THE UNIVERSITY of ADELAIDE

An experimental website to transform negative thought patterns through cognitive reframing
Business Case and Draft Plan

Group- 5Z

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1. Business Case

1.1 Executive Summary

Project 5 is designed to revolutionize the approach towards mental health through an experimental website that employs cognitive reframing to transform negative thought patterns. By collecting a comprehensive dataset of negative thoughts alongside their positive reframes, the project aims to train language models capable of automatically performing cognitive reframing. This initiative not only targets the enhancement of mental health interventions but also proposes a new dimension in the application of AI for mental health support systems.

1.2 Project Overview & Scope

The core of our project is the development of a questionnaire website for collecting negative ideas and the corresponding solutions. We will first create the front-end UI for the website, including the submission form, where users will enter and submit their negative thoughts and questionnaires; the user account area, for login, registration and profile management; and the Html pages, which will contain the homepage, the project profile, about us, and so on. Next we will configure the appropriate back-end services including: user account management to handle user data, preferences and history; tracking of user engagement, AI performance and feedback; and databases to manage and provide educational and support resources. Accordingly, this project also needs to consider data privacy and security. This includes encryption and data processing, in order to protect user data and transactions across the platform; and corresponding privacy policies to manage user consent and privacy preferences.

1.3 Market Positioning

In the realm of mental health interventions, Cognitive Behavioural Therapy (CBT) stands out as an evidence-based and effective approach. However, the path to accessing CBT is fraught with obstacles. Especially in low-income and developing regions, where specialised mental health services are extremely limited, the scarcity of resources becomes evident. This global disparity is profound, with treatment access rates of approximately 33% in high-income countries and only 8% in low-income areas. Limited numbers of therapists, geographic barriers, high costs for uninsured individuals and the social stigma associated with mental health severely hinder access to necessary care.

The emergence of AI technology heralds a new era in mental health treatment, particularly in the field of CBT.The promise of AI integration into therapeutic practice marks a leap towards universal accessibility, offering similar services to those offered by digital therapists. Such advances aim to democratise mental health care, making it more affordable, universally accessible, confidential and reducing the stigma surrounding mental health counselling.

Market Positioning and Challenges Table:

Solution	Accessibility	Cost	Stigma	Data Requirements	Geographic Barriers
Traditional CBT	Limited by physical availability of therapists	High costs, especially without insurance	Societal stigma may deter seeking help.	Relies on therapist expertise and patient interactions	Access limited by therapist proximity
AI-enhanced CBT	Accessible anywhere with internet connectivity.	Potentially lower costs due to automation and scale.	Offers privacy, reducing stigma concerns	Requires extensive datasets for training effective models	Eliminates geographical limitations.

Our market research shows that people want solutions that are not only convenient and easy to use, but also personalised and focused on user privacy. As AI technology advances, researchers are beginning to explore the possibility of incorporating AI into CBT therapy. AI plays the role of a digital therapist, improving accessibility through digital platforms, providing immediate feedback to accelerate progress, and utilising extensive data analytics to refine treatment techniques. This advancement promises to make mental health care more affordable, accessible, and invisible, and to reduce stigma. Creating AI for mental health support is very challenging, especially with the amount of data that is needed to properly train these systems. By addressing key challenges in data collection and model training, the project marks a major step forward in the democratisation of mental health care.

1.4 Business Objective

In confronting the challenges of data collection and processing in the field of AI mental health support, our project proposed a unique and effective solution: to create a web-based platform dedicated to the collection of valuable data that can help transform negative thinking into a positive perspective. Our goal was to inspire deep engagement with participants by providing highly customisable surveys that would not only collect data, but through the process, train AI to become more empathetic and understanding, addressing the IT tools shortage for data acquisition in psychological research identified by Dave et al. (2022, p. 114).

Our business objectives are centred around the following:

1. Enhancing user experience and data collection efficiency: by building a web interface based on four key components - user ease of use, data collection, data security and privacy, and data management - we aim to provide a user experience that is both easy to use and secure. This approach directly responds to the fundamental need for extensive datasets in AI training, as highlighted by Pereira et al. (2021, p. 827), by facilitating the collection of diverse and rich data sets.

