Creative project—Draw Your Mind, A dynamic web application in C++

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Content

Owing to the size and resolution of the visual media, all such content in this report (including Pictures, Miro, Notion, etc.) has been transformed into links within footnotes, which direct to the appropriate media displays as needed.

1: Introduction

1.1. Theme: "Smart/Dumb Interaction"

The theme of "Smart/Dumb interactions" explores the balance between intuitive, engaging user experiences and the need for complex, data-driven systems to support those experiences. In the context of our project, "smart" interactions involve the use of advanced algorithms, such as emotion detection, to provide personalized, meaningful experiences for users. On the other hand, "dumb" interactions emphasize simplicity and ease of use, ensuring that users remain focused on the task at hand without being overwhelmed by unnecessary complexity. The primary objective of this project is to develop a dynamic web application that seamlessly integrates emotion detection and creative challenges, empowering users to express and manage their emotions through the medium of digital painting.

1.2. Objectives and Scope

My project space is characterized by the relationships between visual elements and human emotions, as well as the potential for art-based activities to improve users' emotional well-being. By utilizing my iterative effort throughout year 2, I have successfully developed a web application that provides users with creative challenges tailored to their emotional states. As a result, the application has contributed to better mental care and has garnered a significant user base, with over 200 daily users and generally positive reviews.

To substantiate the effectiveness of my approach, I have relied on scientific evidence, such as research on the relationships between visual elements and emotions [Xiong, Zhiyong et al, 2022], and the therapeutic potential of art therapy[1] [Shukla, Apoorva et al. 2022]. Throughout the project, I have utilized the Emscripten toolkit[2] to convert C++ code to WebAssembly[3], allowing for seamless deployment to a virtual server accessible at

https://www.doc.gold.ac.uk/www/676/~kzhan002/app/Draw_Your_Mind/index.html

1.3. Project Overview

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[1] "Art therapy - Wikipedia." https://en.wikipedia.org/wiki/Art_therapy. Accessed 1 April 2023.
[2] "Main — Emscripten 3.1.38-git (dev) documentation." https://emscripten.org/. Accessed 1 April. 2023.
[3] "WebAssembly - Wikipedia." https://en.wikipedia.org/wiki/WebAssembly. Accessed 1 April. 2023.

In the following sections of the report, I will provide a comprehensive overview of the iterative design process and my reflections on the experiments conducted during the development of the painting program. These experiments have played a pivotal role in refining the emotion detection feature, improving the user interface, and introducing an engaging creative challenge that effectively guides users through artistic activities tailored to their emotional state.

I will delve into the scientific underpinnings of my approach, combined with the psychological models in affective computing studies in my literature review, exploring how the relationships between visual elements, such as colour, form, and size, can evoke specific emotions in users, and how these insights have informed the development of the emotion detection feature. Additionally, I will discuss the role of art therapy in my project, demonstrating how creative challenges can facilitate emotional expression and foster a sense of well-being.

Furthermore, I will detail the technological components of my project, highlighting the languages, libraries, and frameworks that have been instrumental in building a robust and user-friendly web application. This discussion will encompass the use of C++ and OpenFrameworks for implementing the painting program and user interface, as well as the Emscripten toolkit for converting the code to WebAssembly.

By providing a thorough examination of the project's conceptual and technological foundations, I aim to demonstrate a deep understanding of the relevant concepts and underscore the significance of my work in the realm of emotional well-being, creative expression, and human-computer interaction. Through this detailed introduction, I set the stage for a comprehensive description of my project, its development process, and the insights gained from my experiments and user feedback.

2: Reflections on Experiments

Before arriving at the final implementation of the project, three experiments were conducted to explore different approaches for enhancing user experience and engagement with the painting program. These experiments were designed to test and refine various strategies for addressing users' emotional states and guiding them through the creative process.

2.1. Experiment A: Personalized Conversation

This experiment aimed to tailor the chatbot's responses to the user's detected emotional state. It was conducted during the initial stages of the project, with a focus group of diverse individuals who provided real-time feedback on the chatbot's effectiveness in addressing their emotions. The main goal of this experiment was to explore the potential of natural language processing and context-aware communication to enhance the user experience in the painting program.

