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CMPE-492

Final Report

MAI Therapist

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# Introduction

MAI Therapist is a web application designed to help psychologists in analyzing therapy sessions. Its main goal is to give therapists insightful information on their patients' emotional states and behavior during sessions. Artificial intelligence is used by the system to examine client emotions in videotaped therapy sessions. When a session video is uploaded, MAI Therapist creates a transcript of the session and combines it with the emotions that were identified during each particular time period. The analysis result gives therapists a thorough summary of the therapy session, highlighting significant points and giving them a better understanding of their patients' emotions. The system's findings and the therapist's personal analysis can be compared in order to detect any gaps in their analyses and improve therapy strategies. Additionally, the system has a patient management tool that enables psychologists to keep track of session notes, diagnosis information, and other relevant information. Overall, MAI Therapist uses cutting-edge technology to assess and understand client emotions and actions in order to assist psychologists in enhancing their therapeutic methods. This report aims to present the MAI Therapist project's final architecture and design, impact of the solution, contemporary issues, new tools and technologies used in the project, use of internet resources to gather information, test results, the project's final status, and a user manual.

# System Architecture and Design

The purpose of the MAI Therapist system is to give therapists a reliable, effective, and user-friendly platform for reviewing therapy sessions and guaranteeing data security. The system architecture has been specifically designed to serve the needs of therapists and advance productive therapy methods.

The front-end subsystem, which is in charge of designing an intuitive user interface, is at the heart of the system. It makes use of Nuxt.js, a JavaScript framework built on the Vue.js framework, to provide a responsive and simple user interface. Therapists can access and interact with the system from a variety of devices and platforms because the front-end and back-end subsystems can connect with each other via APIs. The solution integrates AWS Amplify to simplify authentication and data storage, ensuring scalable and secure access.

Data administration and critical business logic are handled by the backend subsystem. To guarantee excellent performance, scalability, and fault tolerance, it utilizes the power of AWS cloud services, including Lambda, DynamoDB, and S3. To enable connection with the front-end subsystem and other external systems, this subsystem offers a comprehensive set of APIs. The system can manage enormous amounts of data, maintain data integrity, and support the expanding needs of therapists and patients by utilizing AWS services.

Security is a paramount concern in the MAI Therapist system, and it is managed by a dedicated security subsystem. This subsystem incorporates various measures, such as data encryption, access controls, and user authentication and authorization, to ensure the confidentiality and privacy of sensitive information. Integration with AWS Identity and Access Management (IAM) strengthens security measures and provides granular control over system access.

The therapy analysis subsystem also makes use of AWS Rekognition to offer therapists and clients insightful information from therapy sessions. By utilizing face detection, it generates a multitude of analyses that we utilize for emotion analysis, assisting therapists in making informed decisions and enhancing the therapeutic process.

Overall, to provide a reliable, efficient, and secure therapy platform, the MAI Therapist system integrates cutting-edge technologies, cloud architecture, and a careful design. While upholding the greatest standards of data privacy and security, its user-friendly interface, scalability, and connection with AWS services enable therapists to offer patients the best care possible.

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# Impact of the Solution

## Societal Context

With the automated emotion recognition system and the integration of patient analysis, the MAI Therapist enables therapists to focus more on the patient, leading to more effective and efficient therapy sessions.

## Global Context

The versatility of the MAI Therapist system allows for easy adaptation to various therapeutic settings worldwide. With minimal configuration requirements, the project can be implemented in different countries and cultural contexts, offering a standardized approach to therapy that transcends geographical boundaries. This global perspective ensures that the benefits of the MAI Therapist reach a wide range of individuals seeking mental health support.

## Economical Context

Depending on the setup and requirements, therapists may need to purchase additional cameras or webcam devices to facilitate video recording for therapy sessions. This cost should be taken into account when implementing the MAI Therapist solution. However, it's worth noting that many therapists may already have suitable equipment available, so this cost may not apply to everyone.

Besides equipment costs, therapists are required to pay a subscription fee to access and use the MAI Therapist system.

