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AI SOLUTION FOR INDUSTRIES

HEALTHCARE INDUSTRY

CUREFIND MEDICAL REMINDER APP

Contents

AI Solution (HealthCare Industry)

AI Project in Python: Associates is a team of students that are working on an AI Project called **Curefind Medication Reminder app** or simply Curefind app which leverages artificial intelligence to enhance user engagement and improve medication adherence, making it highly relevant to its core theme of promoting health and wellness. The app can analyse user behaviour, medication patterns, and adherence trends to offer personalized reminders and recommendations by employing machine learning algorithms. This AI-driven approach not only helps users manage their medication schedules effectively but also provides insights into potential issues, such as missed doses or side effects, allowing for timely interventions. Additionally, the integration of natural language processing (NLP) enables users to interact with the app through conversational interfaces, making the experience more intuitive and accessible, especially for older adults or those with limited tech-savviness.

In the broader healthcare environment, the Curefind app addresses critical challenges related to medication non-adherence, which is a significant factor impacting patient outcomes and healthcare costs. By utilizing AI to provide real-time reminders and support, the app contributes to a proactive healthcare model that prioritizes preventive measures and patient education. Moreover, the app can aggregate anonymized data to identify trends and patterns in medication adherence across different demographics, enabling healthcare providers to make informed decisions and tailor interventions more effectively. Overall, the AI solutions integrated into the Curefind app not only align with its mission of enhancing medication management but also support a healthier society by reducing the burden of chronic illnesses and improving quality of life for users.

Business Objectives

- Provide personalized medication reminders to users.
- Assisting users in managing their medical schedules
- Reduce missed medication collection dates
- They keep track of the patient's health status based on how the user uses the app frequently.
- Improve user satisfaction and loyalty.
- Provide conversational AI to automatically do what the user requests it to do.

Business Success Criteria:

- The app should be able to send timely reminders to users, reduce missed medication collection dates by 50%
- Improve user satisfaction ratings by 20% using the net promoter test.

- The app will have a user-friendly GUI by implementing UX Design for the target users
- The performance of the app will be monitored for 12 months from its initial deployment
- Improving data security by 50% continuously based on frequent changes made by the user, their needs, or challenges that they face
- To assist with unreliable machine learning algorithms, A/B testing and longitudinal testing will be used to ensure the application is relevant and effective based on what the application might predict

Business Background:

Managing medication compliance among elderly people has been a growing concern since many of them live independently and no longer have caregivers to remind them daily to take their medications. The project aims to develop a medication reminder app to assist elderly people in managing their medical schedules and reducing missed medication collection dates. Making use of AI technology, the app will monitor the changes over time based on how frequently the user uses the app make suggestions based on the patient's health status (if it is required) which will be altered by either the user or their caregiver (if they have one). In this work, we describe our development approach, provide a rationale for the choice of technology, give details on the application, and report on early feedback from pilot testing

Requirements, Constraints, and Risks:

- Functional Requirements:

- The app should be able to send reminders to users based on their medication schedules.
- The app should be able to integrate with electronic health records (EHR) to access user medical histories.
- The app should be able to generate personalized notifications using natural language processing (NLP)

- *Non-Functional Requirements*:

- The app should have a user-friendly interface

- The app should be able to handle a minimum of 100 concurrent users
- The app should have a response time of less than 2 seconds

- *Constraints*:

- The app should be developed using supervised machine-learning algorithms
- The app should be deployed on a cloud-based infrastructure
- The app should comply with the existing healthcare regulations and data privacy policies (POPIA)
- The development and deployment of the application should be completed according to its designated timeline
- Completion of the app should be done within its budget limit

- Risks:

- The app may not be able to accurately send reminders to users
- The app may not be able to integrate with EHR systems
- The app may not be able to handle a high volume of concurrent users
- The app might be exposed to cyberattacks resulting in data loss or the system being corrupted

Tools and Techniques*:*

- Tools:

- Python
- scikit-learn
- TensorFlow
- NLTK (Natural Language ToolKit)
- spaCy
- Rasa
- Botkit
- Docker
- Kubernetes
- Ansible

