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CS4326
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Introduction/Motivation/Problem Definition:

The application aims to assist users in navigating and enhancing their emotional well-being and motivation throughout the day. Many people experience various emotions throughout the day; sometimes, they struggle with negative feelings or a lack of motivation. This web application addresses this problem by providing users with personalized solutions and resources based on their feelings. It seeks to enhance their overall emotional state and help them maintain a positive and motivated outlook.

Our project incorporates AI (Artificial Intelligence) for mood prediction and recommendations. While existing apps have their approaches, Smiley's focus on AI-driven mood analysis sets it apart. It is also set apart from other mood-tracking apps in its multi-input-method design, where users can decide how they will submit their mood, from a selection of emojis, recording a short voice message to taking a selfie, users have many options for capturing their mood now. It is important to find a way for students or adults to express their feelings through a survey, which can lower their stress or anxiety and show them a good path by recommending various videos through our AI implementation.

It can be used by anyone who experiences anxiety, stress, low feelings, low self-esteem, sadness, etc. The project aims to help users better track their mood and their mood over time. For example, a user with bipolar disorder may find utility in our app, which would allow them to see their history of moods with timestamps. Another utility of our app is the camera-enabled mood tracking, which allows users to, rather than write out their mood, take a "selfie" and have their mood detected based on their face, which is convenient.

The greatest challenge we faced in developing was learning new, unfamiliar languages. We had never used framework languages such as React, JavaScript, HTML, or CSS as a group. Overcoming this initial difficulty came at the expense of development time and design quality.

It is challenging to implement AI since we are new to it, and while building this website, we are learning many new things for creating a website using the reacting environment. We also faced challenges with browser feature compatibility and ended up using a single laptop for all testing, as it was the only "feature-complete" device. We will also be recording a demo video rather than a live presentation in our presentation because of this.

Related Works:

Artificial Intelligence for Mental Health and Mental Illness [1].

They reviewed 28 AI-mental health studies that used EHRs, mood rating scales, brain imaging data, novel monitoring systems (e.g., smartphone, video), and social media platforms to predict, classify, or subgroup mental health illnesses like depression, schizophrenia, and suicide ideation and attempts.

Our project aligns with this study in utilizing AI for mental health analysis. However, our project breaks new ground by integrating novel AI modules and prioritizing accessibility for individuals with disabilities, an aspect not explicitly addressed in this paper.

Depression detection using artificial emotional intelligence and machine learning [2]:

This work aims to present a survey of several AI and ML (Machine Learning) techniques that aid in detecting and analyzing emotion. This study examines how emotional artificial intelligence, text, and image processing, chatbots, and sentiment analysis can be used to understand and treat depression. It focuses on emotional intelligence and integrates various technologies like chatbots but does not directly address the needs of differently abled users. Like this paper, our project employs AI for emotional analysis. Our approach, however, sets itself apart by providing multiple input methods to enhance accessibility, catering to a more diverse user base.

The Utility of Artificial Intelligence for Mood Analysis, Depression Detection, and Suicide Risk Management [3]:

This paper critically examines the capabilities and constraints of artificial intelligence (AI), encompassing machine learning (ML) and deep learning (DL), in the context of mood analysis. The primary emphasis lies in using artificial intelligence (AI) and its integrated tools to comprehend and effectively manage emotional states. It offers a deep dive into the technical capabilities of AI in this field but does not explore user interaction and accessibility aspects. Our work builds upon this study by utilizing AI for mood analysis and enriching user interaction through features like voice-to-text and camera-based input. This approach caters to a broader range of users and fosters a more intuitive and accessible experience.

Data Collection/Annotation

Our study utilized a simple, brief survey the user would complete after trying the web app. Our objectives in creating this survey were to discover the user's happiness with the layout and features of the app and collect additional thoughts on using alternative methods of mood detection. We collected 10 (as of writing) responses, responding to three "1-5 star" style questions and two open-response questions.

We did consider the logical flow of these questions but decided that the order was of no particular significance. We did not provide or advertise any incentives for testing the app or completing the survey, and no respondents were asked to submit any personally identifiable information. We did not collect demographic data, as we believed these factors to be irrelevant to the Goal of the survey.

One major limitation of our survey is a potentially strong bias. Our results were skewed toward the "5 stars" answers; respondents may have been biased as these trials were conducted in a public, non-laboratory setting, and some respondents had personal connections with the authors. It is unlikely that our results would be generalizable to the larger population.