2. Simplified user management: By simplifying the registration and login process, we make the platform easier to access and use, thereby facilitating wider participation and data collection.

3. Deeper data collection: our survey aims to provide insights into negative thought patterns, enriching the dataset needed for AI training to more accurately identify and invert negative emotions. The importance of targeted, high-quality data for the effectiveness of cognitive reframing AI models has been emphasized by Ewbank et al. (2020, p. 36), reinforcing our project's focus on collecting nuanced data reflective of a wide range of human experiences.

4. Ensure data security and privacy: By employing HTTPS, input validation and encrypted storage, we protect user information and build user trust in the platform.

5. Optimise data management: by leveraging Firebase to streamline back-end processes, we ensure high-quality data for AI development while simplifying data handling.

By implementing these business objectives, this project aimed to create a website that could collect ideas for transforming negative thinking into positive perspectives. Through this platform, we are able to collect the critical data needed to train AI to become more empathetic and understanding, thus revolutionising the mental health field.

1.5 Benefits and Limitations

As the project progresses, we are committed to improving the quality and accessibility of services in the field of mental health through artificial intelligence technology. By creating a web platform for collecting and analysing negative thoughts and their positive reconstructions, we aim to contribute to the modernisation and popularisation of Cognitive Behavioural Therapy (CBT). Below are the main strengths of our project along with some of the limitations we face.

1.5.1 Benefits:

1. Research support: The project's platform serves as a research resource that provides valuable practice opportunities for psychology students and junior clinical psychologists. These users can practice their skills in identifying and translating negative thinking by analysing and processing data on the Platform. This hands-on experience not only enhances their clinical practice, but also provides them with the opportunity to apply their theoretical knowledge in real-world situations.
2. Training models: The datasets collected in this project were crucial for training language models, highlighting the value of this project in the field of AI mental health applications. These datasets provide the basis for the construction of more accurate and empathetic language models that will demonstrate greater accuracy in identifying negative thinking. The trained models can be directly applied in psychological research, opening up new perspectives in our understanding of human emotions and cognitive processes.

1.5.2 Limitations:

1. Data security and privacy: Ensuring the security of data and protecting the privacy of users is critical when processing their sensitive mental health information. Project 5 must implement strict security measures to prevent data breaches and ensure that all information collected is encrypted and processed to the highest standards. In addition, privacy policies must be clearly communicated to users and ensure that they have a clear understanding of and consent to how their data will be used and protected.

2. Data collection relies on user engagement: the success of this project is highly dependent on active user participation and contribution of data. This means that there must be enough users willing to share their negative thought patterns and emotional experiences in order to provide a rich data resource for AI model training.

2. Draft Plan

2.1 Tasks Breakdown & Estimations

For the first iteration milestone of our project, which includes setting up the core functionalities of a mental health support website with AI-powered reframing, the development will be structured into manageable phases. The schedule below outlines a phased approach to complete the iteration on time, focusing on critical milestones within each main component of the project: User Interface (UI), Backend Services, Data Privacy and Security, and Expandable Functions (AI and Processing Layer).

Milestone 1	Activities	Projected Outputs
Define the first milestone to be completed by end of week 7	List activities required to achieve 1st milestone	Define projected outputs from your work plan
Weeks 1-2: Initial Planning and Design	Define detailed requirements and specifications for each component.	User Interface (UI) Components: A functional and visually appealing user interface, including submission forms, user account management areas, and informational pages.
	Create wireframes and design prototypes for the UI, focusing on user experience.	
	Establish a data privacy and security framework.	
Weeks 3-4: User Interface (UI) Development	Develop the Submission Form and Questionnaire, ensuring a user-friendly experience.	
	Implement the User Account Area, including login, registration, and profile management functionalities.	
	Create HTML pages (Home, Organizational details, Staff profiles, About Us, etc.).	
Weeks 5-6: Backend Services Setup	Develop User Account Management to handle user data, preferences, and history securely.	Backend Infrastructure: An initial setup of backend services capable of managing user data and providing insights through analytics.
	Set up Analytics and Reporting to monitor user engagement, AI performance, and feedback.	
	Create a Resource Hub to manage and serve educational and support resources.	