# Contemporary Issues

Concern over data security and privacy is a contemporary issue that the MAI Therapist addresses. The system has strong security measures in place to guarantee the privacy of patient data. In order to safeguard sensitive data from unauthorized access, it complies with all applicable privacy laws and regulations. The privacy of each individual is also given top priority by the MAI Therapist, which uses cutting-edge facial recognition methods without actually storing any photographs. Instead, to reduce the potential of privacy violations, the system uses face data as vectors. A safe and private option for productive therapy sessions is provided by the MAI Therapist by addressing these contemporary issues.

# New Tools and Technologies

To improve the efficiency of therapy sessions, the MAI Therapist project includes a variety of new tools and technologies, including several AWS services. One such technology is Amazon Rekognition, an effective facial recognition program that permits facial expression analysis of patients. Utilizing Rekognition, the MAI Therapist can accurately identify and interpret the emotions that patients are displaying, giving them insightful information about their mental state during therapy.

The project uses Amazon S3 (Simple Storage Service) for safe and scalable cloud storage in addition to facial recognition. S3 makes it possible to store patient information in a trustworthy and highly accessible manner, including video recordings and session transcripts. This makes sure that therapists can readily access and evaluate previous sessions, enabling them to gain a comprehensive understanding of each patient's advancement over time.

Amazon Transcribe, a speech recognition service, is another important piece of technology used. The MAI Therapist can use Transcribe to automatically turn speech from therapy sessions into text. This not only makes it simple to review and analyze session content, but it also makes it possible for therapists to spot significant insights and patterns that could improve the efficacy of the therapy.

# Use of Internet Resources

We made considerable use of online resources, notably the Amazon Web Services (AWS) website, to gain access to a variety of technical ideas and best practices. The AWS website offers comprehensive tutorials, case studies, and detailed documentation that provide valuable insights into the services utilized in our project, including data encryption, secure cloud storage, speech and emotion recognition.

We acquired a thorough understanding of the real-world application of these technologies by utilizing the tools offered on the AWS website. We gained knowledge of the many AWS services, including facial recognition software Amazon Rekognition, speech-to-text conversion with Amazon Transcribe, and secure data storage with Amazon S3.

Overall, we used AWS's documentation and community forums to handle technical difficulties, troubleshoot problems, and keep up with the most recent developments in the field.

# Test Results and Assessment

## Test Results

### Logging in and Registration

- The test case for user registration passed, confirming that users can successfully create a new account.

- The test case for user login passed, validating that registered users can log in using their credentials.

- No issues or failures were encountered during the testing of this feature.

### Patient Information Management

- The test case for creating new patient information passed, ensuring that the data is stored accurately in the DynamoDB database.

- The test case for updating existing patient information passed, verifying that the changes are saved correctly.

- The test case for creating new session information for patients, adding notes for them and storing them passed.

- All validations and error handling mechanisms for patient information management functioned as expected.

- No defects or issues were identified during the testing of this feature.

### Video Recording and Analysis

- The test case for uploading session videos passed, indicating that videos are successfully stored in AWS S3 storage.

- The test case for AWS Rekognition's emotion detection on uploaded videos passed, ensuring accurate analysis of emotions.

- The test case for creating transcriptions passed, indicating that the application successfully generates accurate transcriptions for the uploaded session videos.

- No failures or bugs were encountered during the testing of this feature.

## Assessment of the Tests

The successful execution of all test cases reflects the effectiveness of the testing effort in ensuring the quality and reliability of the MAI Therapist software. The absence of failed tests suggests that the development team has implemented the required functionalities accurately and that the application aligns with the expectations outlined in the test plan.

Considering the test results, it is evident that the application has been thoroughly tested, and all critical features have been verified to function as intended. The absence of bugs or issues in the tested functionalities demonstrates the attention to detail and meticulousness of the development team.

# Final Status of the Project

As of the MAI Therapist project's final stage, significant work has been done in meeting the project's goals and milestones. A number of crucial deliverables have been implemented and achieved by the development team. The following is the project's status:

1. Development of the MAI Therapist Application: The MAI Therapist application, the project's central element, has been created and improved to comply with the criteria. The software offers therapists a simple interface for analyzing therapy sessions.