- Prometheus
- Grafana

- Techniques:

- Supervised machine learning
- Natural language processing
- Intent detection
- Entity recognition
- Dialogue management
- State management
- Continuous integration
- Continuous deployment
- Monitoring
- Logging

Problem Definition

The mobile meds reminder app is designed to help people with their problems. The problem is the need for a simple app that helps people stick to their medication schedules. Some people need this because of their health conditions. The biggest issue is that patients often forget or struggle to take their medication because the schedule and doses are too complicated. This is especially hard for people with chronic illnesses like autism, schizophrenia, or bipolar disorder, as they tend to miss more medication during flare-ups of their conditions.

The contribution towards the theme of this problem is in the field of management of health care along with individualization of care. Since medication adherence is important for the course of treatment and health in general, the target audience of a nice functional application could be very beneficial for users. In a case where people would create an account on the app indicating the diseases they are suffering from, medicines assigned to such conditions, the amounts of such medicines, and when to collect them, the app would send a notification for the collection of medicines where applicable.

The application does not only provide these basic reminders. It also has capabilities that address autism, schizophrenia, and Bipolar people to have some strategies in place when they are experiencing episodes. The application would allow for example crisis management tools that address mental health and easily acquiring resources for that matter and provision of additional information such as pictures or text messaging that helps users through the hard times.

In summary, this problem definition highlights a very sensible and relevant well-grounded solution targeting the issue of personalized medication compliance. With clear user assumptions and the presence of additional features for people suffering from severe mental illness, the app can help mobilize prescription compliance and increase health status.

Poster

YOUR HEALTH A TAP AWAY
Curefind
Digital medical file
Book your appointment on the app
Get medical remainders
Medical support
Your health in your pocket!
Available for Android and IoS
Download Now!
And register!
Curefind

MACHINE LEARNING APPROACH

A well-planned, appropriate set of algorithms with Machine learning approach involves selecting, structuring, and combining algorithms to solve specific problems effectively, this typically requires identifying the problem type, the data characteristics, and the target outcome. Machine learning is a certain type of artificial intelligence where machines or computers learn from imported data to predict outcomes.

AI Machine learning approach used for Curefind Healthcare app:

1. Supervised Learning Approach:

- ❖ The Supervised Learning Approach is an approach were we will teach the system application to identify and recognize many different types of diseases and illnesses mainly focused on the elderly group of people then schedule reminders and recommend treatment and the certain type of medication they should take after meals this kind of predictions will be used through AI training of Natural Processing Language (NLP) which will be focused on enabling Curefind app to understand, interpret, and generate human language and text. It will combine linguistics and computer science to allow Curefind app to process and analyse large amounts of natural language data.
- ❖ Recurrent Neural Network (RNN) is a neural network that will be part of training the Curefind app through AI machine learning approach reason being it contains loops that allow data to be passed from one step to the next with memory for retaining data over time, with its function the Curefind app will be able to remember previous inputs then predict future outcomes this kind of adherence will be helpful with tracking the user medical background history inputs, making them suitable for time-series or sequence prediction tasks.
- ❖ Goal is about Curefind app Supervised learning learn from labelled data to make predictions with two types which are classification that predicts discrete labels (e.g., spam vs. not spam, disease vs. no disease) and regression that predicts continuous values (e.g., predicting disease medication, predicting disease treatment).

2. Anomaly detection approach:

- ❖ Anomaly detection in machine learning is a powerful approach for identifying unusual patterns that deviate from expected behaviour. For a healthcare reminder application like Curefind, which aims to support patients with timely medication reminders, anomaly detection can play a key role in enhancing patient adherence and identifying potential health risks. By using machine learning algorithms that learn from each user’s regular habits (such as medication intake times, response to reminders, and health updates), the application can detect anomalies, such as missed doses or significant changes in user behaviour. This can provide insight into potential issues, like worsening symptoms or non-adherence, allowing timely intervention.

