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The Impact of Dream Desensitization Based Data Interpretation on the Mental Health of Youth in Healing Communities

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Abstract. The market for widely popular services like astrology, dream interpretation, MBTI Type 16 personality testing, and other self-help tools has grown as young people's interest in "self-exploration" has grown and they become increasingly interested in understanding or healing themselves through many means. Since dreams can reveal hidden stress, suppressed feelings, and even trauma, dream interpretation has gained popularity as a gentle psychological therapy technique. Through the interpretation of the data and the guiding of the image, the Dream Image—which is created from desensitized dream data—visualizes the dreams of young people in the community and seeks to investigate their impact on mental health. In order to examine the relationship between desensitized dream data and artificial intelligence image generation, the image integrates AIGC, data desensitization, data visualization, and 3D real-time rendering approaches. AIGC created the "dream image" in order to more vividly depict the psychological state of young people. The experimental and statistical results indicate that this AIGC-based visual representation of dream data can improve participants' quality of life and sense of well-being by fostering a positive mindset and healthy coping mechanisms, as well as improving their self-knowledge and ability to manage their emotions.

Keywords. Mental health, AIGC, Dream interpretation, Psychotherapy

1. Introduction

This paper's research is motivated by the pressing need to address issues related to youth mental health as well as the ongoing quest for psychological recovery and self-discovery. We propose a method for interpreting "dream images" generated from dream desensitization data in response to the need for dream visualization and dream healing. We also explore the impact of this method on the mental health of youth in the healing community and strive to provide more effective and individualized mental health support for young people in the community. The goal is to give the young people in the healing community more individualized and efficient mental health support, and to assess the impact of this care on their sense of self, capacity to control their emotions, optimistic outlook, and healthy coping strategies.

The number of "empty-nest youth" has increased recently, and young mental health issues are becoming more and more common in today's culture. As these issues

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continue to grow, society should pay attention to them [1]. Young people are anxious to discover a practical means of self-healing when they are faced with stress, worry, and psychological trauma. A variety of psychological healing techniques, such as astrology, dream interpretation, and the MBTI Type 16 personality test, have emerged in response to this need.

Dreams have attracted the attention of researchers as an important psychological phenomenon. Dreams are a mirror of people's inner depths, which can reflect neglected invisible stresses, unexpressed inner emotions, and potential traumas. Therefore, dream interpretation has become a conventional method in psychotherapy, and drawing the interpretation is a intuitive and vivid therapy with certain therapeutic effects [2].

However, there are certain limitations associated with the traditional method of dream interpretation. Firstly, due to the sensitive nature of dream content, public disclosure may not be readily accepted by all individuals. Secondly, manual dream interpretation lacks an intelligent and efficient mode of visualization, thereby hindering participants' complete comprehension of dream meanings. Consequently, it is crucial to devise an innovative approach that addresses these concerns and offers personalized and effective assistance for the mental well-being of young individuals.

We aspire to present an inventive methodology and tool for nurturing the mental health of young people within the community. Utilizing dream images, participants can delve into their stresses, emotions, and traumas, thereby enhancing their self-awareness. Simultaneously, the utilization of visualization empowers participants to gain a deeper understanding of their psychological states and develop skills for emotional management. Through an analysis of experimental and statistical outcomes, this study aims to establish the effectiveness of visually presenting dream data generated by AIGC (Artificial Intelligence and Generative Creativity). Moreover, it endeavors to demonstrate that dream images have a positive impact in guiding participants towards a constructive mental framework, enriching their mindsets, and developing healthy coping mechanisms. Consequently, this approach will facilitate the provision of precise and personalized mental health support, specifically tailored to meet the diverse needs of young individuals within the healing community.

2. Relevant Studies

In light of the aforementioned expectations, we have conducted pertinent research on the influence of dream interpretation on the improvement of mental health, as well as the visual depiction and examination of dream data. We have gleaned insights from the scholarly community's relevant studies and methodologies in this domain, and utilized them to establish the necessary foundations for the realization of dream image generation and the establishment of a comprehensive dream interpretation framework.

In terms of the impact of dream interpretation on healing mental health, there have been some studies at home and abroad that have made important progress. Some of the relevant studies and researchers are described below:

Freud, as a founder of the field of psychology and psychoanalysis, made important contributions to the interpretation of dreams. He introduced the concept of the subconscious mind and argued that by interpreting dreams it is possible to reveal the underlying psychological conflicts and desires of an individual [3]. Jung developed the theory of individual psychology and proposed the concept of the collective unconscious in dreams. He believed that dreams reflect archetypes and symbols shared by human beings, and by interpreting these symbols, the connection between the individual and

the collective unconscious can be understood [4]. Hall C S conducted a lot of research on dreams and proposed the concept of "dream decoding". He believes that dreams are the reflection and organization of an individual's daily life experiences, and that the interpretation of dreams can reveal an individual's potential needs and emotional states [5].