We have yet to do any higher-level analysis of the responses; we have only quantified our results. Though attempting a statistical/qualitative analysis would be interesting, the response pool was exceedingly small. We considered re-evaluating our project with a unique quiz style and a new user group. It is possible that a separate set of questions, in a distinctive style, could reveal further useful information on areas of focus for improvement or any key issues in the

accessibility/usability of the app. Additionally, a survey focusing on a user's preferences for input methods (e.g., Their favorite option between selfie, speech-to-text, emoji selection, etc.) could have been of great value for this project.

Method Description

A full list of features and human factors considered is below:

Usability and Accessibility:

In our website, we have used a straightforward design with a minimal layout, which has utilized a minimalist approach to reduce clutter and enhance user focus, including a navigation bar on the top of the screen that ensures navigation is logical and straightforward with clearly labeled menus and buttons. We strategically use colors and fonts to enhance legibility for crucial elements and readable fonts. For example, we ensured font sizes and colors were consistent across our pages and ensured text had a high-contract, color-blindness-friendly background color, which would assist in readability. We also have used whitespace on our website effectively to draw attention to key elements and improve readability.

Privacy Considerations:

We have prioritized privacy and anonymity to establish a website that emphasizes our users' mental well-being. Recognizing the sensitivity of mood analysis and mental health information, our website has a no-database policy. This means that all user data is processed in real time and is not saved, retained, or recorded in any way after the user session has ended. This strategy ensures anonymity and privacy by allowing users to use the site's services, obtain results, and exit without fear of saving or abusing personal data. Furthermore, our design philosophy is heavily founded on giving users control. We put the users in charge of their information by not collecting or keeping any data. This level of transparency and user-centric approach fosters confidence and distinguishes our website as a safe and dependable platform for anyone seeking mood analysis. Our website provides a haven for users to freely explore and obtain insights into their emotional well-being, knowing their privacy is respected and always protected.

Language Support:

We have implemented a multilanguage system that can help users to interact with websites in different languages. This feature can help users meet their needs if they are from a diverse background or culture. Our website is now accessible in four different languages: English, Spanish, French, and Arabic. This expansion is part of our ongoing commitment to providing a user-friendly experience for all visitors, regardless of their language background. Everyone should be able to access and understand the information on our website.

Emotional Well-being and Motivation content:

A successful project should provide valuable services and prioritize users' emotional well-being and motivation. The project can create a supportive environment where users feel valued and respected by incorporating features that promote relaxation, stress reduction, and emotional self-care. Additionally, by understanding and catering to individual user motivations, the project can foster a sense of accomplishment and encourage continued engagement. The constructive collaboration between emotional well-being and encouragement is crucial for creating a sustainable and impactful project that meets users' needs and contributes to their overall well-being.

Color Customization:

Because of the different visual needs of our customers, especially those who are colorblind, we built a special tool into the design of our website that lets you change colors. Because we know how important it is for everyone to be able to use our site, we offer many color schemes and themes for people to choose from. This feature has a toggle switch that lets users easily switch between distinct color choices. This makes the part easier to use and more comfortable for everyone's eyes. We give color schemes for people who have trouble seeing colors to see better and tell the difference between various system parts. Additionally, we are considering adding a "color theme picker" to let users make and save their color schemes, tailoring their visual experience to their tastes and requirements. This amount of customization not only shows that we care about accessibility, but it also makes the experience better for users, making our website a more welcoming and flexible space for everyone.

Various modes of communication and interaction:

We handle essential human aspects in digital connection with various interactive elements on our website, including standard questionnaires, mood analysis by the camera ("selfies"), and voice-to-text input, among many others. Conventional surveys increase user engagement and cognitive accessibility by offering a simple, easy-to-navigate, text-based interaction style. Anyone who values clear, concise writing will find this style ideal. People who are more at ease communicating via facial expressions might explore the realm of non-verbal communication with camera-based mood monitoring or potentially "emoji"-based mood tracking. This function allows for the intuitive understanding of emotional states, which broadens the platform's accessibility, especially for people who have difficulty communicating verbally. Things become more physically accessible and inclusive with voice-to-text input, however. People with trouble typing due to physical limitations or who would rather speak than write will find this function helpful. These parts comprise a multimodal interaction approach, showing how much we care about user-centered design. We have made our website more accessible and user-friendly by providing multiple forms of contact so we can accommodate the varying demands and tastes of our user base.