- To train the model, Curefind would collect historical data on users' medication schedules, typical response times to reminders, and any patterns of adherence. For example, if a user regularly acknowledges reminders within a specific time window, the model learns this pattern and flags any deviations as potential anomalies. By continuously updating with new data, the model refines its understanding of what constitutes “normal” behaviour for each user, making it highly personalized. Anomaly detection algorithms like isolation forests or one-class SVM can be employed here, as they’re effective in highlighting irregularities without a large amount of labelled data.

- Once the model is deployed, it monitors each user’s interaction with the reminders in real-time. When an anomaly is detected, like multiple ignored reminders or an unusually late acknowledgment, the system could trigger additional notifications, suggest a check-in with a healthcare provider, or notify a caregiver if pre-arranged. This approach not only helps in improving adherence but also serves as an early warning system, alerting users or caregivers to any unusual patterns that could signal health risks. This added layer of intelligence makes Curefind proactive, not just a simple reminder app, but a tool that supports long-term health management.

3. Reinforcement learning approach:

- Reinforcement learning (RL) in machine learning is an approach where an agent learns to make decisions by receiving feedback from its actions in an environment. For Curefind, a healthcare reminder application, RL can enable the system to optimize reminder schedules based on each user’s unique response patterns, encouraging better medication adherence. The RL agent in Curefind would act by sending reminders and observing the user’s responses (such as acknowledging, delaying, or ignoring reminders). Based on these responses, the agent adjusts its actions to maximize the likelihood of timely medication intake, learning from each interaction to improve reminder effectiveness.

- Training the RL model involves simulating various reminder strategies, with the model receiving “rewards” for actions that lead to positive outcomes, like timely medication intake, and “penalties” for outcomes that indicate non-adherence. For instance, if a user tends to respond well to reminders at certain times, the RL agent learns to prioritize those times. Conversely, if a user frequently ignores reminders at certain intervals, the agent learns to avoid those times or try a different approach, like adjusting the notification style or frequency. Through this trial-anderror process, the model identifies and refines the most effective strategies for each individual, creating a personalized and adaptive reminder system.

Once deployed, Curefind's RL agent continues to learn and adapt based on real-time interactions with the user, which helps it stay effective even as the user's habits or daily schedule changes. This dynamic, personalized system means the application becomes increasingly useful over time, offering reminders that align closely with the user's routine and preferences. By focusing on long-term rewards — like consistent adherence to medication schedules — Curefind with reinforcement learning actively supports healthier habits, ultimately reducing the risk of missed doses and supporting better health outcomes for users.

4. Algorithms for AI Curefind App.

- ❖ Linear Regression: Analyses historical data to find a linear relationship between variables, making it useful for continuous predictions therefore it models the relationship between independent variables (e.g., age, medication type, health condition) and a dependent variable (e.g., likelihood of adhering to reminders).
- ❖ Decision Trees: Split data into branches based on feature values, creating decision rules that help classify users or predict outcomes therefore they provide a structured, branching method of making decisions based on various user attributes and conditions.
- ❖ Support Vector Machines (SVM): SVM separates data into categories (e.g., "likely to adhere" vs. "likely to miss") by finding the best hyperplane that maximizes the margin between classes then it classifies data by finding an optimal boundary between different classes, particularly useful for distinguishing between different types of users or adherence behaviours.
- ❖ Neural Networks: Processes data through layers of interconnected nodes, adjusting weights based on the Curefind app learned patterns, to make complex predictions or classifications after they adept at recognizing complex, nonlinear patterns in data, making them useful for highly personalized reminders and recommendations.