2. Integration of Facial Expression Analysis: The integration of facial expression analysis is a key component of the MAI Therapist application. The technology and algorithms that enable the recognition and interpretation of facial expressions have been successfully developed by the development team. This capability aids in the precise identification and evaluation of emotions during therapy sessions.

3. Strong and Secure Cloud Infrastructure: A strong and secure cloud infrastructure has been built to guarantee the privacy and security of sensitive client data. The infrastructure uses cutting-edge technologies and follows best practices in data encryption, access controls, and secure storage. This gives clients and therapists confidence that their information is secure and private.

4. Analytics and Reporting Development: The project team has concentrated on creating extensive analytics and reporting features for the MAI Therapist application. These tools enable therapists to view emotional trends, read thorough session reports, and learn about their patients' advancement over time. The application's worth and efficiency for therapists' professional practice are greatly increased by the analytics and reporting capabilities.

5. Combining Analysis Results and Generate Downloadable Content: We decided not to combine analysis results and produce downloadable content for the project's final version. Users can examine the analysis results in-depth because they are already visible on the webpage. We think it is unnecessary and redundant to compile the results once more into downloadable stuff.

# User Manual

The user manual provides detailed instructions and guidelines for using the MAI Therapist application effectively. This section outlines the hardware and software requirements for the client-side component.

## Hardware

### Requirements

The following hardware specifications must be met for the MAI Therapist application to operate at its best:

Computer or device with a modern web browser

Webcam or camera device for video recording

## Software

## Requirements

Make sure the following applications are set up and installed on the device:

Operating System: Windows, macOS, or Linux

Web Browser: Google Chrome, Mozilla Firefox, Microsoft Edge, Safari, or any other modern web browser with JavaScript enabled.

Note: It is recommended to keep the web browser up to date to ensure compatibility and security.

The MAI Therapist application is designed to be compatible with a wide range of hardware and software configurations. However, in order to ensure top performance and flawless user experience, it is crucial to comply with the stated standards.

For comprehensive instructions on utilizing the MAI Therapist application, including user registration, session administration, and data analysis, please refer to the following sections.

## User Interface

### Ai Chat Bot

AI chat bot is available at the bottom right corner of each page to assist users at any time.

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### About Page

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Description automatically generated with medium confidence The about page provides information about the system and its purpose.

### Login Page

If users have completed subscription and registration before, they can log in to the system using their email and password.

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### Pricing Page

The pricing page displays subscription plans. Users need to complete a subscription to register for the system.

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### Subscription Page

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Description automatically generated with low confidenceAfter selecting a subscription plan, users are directed to the subscription page where they need to provide their email address to continue.

Users then provide the necessary information for payment.

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After providing the information and clicking the pay button, users receive a success message if there are no issues and proceed to the next step.

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Users are then prompted to provide their email address to verify their subscription. If the subscription exists, they can proceed with registration by entering their name, surname, and password.

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A confirmation code is sent to their email address, which needs to be entered in the corresponding field.

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### Create New Client Page

Once everything is confirmed, users are logged into the system and can create new client entries by entering their name, surname, ID, age, gender, and diagnosis.

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### All Clients Page

On the "All Clients" page, users can access a list of their clients. If they click the button under the “Details” section, they can view detailed client and session information, upload session videos, add session notes and obtain analyses. From the operations section, users can delete a client or update their information.

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### Patient Page

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Users can upload new session information and video recordings by clicking the "Add Session" button. The analysis starts immediately after uploading the video.

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All sessions are listed in the sessions section, displaying their date, notes, and analysis status. Users can also filter sessions by a specific date using the search bar.

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A screenshot of a video chat

Description automatically generated with medium confidenceIf the 'View' button under the 'Actions' section is clicked, detailed information about the video recording and emotion analysis becomes available. Below the video, when it starts playing, a timeline becomes visible. This dynamic timeline moves along with the video, displaying the emotions of the patient at different time intervals. Additionally, the points representing specific emotions on the timeline are clickable, allowing users to view the corresponding parts of the video. Also, there is a section that shows transcript of the video. It is dynamic and flows with the video as well. In the right side, a pie chart displays the distribution of emotions throughout the video.

### Logout

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