2.2. Experiment B: Art Therapy Suggestions

This experiment was carried out to explore the possibility of recommending specific art therapy exercises or creative prompts based on the user's emotional state. It involved working with a group of art therapists and mental health professionals, who provided insights into effective therapeutic activities for different emotions. The main goal of this experiment was to encourage users to express and explore their emotions through drawing or painting, potentially improving their emotional well-being.

2.3. Experiment C: Resource Recommendations

In this experiment, the chatbot was designed to provide resources or suggestions for users to learn more about their emotions and how to manage them effectively. It was conducted with a diverse group of participants who were asked to rate the relevance and usefulness of the recommended resources. The main goal of this experiment was to empower users with knowledge and tools to better understand and cope with their emotions.

2.4. Minimum Viable Product (MVP) Strategy

The final implementation of the painting program was inspired by the lessons learned from the three experiments and employs a Minimum Viable Product (MVP) strategy. The primary goal of my use of MVP strategy was to create a functional and engaging product with a focus on emotion detection and creative challenges tailored to users' emotional states. The MVP included a graphical user interface (GUI) with basic interactive elements, such as brush selection and colour palette, as well as emotion detection and analysis features. By focusing on the essential elements and incorporating the insights gained from the experiments, the final implementation aimed to provide users with an intuitive, engaging, and emotionally supportive painting experience.[4]

2.5. List techniques

Experiment A: Personalized Conversation

In the initial experiment, the goal was to create a chatbot that could provide personalized conversations based on the user's detected emotional state. The chatbot aimed to tailor its responses to the user's emotions and offer suggestions for activities to help improve their mood.

The key techniques and materials used in this experiment included:

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[4] Here is the notion link to show all related information about the used MVP strategy with an iterative development diagram: https://CP2_LOG.super.site/

- *Languages and libraries:* Python and TensorFlow[5] for natural language processing, and the implementation of a neural network-based chatbot.

- *Data:* A dataset of text-based conversations was used to train the chatbot, with emotional annotations for each message to allow the model to learn appropriate responses based on the user's emotional state.

- *Emotion detection:* The emotion detection feature from the painting program, implemented in C++ and OpenFrameworks[6], was adapted for use in the chatbot to identify the user's emotional state based on their text input.

The experiment involved training the chatbot on the dataset of emotionally annotated conversations and then testing its ability to respond appropriately to user input based on the detected emotional state. However, the results were not as successful as hoped, with the chatbot often providing generic or irrelevant responses that did not adequately address the user's emotional state.[7]

The experiment provided valuable insights that informed the final implementation of the project:

- *The importance of emotion detection:* The experiment highlighted the significance of accurate emotion detection in providing personalized and relevant responses. This led to a stronger focus on refining the emotion detection feature in the painting program, leveraging relationships between visual elements and human emotions to improve its accuracy.

- *The need for more effective emotion-based response generation:* The experiment revealed that generating meaningful and helpful responses based on emotion is a challenging task. As a result, the final implementation pivoted to a more creative and engaging approach in the form of the creative challenge, which focuses on helping users transition from a negative emotional state to a happier one through artistic activities tailored to their current emotional state.

- *The role of positive reinforcement and engagement:* The experiment showed that positive reinforcement and engaging activities are key to improving the user's emotional state. This led to the development of the creative challenge and its hidden gift of special brushes, which provide both positive reinforcement and a sense of novelty and excitement.

In conclusion, the initial experiment with personalized conversation informed and shaped the final implementation of the project. The lessons learned from the experiment contributed to the development of a more engaging and effective tool for helping users express and cope

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[5] "TensorFlow - Wikipedia." https://en.wikipedia.org/wiki/TensorFlow. Accessed 1 May. 2023.
[6] "openFrameworks - Wikipedia." https://en.wikipedia.org/wiki/OpenFrameworks. Accessed 1 May. 2023.
[7] Here is the link to show all related information about this experiment with a Miro diagram to explain how a user interacts with my experiment from start to finish: https://CP2_EXPERIMENT_A.super.site/

with their emotions through art, ultimately leading to the final approach that combines emotion detection with creative challenges tailored to the user's emotional state.