In addition, there are some related researches on dream visualization analysis and artistic image presentation: Japanese scientists Yukiyasu Kamitani et al., 2013 proposed a neural decoding method, which uses functional magnetic resonance imaging to find out the connection between human brain activity patterns and vocabulary and image databases, and predicts the visual image content during the early stage of sleep through a machine-learning model. Content. The findings suggest that specific visual experiences during sleep are consistent with the brain perception of visual stimuli during wakefulness, which provides a way to reveal the subjective content of dreams using objective neural measures [6]. Aiello et al., 2021 designed a data visualization tool "Dreamcatcher ", which can be used to "map" eight factors of any individual's dream: family members, negative emotions, aggressive interactions, animals, friends, male roles, female roles, and imagined existences, and they believe that by analyzing dreams, one can gain insight into one's psychological state and potentially solve problems [7]. The "dream visualization" system independently developed by Eddie Bing Chen et al., 2023, is mainly dedicated to the explicit presentation of the hidden cognitive states in the subconscious and unconscious states of human beings, to be used in the fields of sleep monitoring, health management, and psychological healing [8]. These studies provide important references and insights for us to understand and apply the role of dreams in the field of mental health.

3. Design Case

Combining the theoretical and technological results mentioned above, we conducted an innovative study of dream interpretation as a way to heal mental health. A certain number of community youth aged 20-35 years old were recruited as participants. They should have some degree of psychological problems or stress and have the willingness to participate in studies. Data was collected and integrated from the participants' dreams, which were desensitized to enable the research team to generate "dream images" based on the data while protecting the privacy of the participants. These images can help participants gain a deeper understanding of their inner world and provide personalized mental health support.

3.1. Data collection and preprocessing

First, during the data collection process, participants will be asked to collect their personal information, mental health status, life experiences and other relevant data for subsequent analysis and interpretation. Secondly participants will be asked to record their dreams every night. In order to protect privacy for desensitization, participants can use a specialized mobile app or online platform to record dream data. This data should include information such as dream description, emotional expression, and dream duration. Participants' privacy will be protected during the data collection process.

In order to protect user privacy, the above data will be pre-processed, and for dream data involving personal information, desensitization can be used. Specifically, it includes the following steps:

- Identify and classify sensitive information: first, we need to identify and classify sensitive information in the dream data, such as names and locations. Natural language processing techniques, such as Named Entity Recognition (NER) algorithm, can be used to automate the labeling and classification of such sensitive information.
- Replacement or Covering of Sensitive Information: For sensitive information that has been identified, it can be processed by replacement or covering. For example, a person's name can be replaced with a generic placeholder symbol, and a location can be replaced with the name of a representative place. In addition, sensitive information such as time and date can be blurred to protect the user's privacy.
- Encrypting sensitive information: For some particularly sensitive information, such as personal identification numbers, encryption can be used for processing. Common encryption algorithms include hash function, symmetric encryption and asymmetric encryption. By encrypting sensitive information, it can ensure the security of data during transmission and storage.

3.2. Visual system design

In order to generate "dream images" based on desensitized dream data, a visual system framework needs to be designed. The framework should include the steps of dream data feature extraction and image generation. In the feature extraction stage, Natural Language Processing (NLP) techniques [9] can be used to extract the emotion, theme and other features of the dream text. This is done by transforming the dream description text into a vector representation using a bag-of-words model or a word embedding model (e.g., Word2Vec or BERT) to capture the semantics and contextual relationships of the words. Sentiment analysis algorithms, such as naive Bayesian classifiers, are then used to determine the sentiment embedded in the dream description text [10], helping us to understand the emotional tendency of the dream, e.g., positive, negative, or neutral. Finally, in the image generation stage, algorithmic models such as AIGC image generation techniques: generative adversarial networks (GAN) can be utilized to transform the extracted features into realistic images, as Figure 1.

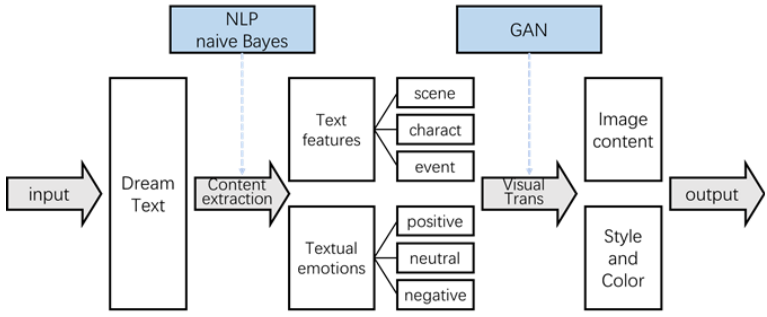

Figure 1. Visual system.