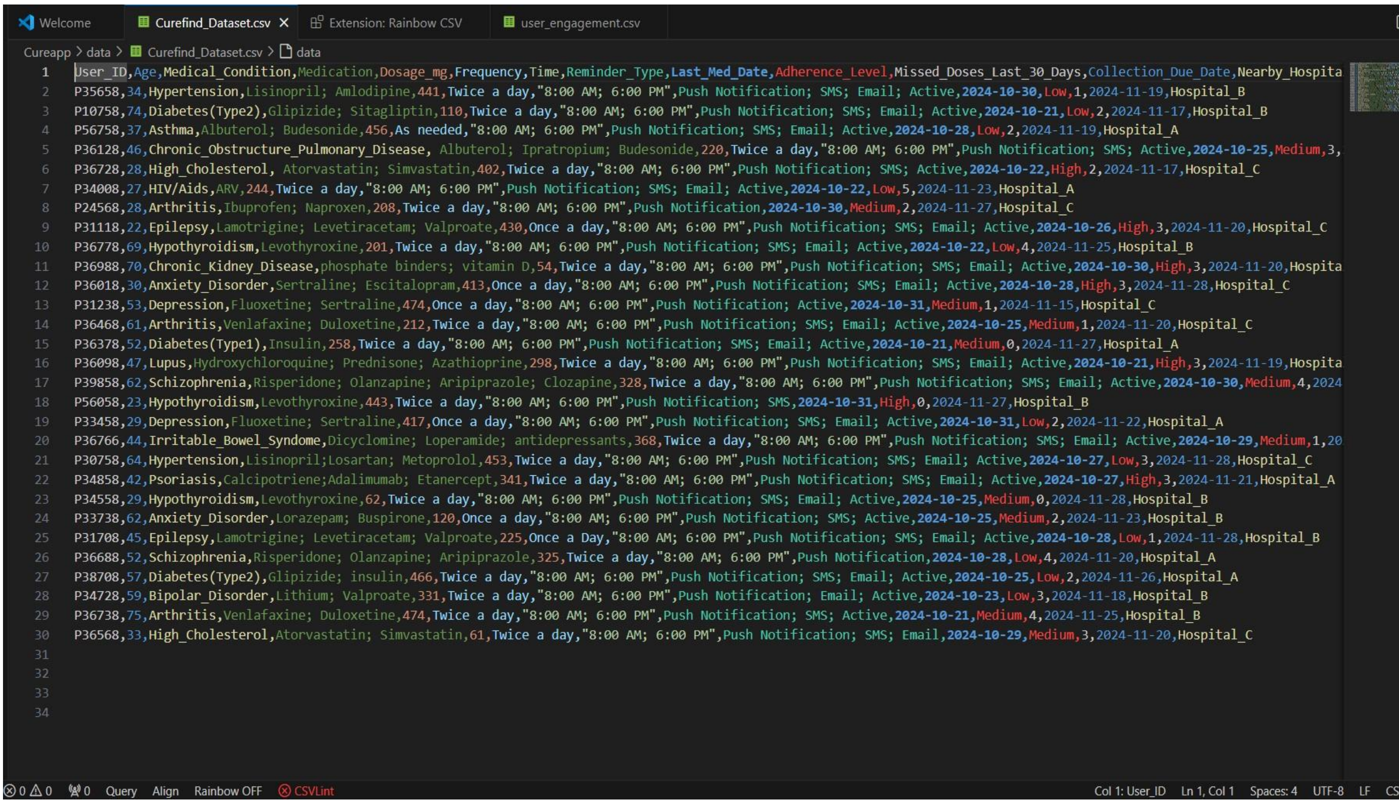
Data

- ❖ The Curefind Medication Reminder app is designed to help users manage their medication schedules effectively. At its core, the dataset comprises several key entities, including Users, Medications, User Medications, Reminders and Adherence Tracking. The Users table captures essential user information such as names, email addresses, and phone numbers, while the Medications table contains details about each medication, including dosage, frequency, and potential side effects. This structure allows for easy retrieval and management of user and medication data, ensuring a tailored experience for each user based on their specific health needs.

- To link users with their prescribed medications, the User Medications table creates a many-to -one relationship between users and medications. This table records additional details like the start and end dates of medication use and any relevant notes from the user. Complementing this is the Reminders table, which stores personalized reminders set by users for their medications, detailing when and how often they should take them. This functionality is crucial for improving adherence to medication schedules, making it easier for users to remember when to take their medications.