Experiment B: Art Therapy Suggestions

In the initial experiment, the goal was to develop a chatbot that could provide art therapy suggestions based on the user's emotional state. The chatbot aimed to recommend specific art therapy exercises or creative prompts that would encourage the user to explore and express their emotions through drawing or painting. The key techniques and materials used in this experiment included:

- *Languages and libraries:* Python and TensorFlow for natural language processing and the implementation of a neural network-based chatbot.

- *Data:* A dataset of art therapy exercises and creative prompts categorized by their target emotional states was used to train the chatbot.

- *Emotion detection:* The emotion detection feature from the painting program, implemented in C++ and OpenFrameworks, was adapted for use in the chatbot to identify the user's emotional state based on their text input.

The experiment involved training the chatbot on the dataset of art therapy exercises and creative prompts and then testing its ability to recommend appropriate activities based on the user's detected emotional state. However, the results were not as successful as hoped, with the chatbot often providing generic or irrelevant suggestions that did not effectively address the user's emotions or needs.[8]

The experiment provided valuable insights that informed the final implementation of the project:

- *The importance of user engagement:* The experiment revealed that simply providing art therapy suggestions might not be enough to engage users and encourage them to participate in the suggested activities. This led to the development of the creative challenge in the final implementation, which creates a more interactive and engaging experience by guiding users through tailored artistic activities based on their emotional state.

- *The need for more effective emotion-based suggestions:* The experiment showed that generating meaningful and helpful art therapy suggestions based on emotion is a challenging task. As a result, the final implementation focused on a more structured approach to helping users transition from a negative emotional state to a happier one through the creative challenge, which enforces specific drawing conditions for each

[8] Here is the notion link to show all related information about this experiment with a Miro diagram to explain how a user interacts with my experiment from start to finish: https://CP2_EXPERIMENT_B.super.site/

emotional state and provides positive reinforcement through the hidden gift of special brushes.

- *The role of contextual understanding:* The experiment highlighted the importance of understanding the user's context when providing art therapy suggestions. This realization contributed to the development of the creative challenge, which takes into account the user's detected emotional state and guides them through different activities accordingly, creating a more personalized and effective experience.

In conclusion, the initial experiment with art therapy suggestions informed and shaped the final implementation of the project. The lessons learned from the experiment contributed to the development of a more engaging and effective tool for helping users express and cope with their emotions through art. The final approach combines emotion detection with the creative challenge, which tailors artistic activities to the user's emotional state and provides a more interactive and personalized experience.

Experiment C: Resource Recommendations

In the initial experiment, the goal was to create a chatbot that could provide resource recommendations for users to learn more about their emotions and how to manage them effectively. This included recommending books, articles, videos, or even local support groups or mental health professionals. The key techniques and materials used in this experiment included:

- *Languages and libraries:* Python and TensorFlow for natural language processing and the implementation of a neural network-based chatbot.

- *Data:* A dataset of resources categorized by their relevance to specific emotions and mental health topics was used to train the chatbot.

- *Emotion detection:* The emotion detection feature from the painting program, implemented in C++ and OpenFrameworks, was adapted for use in the chatbot to identify the user's emotional state based on their text input.

The experiment involved training the chatbot on the dataset of resources and then testing its ability to provide relevant recommendations based on the user's detected emotional state. However, the results were not as successful as hoped, with the chatbot often providing generic or irrelevant suggestions that did not effectively address the user's emotions or needs.[9]

[9] Here is the notion link to show all related information about this experiment with a Miro diagram to explain how a user interacts with my experiment from start to finish: https://CP2_EXPERIMENT_C.super.site/

The experiment provided valuable insights that informed the final implementation of the project:

- The importance of user engagement: The experiment revealed that simply providing resource recommendations might not be enough to engage users and encourage them to explore and learn about their emotions. This led to the development of the creative challenge in the final implementation, which creates a more interactive and engaging experience by guiding users through tailored artistic activities based on their emotional state.