3.3. Algorithmic model construction framework

In order to realize a visual system for generating images from dream data, an algorithmic model based on Generative Adversarial Network (GAN) can be used [11]. This model can be composed of a generator and a discriminator. The generator is responsible for transforming dream features into images, while the discriminator is responsible for determining whether the generated images are realistic or not. By training this model, the quality and accuracy of the generated images can be continuously optimized, as Figure 2. The following is the concept and flow of the model:

- Generator: receives the feature vector of the dream description text as input and maps it to the image space to generate the corresponding dream image.
- Generate dream image: The generator module uses the feature vector of the dream description text as input, and generates an image with dream features through learning and training.
- Discriminator: Receive the real image and the generated dream image as inputs for evaluating its authenticity and provide feedback to the generator and then generate the image or perform parameter optimization repeating the above steps.

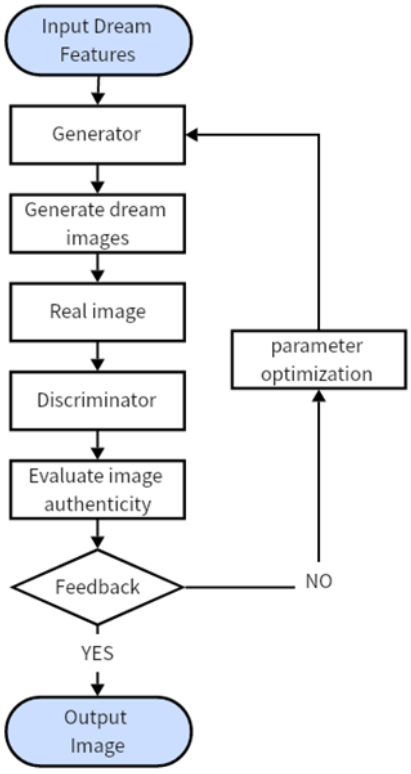

Figure 2. Algorithmic process.

3.4. Visual effect display

The final effect of the dream image is shown in Figure 3, which is a digital image constructed based on the dream data of different volunteers, in which the corresponding feature phrases are labeled. It can be seen through the images that if it is a beautiful dream, the system-generated paintings are mostly in warm colors with bright tones; if it is a nightmare, the paintings are in cold and dark tones, with a calm and quiet atmosphere.

Figure 3. Dream image.

After generating the "dream images," the researchers will analyze and interpret the data. They can use statistical analysis to explore the association between dream images and participants' mental health. In addition, researchers can collect participants' subjective experiences and feedback on the generated dream images through interviews and questionnaires to gain a deeper understanding.

4. Case Study

4.1. Case study methodology

In this study, we recruited 20 young volunteers aged 20-35 from an urban community and asked them to collect dream data and use a dream image generation system. In the preparation phase of the experiment, we utilized mental health questionnaires and scales to assess participants' mental health status and dream experiences. Specifically, this included the use of mental health questionnaires (e.g. DASS-21) to assess participants' changes in depression, anxiety, and stress reactions [12]. The scale has three dimensions, which were completed by the participants based on the actual situation in the last week, and involves 7 entries each for depressed mood, anxious mood and stressful mood, and Table 1 demonstrates part of the screened questionnaire. A score of ≥10 on the depression subscale, ≥8 on the anxiety subscale, and ≥15 on the

stressful emotions subscale was considered to be the presence of corresponding negative emotions. Eight volunteers with three dimensions of negative emotions were finally selected.

Table 1. Part of the DASS-21.

The "Depression" dimension contains seven entries.				
Question	Answer (tick all that apply)			
I don't seem to feel any pleasure or relief at all.	Doesn't	Sometimes	Often	Always
I find it hard to take the initiative to start working.	Doesn't	Sometimes	Often	Always
I have nothing to look forward to in the near future.	Doesn't	Sometimes	Often	Always
I feel depressed.	Doesn't	Sometimes	Often	Always
I don't feel enthusiastic about anything.	Doesn't	Sometimes	Often	Always
I don't feel worthy of being a human being.	Doesn't	Sometimes	Often	Always
I feel that life is meaningless.	Doesn't	Sometimes	Often	Always

4.2. Case study process

At the beginning of the experiment, randomly assigned control and experimental groups were used, and the process of generating dream images was intervened in the experimental group and compared with the control group. This experimental design helps us to assess the effect of dream images on the mental health of the healing participants and to exclude the effect of other possible confounding variables. The impact of the generated dream images on the mental health of the healing participants was assessed by comparing and analyzing the data from the experimental and control groups. Statistical methods (e.g., t-test analysis) were used to compare the significant differences between the experimental and control groups in terms of depression, anxiety and stress responses.