- Finally, the Adherence Tracking table plays a vital role in monitoring users' medication compliance. It logs daily adherence records, allowing users to indicate whether they took their medication as scheduled and providing a space for comments on their adherence experience. This structured approach to data management, whether using SQL databases for robust querying or CSV files for simpler data storage and sharing, enables the Curefind app to provide valuable insights into user behaviour and medication effectiveness, ultimately supporting better health outcomes.

Examples of forms in data:




```
User_ID,Age,Medical_Condition,Medication,Dosage_mg,Frequency,Time,Reminder_Type,Last_Med_Date,Adherence_Level,Missed_Doses_Last_30_Days,Collection_Due_Date,Nearby_Hospita
P35658,34,Hypertension,Lisinopril; Amlodipine,441,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-30,Low,1,2024-11-19,Hospital_B
P10758,74,Diabetes(Type2),Glipizide; Sitagliptin,110,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-21,Low,2,2024-11-17,Hospital_B
P56758,37,Asthma,Albuterol; Budesonide,456,As needed,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-28,Low,2,2024-11-19,Hospital_A
P36128,46,Chronic_Obstructure_Pulmonary_Disease, Albuterol; Ipratropium; Budesonide,220,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Active,2024-10-25,Medium,3,
P36728,28,High_Cholesterol, Atorvastatin; Simvastatin,402,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Active,2024-10-22,High,2,2024-11-17,Hospital_C
P34008,27,HIV/Aids,ARV,244,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-22,Low,5,2024-11-23,Hospital_A
P24568,28,Arthritis,Ibuprofen; Naproxen,208,Twice a day,"8:00 AM; 6:00 PM",Push Notification,2024-10-30,Medium,2,2024-11-27,Hospital_C
P31118,22,Epilepsy,Lamotrigine; Levetiracetam; Valproate,430,Once a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-26,High,3,2024-11-20,Hospital_C
P36778,69,Hypothyroidism,Levothyroxine,201,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-22,Low,4,2024-11-25,Hospital_B
P36988,70,Chronic_Kidney_Disease,phosphate binders; vitamin D,54,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-30,High,3,2024-11-20,Hospita
P36018,30,Anxiety_Disorder,Sertraline; Escitalopram,413,Once a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-28,High,3,2024-11-28,Hospital_C
P31238,53,Depression,Fluoxetine; Sertraline,474,Once a day,"8:00 AM; 6:00 PM",Push Notification; Active,2024-10-31,Medium,1,2024-11-15,Hospital_C
P36468,61,Arthritis,Venlafaxine; Duloxetine,212,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-25,Medium,1,2024-11-20,Hospital_C
P36378,52,Diabetes(Type1),Insulin,258,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-21,Medium,0,2024-11-27,Hospital_A
P36098,47,Lupus,Hydroxychloroquine; Prednisone; Azathioprine,298,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-21,High,3,2024-11-19,Hospita
P39858,62,Schizophrenia,Risperidone; Olanzapine; Aripiprazole; Clozapine,328,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-30,Medium,4,2024
P56058,23,Hypothyroidism,Levothyroxine,443,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS,2024-10-31,High,0,2024-11-27,Hospital_B
P33458,29,Depression,Fluoxetine; Sertraline,417,Once a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-31,Low,2,2024-11-22,Hospital_A
P36766,44,Irritable_Bowel_Syndome,Dicyclomine; Loperamide; antidepressants,368,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-29,Medium,1,20
P30758,64,Hypertension,Lisinopril;Losartan; Metoprolol,453,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-27,Low,3,2024-11-28,Hospital_C
P34858,42,Psoriasis,Calcipotriene;Adalimumab; Etanercept,341,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-27,High,3,2024-11-21,Hospital_A
P34558,29,Hypothyroidism,Levothyroxine,62,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-25,Medium,0,2024-11-28,Hospital_B
P33738,62,Anxiety_Disorder,Lorazepam; Buspirone,120,Once a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Active,2024-10-25,Medium,2,2024-11-23,Hospital_B
P31708,45,Epilepsy,Lamotrigine; Levetiracetam; Valproate,225,Once a Day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-28,Low,1,2024-11-28,Hospital_B
P36688,52,Schizophrenia,Risperidone; Olanzapine; Aripiprazole,325,Twice a day,"8:00 AM; 6:00 PM",Push Notification,2024-10-28,Low,4,2024-11-20,Hospital_A
P38708,57,Diabetes(Type2),Glipizide; insulin,466,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email; Active,2024-10-25,Low,2,2024-11-26,Hospital_A
P34728,59,Bipolar_Disorder,Lithium; Valproate,331,Twice a day,"8:00 AM; 6:00 PM",Push Notification; Email; Active,2024-10-23,Low,3,2024-11-18,Hospital_B
P36738,75,Arthritis,Venlafaxine; Duloxetine,474,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Active,2024-10-21,Medium,4,2024-11-25,Hospital_B
