure 4c shows the painting of Fang Shuren of interviewee 3. In this figure, the interviewee said that the idea of painting was that a princess walked back to the castle happily after playing with her friends. Blue sky, red sun, green trees, and people had a good mood.

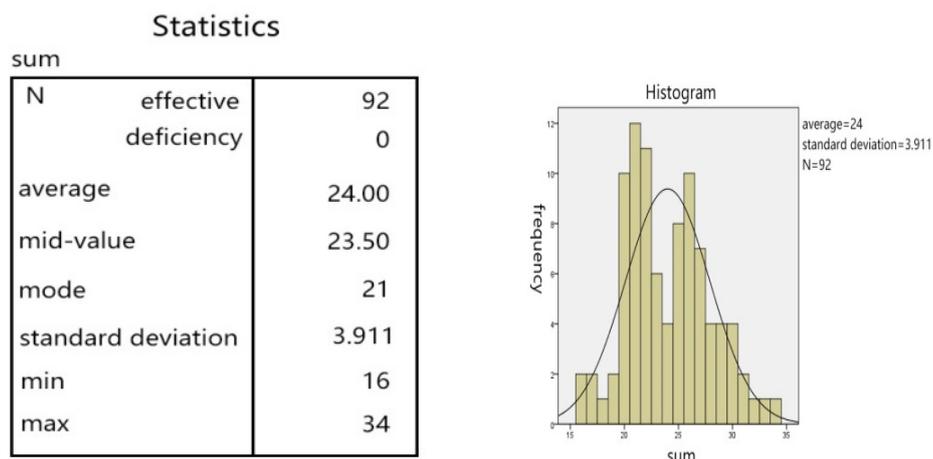
Figure 4d shows the painting works of Fang Shuren of interviewee 4. In this figure, the interviewee expressed the idea of painting: Thinking of the picture of people working hard and the picture of curling smoke and harvesting.

(3) Comparative experimental analysis of the general self-efficacy scale

The general self-efficacy (GSE) scale was used to test and analyze the participants in this study so as to verify the effectiveness of the psychological test and analysis of painting based on mobile Internet technology.

The test guide was as follows: in the following 10 sentences about your general opinion of yourself, please mark "√" on the selected number according to your actual situation (actual feeling): 1 = totally incorrect; 2 = slightly correct; 3 = most correct; 4 = completely correct. No right or wrong answer exists, and thinking too much about each sentence is not required.

In this test, 97 questionnaires were collected, 92 were valid questionnaires, and the effective rate was 94.8%. The total score basically conformed to the normal distribution, and the results were credible. The experimental data analysis chart obtained using SPSS is shown in Figure 5.



(a) Static data analysis. (b) SPSS software analysis chart.

Figure 5. Experimental data analysis chart obtained using SPSS software

The experimental results showed that the test data of the self-efficacy scale conformed to the normal distribution characteristics, and the test results were consistent with the online psychological test results of painting based on the software system of "picture heart sound."

(4) Evaluation analysis of online painting psychological test and analysis effect test

In the psychological test and analysis of painting, 12 students with mental health problems were selected, and the project team conducted 2-month team counseling for 12 respondents. The name and goal setting of team coaching activities are shown in Table 2.

Table 2. Team coaching activity name and goal setting

Stage	Activity name	Unit target
First stage	I want to find your drawing psychology software:	Summarize the activity, compare and analyze, and test the effect
Second stage		
The second stage	"Five" unit painting (paper + software): f	From the initial understanding of team members, develop group rules to the end of the activities, and complete psychological post-test
The third stage		
Third stage	Activity summary:	Summarize the activity, compare and analyze, and test the effect

The group counseling process was divided into three stages: determine the object, establish the group, and implement the group counseling; the data were sorted and the effect evaluation report was completed in 8 weeks. The interviewees used the "drawing heart sound painting psychological software system" to complete the painting.