Week 7: Data Privacy and Security Implementation	implementing encryption and secure data handling practices.	Data Privacy Framework: A foundational framework for ensuring user data privacy and security, including initial encryption measures and a draft privacy policy.
	Draft Privacy Policy and outline User Consent procedures.	

This schedule is intended to ensure a structured approach to completing the first iteration milestone effectively. It's important to maintain flexibility in the timeline to accommodate unforeseen challenges or adjustments needed based on interim feedback. Regular team meetings and progress reviews will be crucial to stay on track and make necessary adjustments to the schedule.

2.2 Project Management Activities

2.2.1 Collaboration inside Group-5Z

Our team's development strategy is divide and conquer. We have divided our team members into two groups, each responsible for a different module. Each module is independent of the other and will be merged into a complete project at a later stage. This mechanism allows us not to influence each other's progress. On the team side, we have a project manager who has overall control over the project, here is a list of the current roles:

scrum roles	PM: Jiulong Li a1869956 DT: Jinhong Liu a1820379 Wenjing Shen a1878048 Danyang Zhang a1875877 Rongguang Wang a1879822

1. In order for the pitch presentation to run smoothly, we assigned tasks, reviewed each other's PPT content, prepared our own parts and recorded the video.

2. We often exchange our understanding and use of javascript, front-end and back-end frameworks, and constantly share useful resources.

3. In order to have efficient and productive communication, we take turns to take minutes of client meetings, and then send the well-formatted minutes to the clients via email.

4. For efficient and productive communication, we record client meetings in as much detail as possible, and then upload the well-formatted minutes to GitHub for backup.

5. We use Github to track our contributions, project progress and version control.

2.2.2 Communication Plan with Clients

Client meetings are held fortnightly on Thursdays at 11am, we have chosen to meet online and prior to each client meeting we will：

1. think through and create a detailed agenda for the meeting and email it to the client.

2. Taking into account the language barrier, we take detailed notes during the meeting and record the meeting. After the meeting is over, we submit the minutes to Github.

3. If there is something unclear or we encounter a technical problem, we will ask the client for help and confirmation via email, or bring the problem to the next client meeting.

2.2.3 Quality Control

Quality control is divided into the following three areas:

1. Code Quality: We use a strict code review process to ensure that all code is peer-reviewed before merging into the master branch. We are able to identify and fix potential code issues in a timely manner to maintain system stability and reliability.

2. Functional Quality: Delivering on every milestone on time is my top priority. And we collect user feedback through regular customer meetings. This feedback is used to continually improve the platform's functionality and ensure that our services meet the actual needs and expectations of our users.

3. User Experience: We value the intuitive design of the user interface (UI) and the user experience (UX), and we are committed to creating a platform that is easy to navigate and use in order to reduce the cognitive burden on our users and increase overall satisfaction. Secondly, protecting the privacy and security of our users' data is our primary responsibility. We follow industry best practices to ensure the security and privacy of all user data.

3. Reference

1. Dave, R, Sargeant, K, Vanamala, M & Seliya, N 2022, ‘Review on Psychology Research Based on Artificial Intelligence Methodologies’, *Journal of Computer and Communications*, vol. 10, no. 5, pp. 113–130.

2.Ewbank, MP, Cummins, R, Tablan, V, Bateup, S, Catarino, A, Martin, AJ & Blackwell, AD 2020, ‘Quantifying the Association Between Psychotherapy Content and Clinical Outcomes Using Deep Learning’, *JAMA Psychiatry (Chicago, Ill.)*, vol. 77, no. 1, pp. 35–43.

3.Pereira, T, Morgado, J, Silva, F, Pelter, MM, Dias, VR, Barros, R, … Oliveira, HP 2021, ‘Sharing biomedical data: Strengthening ai development in healthcare’, *Healthcare (Basel)*, vol. 9, no. 7, pp. 827-839.