P36568,33,High_Cholesterol,Atorvastatin; Simvastatin,61,Twice a day,"8:00 AM; 6:00 PM",Push Notification; SMS; Email,2024-10-29,Medium,3,2024-11-20,Hospital_C
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- Evaluating the accuracy of the AI model developed for the Curefind healthcare medication reminder app is critical to ensuring its effectiveness in promoting medication adherence among users. The evaluation process will begin with data validation to ensure that the training and testing datasets are of high quality and representative of the diverse user population. This includes checking for data completeness, consistency, and relevance, as well as addressing any biases that may arise from underrepresented demographics or medical conditions. By using a comprehensive dataset that captures a wide range of user experiences and adherence patterns, the AI model can be trained more effectively, leading to improved predictive capabilities and a higher likelihood of accurate real-world performance.

- Following data validation, the AI model will undergo performance testing using a variety of evaluation metrics that are essential for assessing its predictive accuracy. Key metrics such as accuracy, precision, and recall will be employed to gauge how well the model predicts adherence behaviour. Accuracy measures the proportion of correct predictions among all predictions made, while precision focuses on the correctness of positive predictions, and recall indicates the model's ability to identify actual adherent users. The F1 score serves as a harmonic mean of precision and recall, providing a balanced evaluation. By conducting cross validation-where the dataset is repeatedly split into training and validation sets-the model's performance can be rigorously assessed, allowing for the identification of any issues like overfitting or under fitting.

- Once initial performance testing is completed, the next phase will involve real-world testing of the AI model within the Curefind app. This phase will include a pilot study or phased rollout, where a select group of users will utilize the app over a specified period. During this time, their interaction with medication reminders, response rates, and adherence levels will be closely monitored. By gathering quantitative data on user behaviour alongside qualitative feedback regarding the user experience, the effectiveness of the AI model can be thoroughly evaluated. This real-world testing is crucial for understanding how the model operates in dynamic environments and how well it adapts to individual user needs.

- The evaluation process will also incorporate continuous monitoring and adjustment of the AI model based on user interactions and health outcomes. By establishing a feedback loop, the model can be refined over time, ensuring that it remains accurate and relevant as user needs evolve. Key performance indicators (KPIs) related to adherence rates, health outcomes, and user satisfaction will be tracked regularly, allowing for timely adjustments to the model's algorithms and parameters. This iterative process is essential for maintaining the app’s effectiveness and fostering user engagement, as it demonstrates a commitment to improving user health and overall experience.

- Finally, the culmination of the evaluation process will involve a comprehensive reporting and analysis phase, where findings from the performance testing, real-world usage, and continuous monitoring are synthesized. This report will detail the model's accuracy, strengths, and areas for improvement, providing actionable insights for stakeholders. By sharing this information, the Curefind team can make informed decisions about further enhancements to the AI model and the app itself, ultimately leading to better health outcomes for users. Through this systematic approach to evaluating the AI model’s accuracy, the Curefind healthcare medication reminder app can effectively support users in managing their medications and improving adherence.

Time Series Analysis on Data

A sample/description of this analysis exists and is appropriate.

- Time Series Analysis is a powerful statistical technique that can be applied to the Curefind healthcare medication reminder app to identify patterns and trends in user behaviour over time. This analysis is particularly relevant for understanding medication adherence, as it allows the app to track users’ responses to reminders and their actual medication intake. By collecting data on when users receive reminders, when they take their medications, and any missed doses, the app can generate a time series dataset. This dataset can be analysed to uncover seasonal patterns, trends, and anomalies in user adherence, facilitating proactive adjustments to the reminder system.