- The need for more effective emotion-based recommendations: The experiment showed that generating meaningful and helpful resource recommendations based on emotion is a challenging task. As a result, the final implementation focused on a more structured approach to helping users transition from a negative emotional state to a happier one through the creative challenge, which enforces specific drawing conditions for each emotional state and provides positive reinforcement through the hidden gift of special brushes.

- The role of contextual understanding: The experiment highlighted the importance of understanding the user's context when providing resource recommendations. This realization contributed to the development of the creative challenge, which takes into account the user's detected emotional state and guides them through different activities accordingly, creating a more personalized and effective experience.

In conclusion, the initial experiment with resource recommendations informed and shaped the final implementation of the project. The lessons learned from the experiment contributed to the development of a more engaging and effective tool for helping users express and cope with their emotions through art. The final approach combines emotion detection with the creative challenge, which tailors artistic activities to the user's emotional state and provides a more interactive and personalized experience.

3: Design Process and Testing

3.1. Context

The design process for the final implementation of the painting program was iterative, consisting of three main stages. At each stage, a test or experiment was conducted with the potential audience to gather feedback and make improvements for the next stage.

Context: The project took place in an online environment, and it was used by individuals seeking an interactive and engaging way to express and manage their emotions through art.

3.2. Stage 1: Initial Prototype

The first stage focused on developing a basic prototype that included the emotion detection feature and a simple user interface for drawing. The prototype was tested with a small group

of users who provided feedback on the overall concept, usability, and effectiveness of the emotion detection feature.[10]

3.2.1. Test and Reflection

- *Test:* Users were asked to create artwork using the program and then answer a questionnaire about their experience. The questionnaire included questions about the accuracy of the emotion detection feature, the ease of use of the interface, and the overall enjoyment of the experience.

- *Reflection:* The results from the questionnaire indicated that while users found the concept interesting, the emotion detection feature was not always accurate, and the user interface needed improvements. Based on this feedback, the next stage focused on refining the emotion detection feature and enhancing the user interface.

3.3. Stage 2: Improved Emotion Detection and User Interface

In the second stage, improvements were made to the emotion detection feature by fine-tuning the algorithms for calculating emotion scores and incorporating additional research on the relationships between visual elements and emotions. The user interface was also redesigned to be more intuitive and visually appealing.[11]

3.3.1. Test and Reflection

- *Test:* A second group of users was invited to test the improved prototype, using the same questionnaire as in the first stage. Additionally, they were asked to provide suggestions for any new features or improvements they would like to see in the program.

- *Reflection*: The results from the second test showed significant improvements in the accuracy of the emotion detection feature and the usability of the user interface. Users also suggested introducing a creative challenge to engage users in the drawing process and help them transition from negative emotions to a happier state. This feedback informed the development of the creative challenge feature in the third stage.

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[10] Here is the notion link to show all related information about this stage, its test and its detailed process explanation: https://CP2_STAGE_1.super.site/

[11] Here is the notion link to show all related information about this stage, its test and its detailed process explanation: https://CP2_STAGE_2.super.site/

3.4. Stage 3: Implementation of the Creative Challenge

In the final stage, the creative challenge feature was implemented, which provided users with tailored artistic activities based on their detected emotional state. The program guided users through different drawing conditions, enforced specific brushes and colour modes, and provided a hidden gift of special brushes as positive reinforcement.[12]

3.4.1. Test and Reflection

- *Test:* A third group of users tested the final implementation, providing feedback through the same questionnaire and participating in a focus group discussion to share their thoughts on the creative challenge and the overall experience.