In order to investigate the effect of dream images on mental health, participants' satisfaction with the generated dream images and related psychological effects were assessed through a quantitative research method using the Systematic Usability Scale (SUS) [13]. Thus, to understand the participants' preference for dream images, the emotional experience associated with the images, and the effects on mental health, Table 2 demonstrates some of the questionnaire contents.

Table 2. Usability questionnaire part content.

No.	**Question**	**1 strongly disagree – 5 strongly agree**				
1	I would like to use this system	1	2	3	4	5
2	I found the system complicated	1	2	3	4	5
3	I think the system is easy	1	2	3	4	5
4	I need professional help to use this system	1	2	3	4	5
5	I found that the system functions were well integrated	1	2	3	4	5

Based on the participants' responses, we can calculate the average score for each question and use data analysis methods (e.g., frequency analysis or correlation analysis) to understand the participants' satisfaction with the dream images and the impact of the dream images on their mental health.

By using a combination of experimental design and quantitative research methods, we can assess the impact of the generated dream images on the mental health of the healing participants. By comparing data from the experimental and control groups, we can understand whether the dream image intervention made a significant difference to

mental health. Also, by assessing participants' satisfaction and psychological effects using the Dream Quality Scale, we can gain insight into the specific impact of dream images on mental health.

5. Case Study Results

In order to assess the level of mental health of the participants, we used a mental health questionnaire (e.g., DASS-21) to assess the changes in depression, anxiety, and stress reactions of the participants, and by comparing the scale statistics of the participants in a group comparison experiment, we obtained the following results, which are shown in Table 3.

Table 3. Experimental statistical results.

Group	Initial average	Post-test average	t-value	p-value
Experimental Group	30.4	25.2	-3.26	<0.01
Control group	31	30.8	-0.43	0.672

Based on the t-test results, we found that the mental health scores of the experimental group improved significantly at the end of the experiment ($t = -3.26$, $p < 0.01$), while the mental health scores of the control group did not change significantly ($t = -0.43$, $p = 0.672$). This suggests that the experimental group's mental health improved after receiving the dream-image-based mental health assistance system intervention.

We counted the results of filling out the SUS scale and obtained the results of the number of people and the average score results for each subsection of the ten questions on the scale, which are shown in Table 4. The score of the SUS was calculated to be 74, which indicates that the usability of the system is acceptable [14].

Table 4. Number of scores and average score.

No.	1	2	3	4	5	Average
1	0	0	1	13	6	3.25
2	8	8	3	1	0	3.15
3	0	1	4	12	3	2.85
4	6	5	4	4	1	2.55
5	0	2	2	11	5	2.95
6	3	6	8	1	2	2.35
7	0	0	1	10	9	3.4
8	12	4	2	2	0	3.3
9	1	1	5	7	6	2.8
10	7	7	5	1	0	3

5.1. Analysis of results

Statistical analysis of the results of the experiment revealed that the generated dream images had a positive impact on the participants' mental health. The participants' mental health scores significantly improved after the experiment, indicating that the generated dream images could help them improve their mood and sense of well-being. The generated dream images were able to significantly reduce participants' anxiety levels. After the experiment, participants' anxiety scores decreased significantly, indicating that the generated dream images had an anxiety-relieving effect. These

results support our research hypothesis that generated dream images have a significant effect on the mental health of healing participants. This finding provides important insights for practice and intervention in the field of mental health.

The results of the analysis also indicated that the effect of generated dream images on the improvement of participants' mental health and anxiety levels was significant beyond statistical chance differences. This implies that the generated dream images have practical applications in healing participants' mental health.

6. Conclusion

The dream images generated have the potential to elicit sensory experiences and emotional reactions in participants through the provision of positive, soothing, enjoyable, or imaginative settings. This stimulation offers an avenue for escape and emotional relief, effectively alleviating participants' levels of stress and anxiety.

Moreover, the production of dream images can also foster individuals' consciousness regarding their own emotions and needs by instigating introspection and self-exploration. This cognitive process aided participants in gaining a better understanding of their psychological state and identifying constructive coping mechanisms.

It should be emphasized that this study has certain limitations. Firstly, the sample size was relatively small, thereby compromising the generalizability of the findings. Secondly, the investigation exclusively concentrated on the impacts of dream images on mental health and anxiety, disregarding the examination of other psychological factors like depression and self-esteem in great detail.

To summarize, after evaluating the effects of dream images created for therapeutic participants, it was established that these generated dream images substantially enhanced their mental well-being and mitigated their anxiety levels. The outcomes of this study provide a scientific foundation for further exploration and application of dream healing and furnish valuable insights for practical implementation and intervention within the realm of mental health.

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