- The first step in conducting Time Series Analysis for the Curefind app involves data collection and pre-processing**.** The app would need to log various time-stamped data points, such as the date and time a reminder is sent, when a user acknowledges the reminder, and when they mark their medication as taken. This data will need to be cleaned and organized to ensure accuracy, removing any outliers or inconsistencies that could skew the results. Once the data is prepared, it can be structured into a time series format, with each observation representing a specific time point and associated adherence status. This allows for the identification of trends in medication adherence over days, weeks, or months.

- After pre-processing, the next phase involves **analysing the time series data** to identify trends and patterns. For example, the analysis may reveal that adherence rates are higher on weekends compared to weekdays, indicating that users may have more time to engage with the app during their days off.

Seasonal trends might also emerge, such as higher rates of missed doses during holiday seasons or specific months when users are more likely to travel.
Additionally, techniques such as moving averages and exponential smoothing can be applied to forecast future adherence rates based on historical data, allowing the app to optimize reminder timing and frequency for each user.

- Finally, the insights gained from Time Series Analysis can be utilized to enhance the user **experience** and improve overall adherence rates. For instance, if the analysis shows that certain users consistently miss reminders at specific times, the app could adjust its notification strategy by sending reminders at more effective times. Moreover, understanding user patterns allows for personalized interventions, such as targeted motivational messages during periods of lower adherence. By leveraging Time Series Analysis, the Curefind healthcare medication reminder app can become more adaptive and responsive to user behaviours, ultimately leading to better medication management and improved health outcomes.

Solution Techniques

Several solution techniques to effectively develop and implement your AI-driven medication reminder app for elderly users:

1. User-Centered Design Techniques

Personas and Scenarios: Create detailed user personas and scenarios to guide design decisions based on the specific needs and behaviours of elderly users.
Usability Testing: Conduct regular usability tests with actual users to identify pain points and improve interface design based on real-time feedback.

2. AI and Machine Learning Techniques

Behavioural Analysis: Implement machine learning algorithms to analyse user interaction data, allowing the app to tailor reminders and suggestions based on individual adherence patterns.
Predictive Modelling: Use predictive analytics to identify potential adherence issues before they occur, enabling proactive adjustments to medication schedules.

3. Mobile Application Development Techniques

Responsive Design: Ensure the app is designed to be responsive, providing a seamless experience across various devices (smartphones, tablets).
Push Notifications: Utilize mobile push notifications for timely reminders, ensuring users receive alerts even when the app is not actively open.

4. Data Management and Security Techniques

Cloud Storage Solutions: Implement secure cloud storage for user data, enabling access across multiple devices while ensuring data privacy.
Encryption Protocols: Use strong encryption methods to protect sensitive user data and comply with privacy regulations (e.g., HIPAA, GDPR).

5. Integration Techniques

APIs for Health Data: Integrate with existing health management platforms or APIs to pull relevant health data, which can inform medication management and user recommendations.
Wearable Device Compatibility: Explore integration with wearable health devices (e.g., fitness trackers) to monitor health metrics that may impact medication adherence.

6. Feature Development Techniques

Customizable User Settings: Allow users to personalize notification settings (e.g., snooze options, preferred reminder times) to accommodate individual preferences.
Symptom Tracking: Implement a logging feature for users to track symptoms and side effects, which can trigger alerts for users and their caregivers.

7. Caregiver Support Techniques

Shared Access Functionality: Develop features that allow caregivers to access the user's medication schedule and receive alerts about adherence issues.
Communication Tools: Incorporate in-app messaging or alert systems that enable direct communication between users and caregivers.

Natural Language Processing, Speech Recognition or Speech Synthesis

Natural Language Processing (NLP):