Backward Chaining:

Backward chaining is goal-driven; it first puts the Goal in the Stack and then matches the Goal with the variables in the ‘then’ clauses of the rules and finds the rule whose ‘then’ clause variable matches. It then puts the rule's ‘if’ clause variables in the Stack. It repeats the process with the variable at the top of the stack. If it finds the rule whose ‘then’ clause variable matches, it puts the ‘if’ clause variables at the top of the stack. If it does not find the rule, it asks the user for the variable's value. It is removed if the variable at the top of the stack is satisfied. If it is not satisfied, the goal fails. The Goal succeeds when the stack becomes empty.

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for the variable's value. It is removed if the variable at the top of the stack is satisfied. If it is not satisfied, the goal fails. The Goal succeeds when the stack becomes empty.

Forward Chaining:

Forward chaining is fact-driven. First, the Forward Chaining stores entered facts in the fact base. Then, the forward chaining matches the entered variable with variables in the 'if' clauses of the rules. If a match is found, it selects the rule and, one by one, checks if all the variables in that rule's 'if' clause are satisfied. If satisfied, it puts that rule's 'then' clause variable in the fact base. It continuously checks if any rule's 'if' clause is satisfied; if it is, it enters the variable in the then clause of that rule in the fact base. If a question is asked about a fact, it checks the fact base if the fact is in the fact base and provides the answer if it finds it.

Evaluation Criteria

Describe how did you evaluated your solution.

We used a survey method to gather feedback, a practical approach for collecting qualitative and quantitative data. Our Survey form allows us to gather diverse opinions and experiences, making them suitable for evaluating a web application like Smiley.

We focused on Texas State students as survey participants, which was a strategic choice. This demographic is likely to be tech-savvy and have had varied experiences with emotional and motivational challenges, making the feedback valuable.

It was encouraging for us that the response was alright. We plan to utilize this feedback to improve our website. We will make continuous improvements based on user feedback, which is crucial for the success of applications dealing with sensitive issues like emotional well-being.

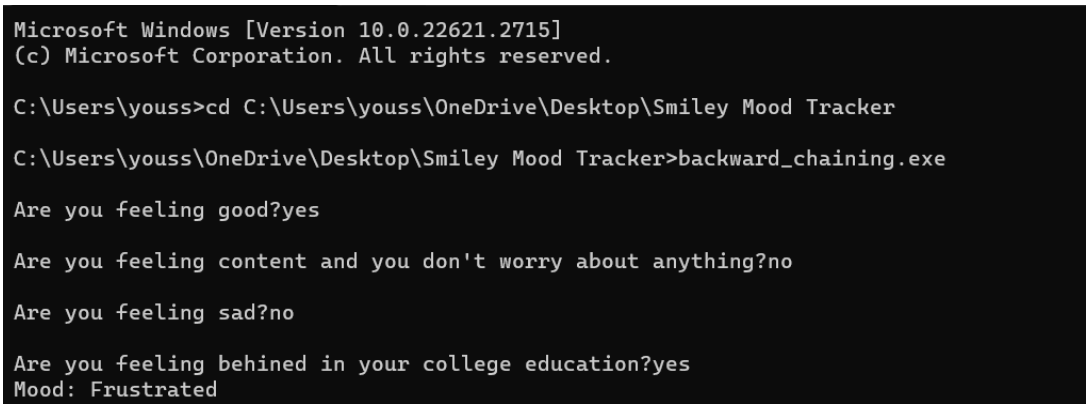
Baseline System:

Visual Studio builds an executable file that can be run locally using a command prompt on Windows or a terminal on Mac OS. This specific Program uses simple and outdated Artificial Intelligence algorithms through forward and backward chaining to process results on User Input.

The baseline system requires technical expertise to get results successfully. The user must download the VS code compiler and install C++ and all the required libraries. Once C++ runs smoothly on VS code, the user can build our project on VS code to produce a .exe file. The .exe

file can run on a Windows command prompt or a Mac OS terminal. The average person with no Computer science experience might experience some difficulty running our baseline software.

Once the user successfully runs the .exe file, the Program will ask questions such as "How are you feeling today? or Are you feeling content with your life? The program expects user input for these questions; based on the information the user gives, we can derive a simple prediction using the implemented backward chaining algorithm.



How much did your system outperform the baseline?

Visual Interface:

The website offers a graphical user interface (GUI), allowing users to interact with elements visually. This can include navigation bars, buttons, menus, and images, making it more intuitive for users unfamiliar with command-based interactions.

Ease of Navigation:

Websites typically have navigational structures such as menus, links, and tabs, making it easier for users to move between different sections or functionalities than memorizing or typing commands.

Accessibility:

GUI-based interfaces are often more accessible to a wider range of users, including those who might find it challenging to use command lines due to technical complexity or physical limitations.