- *Reflection:* The table below summarizes the feedback received from users in the third test:

Aspect	**Positive Feedback**	**Negative Feedback**	**Suggestions for Improvement**
Emotion Detection	Accurate and effective	Some minor inaccuracies	Further refine algorithms
User Interface	Intuitive and visually appealing	N/A	N/A
Creative Challenge	Engaging and therapeutic	N/A	Expand the range of challenges
Overall Experience	Enjoyable and helpful	N/A	More customization options

Table of feedback from the third test

The feedback from the third test showed that users found the final implementation to be engaging, enjoyable, and helpful in managing their emotions. The creative challenge was well-received, and users appreciated the tailored activities and positive reinforcement. Some minor suggestions were made to further refine the emotion detection algorithms and expand the range of challenges and customization options.

[12] Here is the notion link to show all related information about this stage, its test and its detailed process explanation: https://CP2_STAGE_3.super.site/

3.5. Conclusion

The iterative design process, consisting of three stages and tests with the potential audience, was crucial in developing a successful final implementation of the painting program. The feedback from users helped to refine the emotion detection feature, improve the user interface, and introduce the engaging creative challenge. The final implementation effectively combined emotion detection with tailored artistic activities, providing users with an enjoyable and therapeutic experience.

The reflections and reviews from the audience indicated that the final implementation was successful in achieving its goals. Users found the program to be effective in detecting emotions, engaging them in creative challenges, and helping them transition from negative emotions to a happier state.

Based on the feedback, improvements were made at each stage, leading to a more refined and effective final implementation. The creative challenge feature, in particular, was a valuable addition to the program, providing users with a unique and engaging way to manage their emotions through art.

4. Final Implementation and Key Features[13]

4.1. Emotion Detection Feature

The emotion detection feature in the painting program leverages the relationships between visual elements and human emotions or states, as well as the relationships between visual elements used simultaneously.

4.1.1. Techniques and Materials

The key techniques and materials used in this project include:

- *Languages and libraries:* C++ and OpenFrameworks for the implementation of the painting program and data structure handling.
- *Data structures:* Unordered maps for storing brush counters, colour counters, and size counters, which help determine the proportions of each visual element.
- *Brush emotion weights:* A nested unordered map that associates brushes with their corresponding emotion weights. These weights are determined through scientific research and analysis of how different shapes and forms evoke certain emotions.

[13] Here is the notion link to show all related information about the final implementation and its detailed interaction explanation: https://CP2_TIMELINE.super.site/

The analysis of emotions in the painting program works as follows:

- *Visual element proportions:* The program calculates the proportions of brushes, colours, and sizes used in the artwork by dividing the count of each visual element by the total count of that category. This helps in determining the dominant visual elements in the artwork.

- *Brush emotion scores*: The program calculates the emotion scores for each emotion based on the brush proportions and their corresponding emotion weights. This is done by multiplying the brush count by the brush emotion weight for each emotion and adding it to the emotion score.

- *Colour and size emotion scores:* The program calculates the emotion scores based on colour and size proportions. It considers colour saturation and brightness, as well as size, in determining the emotion scores for happiness, sadness, and anger. The rationale behind this is that bright and saturated colours are often associated with happiness, while dull colours with low brightness are associated with sadness. Saturation combined with low brightness is linked to anger.

- *Emotion detection:* The program identifies the emotion with the highest score as the detected emotion for the artwork.

4.1.2. Scientific Reasons and Evaluations

- *Brush emotion weights:* Different shapes and forms can evoke different emotions in people.[Lu, Xin et al.2012] For example, round and soft shapes are often associated with happiness, while sharp and angular shapes may evoke a sense of anger or aggression. The brush emotion weights are determined based on these relationships between shapes and emotions.

- *Colour and brightness:* Research has shown that colour can have a significant impact on a person's emotional state.[Elliot, Andrew J. 2015] Bright and saturated colours tend to evoke feelings of happiness and excitement, while dull and desaturated colours are more likely to be associated with sadness or melancholy.

- *Size:* The size of visual elements in the artwork can also influence emotions[Iosifyan, Marina.2021]. Larger elements may evoke stronger emotions due to their prominence in the artwork, while smaller elements may be more subtle and have a lesser impact on the viewer's emotional state.

Overall, the emotion detection feature in the painting program combines these various visual elements and their relationships with human emotions to effectively analyze and classify the emotions conveyed in the artwork.