A questionnaire survey was conducted again after the completion of the phased team counseling. A total of 92 respondents were selected for the preliminary test, including 12 who had received team counseling, to conduct comparative experimental analysis. A total of 92 GSE questionnaires were collected, 91 of them were effective, and the effective rate was 98.9%. After sorting out, the data of pre-test and post-test were all valid in 83 groups (including 12 groups receiving counseling and other 71 groups). SPSS18 was used to conduct "independent-

samplest test" on the data in the collected questionnaires. In the independent-sample ttest, the significance value P was considered as the data analysis result. If $P < 0.05$, the difference was statistically significant. If $P > 0.05$, the correlation between pre-test and post-test data was not significant; that is, group auxiliary activities were invalid. If $P < 0.05$, the correlation between pre-test and post-test data was significant; that is, the group-assisted activity was effective. If $P < 0.01$, the correlation between the pre-test and post-test data was extremely significant; that is, the group-assisted activity was effective. The specific experimental parameters of the independent-samplest test are shown in Table 3.

Table 3. Analysis results of independent-samplest test

	Difference between the two groups before the activity	Difference between the two groups after the activity	Pvalue
Homogeneity of variance	5.67±6.095	0.48±4.554	0.001
Heterogeneity of variance			0.014

The independent-samplesttest analysis data in Table 3 showed that the P value was 0.001 (less than 0.01) under the condition of homogeneity of variance and 0.014 (very close to 0.01) under the condition of nonuniformity of variance, indicating that the group counseling activity obviously improved the self-efficacy of college students.

5. Summary and Prospects

Painting psychotherapy is one of the effective ways of psychological consultation and treatment in mental health centers of colleges and universities. This study designed the "painting heart sound" painting psychological software system based on the mobile Internet and software engineering technology,, which could perform the psychological measurement and analysis of painting anytime and anywhere. It was an effective method for mental health consultation and treatment of college students.

This study showed that the psychological measurement and analysis of painting based on Internet technology, through online communication and consultation in a virtual environment combined with counseling and consultation in actual offline environment, enriched the form of psychological measurement and analysis of painting, was conducive to counselors offering targeted psychological counseling services, solving psychological problems, and improving counseling effect. Of course, painting psychotherapy still had some limitations. Hence, the standardization of "Fang Shu Ren" painting treatment standard needs further exploration.

Acknowledgments

This study was supported by a project on research and implementation of painting psychotherapy software technology based on mobile Internet technology (17zb0493).

References

- [1] Wang Longde's healthy lifestyle and healthy China 2020 [J]. Journal of Peking University: Medical Edition, 2010, 42 (3): 245-246. Doi: 10.3969/j.issn.1671-167x.2010.03.001
- [2] Role separation and integration of college counselors from the perspective of Li Qi's psychological counseling DOI:10.13236/j.cnki.jshe.2018.07.017

- [3] Macaurti's children's painting and psychotherapy [M] translated by Li Xiaoqing, Beijing: China Light Industry Press, 2005.
- [4] Tan Caijun, Huang Meilian, Su Lidi. Analysis of the effect of cognitive behavioral nursing therapy on improving self-care ability of patients with depression [J]. Journal of clinical nursing, 2018, 17 (3): 33-35.
- [5] The 43rd statistical report on China's Internet development http://www.cnnic.net.cn/hlwfzyj/hlwzxbg/hlwtjbg/201902/t20190228_70645.htm [EB / OL]. February 28, 2019.
- [6] XieZiqing, Chen jionghua, and Chen Haisong on College Students' attitudes towards psychological counseling -- a case study of Guangzhou Institute of technology and technology [J] think tank era, 2019, (43), 137-138.
- [7] Application of Liu Xueqin and Li Pengfei's painting psychotherapy in college students' group psychological counseling [J] Journal of Jiyuan vocational and technical college, 2013, 6:33-34.
- [8] Research on the application of Wu Peibo's painting therapy in mental health education of independent college students [J] contemporary education practice and teaching research 2016, (03): 210-211.
- [9] Tong Huijie. Three testing techniques in psychology. Journal of Nanjing Normal University (SOCIAL SCIENCE EDITION) [J], 2002, 5 (3): 81-88.
- [10] Application of Xuxinzan's painting psychotherapy in college group psychological consultation course teaching [J], 2015 (78) 159:160.
- [11] Application of Chen Yan's painting therapy in psychological counseling of primary and secondary schools.
- [12] Su Yun, research on emotion recognition and emotion induction of agent based on Ontology [D], Lanzhou University, 2019.