Individualized Notices**:** NLP algorithms produce tailored and contextually appropriate alerts for recalling medications. The program can, for instance, compose messages taking into account the user's likes and mood to make reminders more interesting and unlikely to be overlooked.
User Query Processing**:** Natural Language Processing (NLP) is utilized to comprehend and handle user inquiries about prescription regimens, medical issues, or overall program features. This makes it possible for users to communicate with the app using normal language, which facilitates their ability to find the data they require.

Voice Recognition and Synthesis:

Speech Recognition: Users can communicate with the app orally thanks to voice recognition technology. Those with impairments or the elderly, who might find it easier to talk than to write, will find this extremely helpful. Users can report missing doses, ask for help, or ask questions verbally regarding their prescription schedule. Speech Synthesis**:** This feature makes the app more readable and accessible for people with visual impairments or reading issues by turning text-based reminders and notifications into spoken words. It can help ensure clarity and comprehension by reading aloud complicated healthcare directions or information. EHR Integration*:*

Medical History Access: Through integration with EHR systems, the app may retrieve and utilize current, precise medical data to customize reminders and assistance according to the user's unique medical needs and prescription regimen. Personalized Alerts**:** The reminders and alerts are modified based on the user's medical background and present state of health. For example, the app can indicate when to take medications or offer extra assistance throughout episodes associated with particular medical conditions.

Conclusion

The app offers an extensive system for managing prescription schedules through the merging of speech, natural language processing, and supervised machine learning. The app seeks to improve medication adherence and overall health management, especially for senior users as well as people with special needs, by tailoring reminders, promoting natural interactions, and connecting with users' medical records.

Deep Learning

Neural Networks

For our Curefind application, we will be using Convolutional Neural Networks (CNNs) and Recurrent Neural Network (RNN)

This deep learning network will help us in processing and making predictions from different types of data including text, images, and audio.
Unlike the traditional algorithms which are hand-engineered, CNNs learn from optimizing filters through automated learning while RNN contains loops that allow data to be passed from one step to the next with memory for retaining data over time, this independence provides a huge advantage.

Natural Language Processing (NLP)

NLP will be our main focus with its ability to understand, produce, and work with human language.

FEATURES

- Customized schedules
- Timely Reminders
- Customizable settings

Other Features

The app facilitates connection and care through advanced communication features. Users can engage with a sophisticated **chatbot** for mood tracking, symptom reporting, and crisis support, while also receiving personalized guidance (Check-up date reminders and so on). Furthermore, live therapy sessions and goal setting are enabled through human assisted support. Secure messaging and video conferencing capabilities to ensure seamless communication with healthcare professionals, fostering a supportive ecosystem that links patients, providers, and peers. Specifically, elderly users benefit from:

- Access to medical professionals
- Reducing hospitalization
- Emergency visits.

Grammarly report

grammarly Report: Business Analysis 3.2 Project

Business Analysis 3.2 Project

by Naledi

General metrics

16,425	2,345	226	9 min 22 sec	18 min 2 sec
characters	words	sentences	reading time	speaking time

Score

85

This text scores better than 85% of all texts checked by Grammarly

Writing Issues

88	✓	88
Issues left	Critical	Advanced

Unique Words

Measures vocabulary diversity by calculating the percentage of words used only once in your document

31%
unique words

Rare Words

Measures depth of vocabulary by identifying words that are not among the 5,000 most common English words.

38%
rare words

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Word Length — 5.3

Measures average word length — characters per word

Sentence Length — 10.4

Measures average sentence length — words per sentence

Declaration!!

I hereby declare that this submission is a true and accurate representation of my contributions to the project and the work here has not been plagiarized.

Signature:

- T.B Mokoena: ______
- M Naledi: ____
- TG Molokwane: _____
- S Mngomeni: _
- KZ Mahlangu: ______
- T Motaung: ___
- KT Nkhatho: __
- KC Koza: ____
- T Tlhatlha: ____
- K Lehoko: ____