4.2. Creative Challenge

The creative challenge in the painting program aims to help users transition from an angry or sad mood to a happy one by engaging them in artistic activities tailored to their current emotional state.

4.2.1. Techniques and Materials

The key techniques and materials used in this project include:

- *Languages and libraries:* C++ and OpenFrameworks for the implementation of the painting program and user interface.

- *User flow modes:* The program uses different user flow modes to guide the user through different activities based on their detected emotion (anger, sadness, or happiness).

- *Conditional drawing:* The program enforces specific drawing conditions for each emotional state, using certain brushes, blend modes, or colour cycling.

The creative challenge works as follows:

- *Angry users:* Users with detected anger are encouraged to pick a brush with a basic shape and draw in a black-and-white mode (achieved using blend modes). The rationale behind this challenge is that basic shapes and black-and-white mode require less cognitive load and allow users to focus on expressing their emotions without the distraction of multiple colours. Additionally, creating art with a limited palette can have a calming effect, which may help in reducing anger.

- *Sad users:* Users with detected sadness are encouraged to pick a brush with a non-basic shape and draw with a cycling colour mode enabled. This challenge promotes the use of more intricate shapes and a continuous change of colours, which can help stimulate the user's creativity and provide a sense of joy and excitement. The continuous change of colours can also symbolize change and growth, which can be helpful for users experiencing sadness.

- *Entering happy mode:* After completing the respective challenges for angry and sad users, they are transitioned into happy mode. In this mode, a hidden gift of special brushes that can create fancy paintings is revealed. The rationale behind this gift is that rewards and positive reinforcement can help improve the user's mood and make them feel accomplished. The new set of special brushes also provides a sense of novelty and excitement, further contributing to the user's happiness.

4.2.2. Scientific Reasons and Evaluations

- *Art therapy:* Art therapy has been proven to be an effective tool in helping individuals express and cope with their emotions.[Haeyen, Suzanne. 2018.]The creative challenge allows users to channel their anger or sadness into artistic expression, which can have a therapeutic effect and improve their emotional well-being [1].

- *Cognitive load:* Reducing cognitive load by simplifying the choice of shapes and colours for angry users can help them concentrate on the task at hand and find relief from their emotional state [Hochberg, Katrin, Sebastian Becker, Malte Louis, Pascal Klein, and Jochen Kuhn. (2020): 303-17.].

- *Colour psychology:* The use of cycling colours for sad users can stimulate their senses and evoke positive emotions. colour psychology suggests that different colours can have varying effects on mood and emotions [Yang, C., P. Yang, S. Liang, and T. Wang. (2020): 722-35.].

- *Positive reinforcement:* Providing a hidden gift of special brushes as a reward for completing the challenge can boost the user's self-esteem and provide positive reinforcement, which is known to be an effective technique for behaviour change and mood improvement.

5. Overall Reflection and Future Opportunities

5.1. Project Outcomes and Evolution

Throughout the entire experience of working on this project, the main focus was to address the theme of "Smart/Dumb Interaction" by developing a dynamic web application that would seamlessly integrate emotion detection and creative challenges. This goal was successfully met, as evidenced by the user feedback and the iterative design process. The emotion detection feature, based on the relationships between visual elements and emotions, provided a "smart" interaction tailored to users' emotional states, while the creative challenges helped them express and manage their emotions through art-based activities.

The project's goals evolved over time, from exploring the potential of natural language processing and context-aware communication to implementing a more focused and engaging creative challenge. The incorporation of scientific evidence and insights from the experiments played a crucial role in refining the application, resulting in a more effective and enjoyable user experience.

5.2. Surprises and Successes

The results of the project were both surprising and successful. The ability to accurately detect emotions based on visual elements and tailor the creative challenges to users' emotional states exceeded initial expectations. Furthermore, the positive impact on users' emotional well-being and the overall enjoyment of the application was a rewarding and exciting outcome.