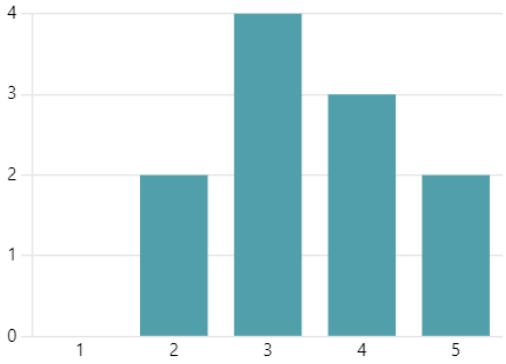
Usability:

A website rather than a command-line application provides an immense amount of context for the users, given that all Texas State University students are practically required to use a web browser if they have not already used one.

Results Analysis:

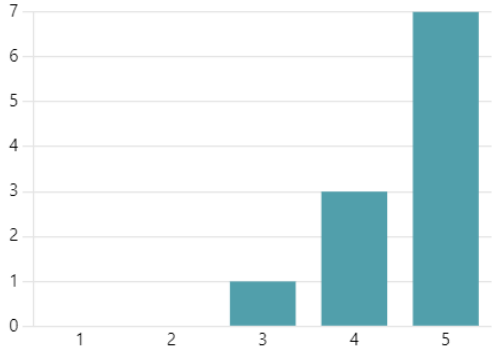
How Satisfied are you with Mood Prediction?

3.45
Average Rating



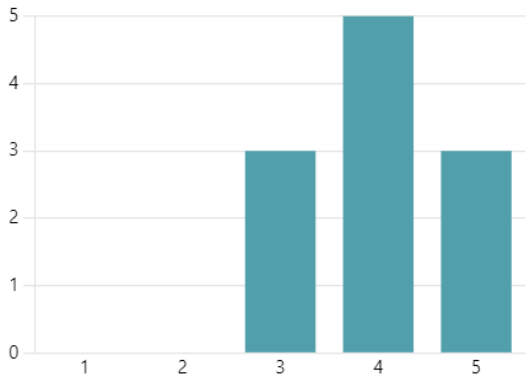
How likely are you to recommend our mood prediction website to a friend or colleague?

4.55
Average Rating



Would using this product in my daily life enable me to become happier and accomplish more things?

4.00
Average Rating



Error analysis:

For our error analysis regarding the AI implemented for mood prediction, we should focus on evaluating the performance of the AI model and identifying areas where it may not be performing optimally.

Accuracy of Predictions:

Assess how accurately our AI model predicts moods. We should compare the predicted mood against the actual mood reported by users, using metrics such as accuracy, precision, and recall.

Common Sources of Error:

Identify specific situations or types of data where our AI model tends to make errors. This could include emotional states that are harder to predict or errors arising from user input variability.

Data Quality and Diversity:

Evaluate if the data used to train our model is diverse and representative of our current user base. Poor data quality or lack of diversity can lead to biased or inaccurate predictions.

User Feedback:

Incorporate user feedback into the analysis. If users frequently report that their mood was misclassified, we should investigate the possible reasons why this is happening.

Model Overfitting or Underfitting:

Determine if our model is too complex (overfitting), needs to generalize well to new data, or is too simple (underfitting) and missing key data patterns.

Algorithm Analysis:

Examine the algorithms used in our AI model. Some algorithms may be more suitable for mood prediction than others, and switching algorithms or adjusting parameters could improve accuracy.

Impact of Errors:

Discuss the impact of these errors on the user experience. Inaccuracies in our mood prediction application can lead to inappropriate content recommendations or interventions, potentially affecting the tool's effectiveness.

Improvement Strategies:

Propose strategies for improving the model based on our findings. This might include collecting more diverse data, trying different algorithms, or implementing more sophisticated data preprocessing techniques.

Future Testing Plans:

Outline how we plan to continue testing and refining our AI model. This could involve setting up a schedule for regular re-evaluation or establishing a process for continuously integrating user feedback.

Limitations of AI in Mood Prediction:

Acknowledge the inherent limitations of using AI for mood prediction, such as the subjective nature of emotions and the challenge of capturing the nuances of human emotional states through technology.

Suggestions for future improvements:

Some feedback from the student survey suggested making our website accessible via smartphones for more convenient daily use. Additionally, students recommended a feature to

connect with others experiencing similar stress or anxiety. This could create a supportive community where individuals who have effectively managed these challenges can share strategies and support others in coping with their stress and anxiety. This would also introduce privacy and safety concerns, which should have been considered in this project.

References

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