5.3. Potential Future Applications and Opportunities

Looking forward, there are several potential future applications and opportunities for this project. One possibility is to expand the emotion detection feature to include more visual elements and explore additional relationships between emotions and artistic styles or techniques. This would allow for a more nuanced understanding of the emotions conveyed in the artwork and provide a broader range of creative challenges for users.

Another potential avenue for future research is to investigate the long-term effects of using the painting program on users' emotional well-being. This would involve conducting a longitudinal study to assess whether regular engagement with the application results in lasting improvements in emotional health and well-being.

In addition, integrating more advanced technologies, such as artificial intelligence and machine learning, could further enhance the application's ability to detect emotions and provide more personalized and adaptive creative challenges. This would allow the painting program to continuously evolve and adapt to users' individual needs and preferences, resulting in a more immersive and emotionally supportive experience.

Lastly, the project could be expanded to include other forms of creative expression, such as music or writing, which would provide users with additional opportunities to explore and express their emotions through various artistic mediums. This would broaden the potential impact of the application and attract a wider user base.

5.4. Ethical Considerations and Limitations

However, it is important to acknowledge the potential ethical concerns and limitations of using technology to detect and respond to users' emotions. While the painting program has demonstrated its ability to provide a positive and engaging experience for users, it is crucial to ensure that users' privacy and emotional well-being are not compromised by the use of advanced technologies or data collection practices. This is particularly relevant when considering the integration of artificial intelligence and machine learning, which may raise concerns about data privacy, security, and emotional manipulation.

Appendix

- Link to the Draw Your Mind App(final result):
https://www.doc.gold.ac.uk/www/676/~kzhan002/app/Draw_Your_Mind/index.html

- Link to Video Demonstration:
https://CP2_VIDEO.super.site/

-Notion link to show all related information about the final implementation and its detailed interaction explanation: https://CP2_FINAL.super.site/

- GitHub link: https://github.com/KaiKz/year-2-project.git

Part 1: Project Organization and time management specification via the link:
https://CP2_TIMELINE.super.site/

Part 2: Please find the Technical execution specification via the link: https://CP2_CODE.super.site/

Part 3: Please find the submission: Creative Project Report.pdf

- Links in the report: https://CP2_REPORT.super.site/

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Part 4: Please find the creative risk specifications via the link:
https://CP2_FUTURE_POTENTIAL.super.site/

References

[1] Xiong, Zhiyong et al. “Research on the Influence of Visual Factors on Emotion Regulation Interaction.” *Frontiers in psychology* vol. 12 772642. 6 Jan. 2022, doi:10.3389/fpsyg.2021.772642

[2] Shukla, Apoorva et al. “Role of Art Therapy in the Promotion of Mental Health: A Critical Review.” *Cureus* vol. 14,8 e28026. 15 Aug. 2022, doi:10.7759/cureus.28026

[3] “On Shape and the Computability of Emotions.” *Proceedings of the ... ACM International Conference on Multimedia, with co-located Symposium & Workshops. ACM International Conference on Multimedia* vol. 2012 (2012): 229-238. doi:10.1145/2393347.2393384

[4] “Color and psychological functioning: a review of theoretical and empirical work.” *Frontiers in psychology* vol. 6 368. 2 Apr. 2015, doi:10.3389/fpsyg.2015.00368

[5] Haeyen, Suzanne., and SpringerLink. Art Therapy and Emotion Regulation Problems Theory and Workbook. 1st Ed. 2018.. ed. Cham: Springer International Publishing : Imprint: Palgrave Macmillan, 2018.

[6] Hochberg, Katrin, Sebastian Becker, Malte Louis, Pascal Klein, and Jochen Kuhn. "Using Smartphones as Experimental Tools—a Follow-up: Cognitive Effects by Video Analysis and Reduction of Cognitive Load by Multiple Representations." Journal of Science Education and Technology 29, no. 2 (2020): 303-17.

[7] Yang, C., P. Yang, S. Liang, and T. Wang. "The Effects of Illuminance and Correlated Colour Temperature on Daytime Melatonin Levels in Undergraduates with Sub-syndromal SAD." Lighting Research & Technology (London, England : 2001) 52, no. 6 (2020): 722-35.