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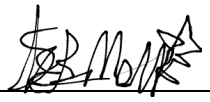
221874895	T.G Molokwane	
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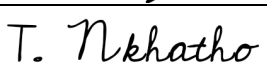
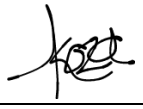
222071338	K.T Nkhatho	
221415920	K.C Koza	
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AI SOLUTION FOR INDUSTRIES

HEALTHCARE INDUSTRY

MEDICAL REMINDER APP

Contents

AI SOLUTION (HEALTHCARE INDUSTRY)

AI Project in Python: Associates is a team of students that is working on an AI Project called Medication Reminder App.

Business Objectives

Business Background:

Managing medication compliance among older adults has been a growing concern. Many older adults live independently and have no caregiver 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

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.
- 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

- based on frequent changes made by the user, their needs, or challenges that they face

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 sum, 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.

- Data capturing: The medication reminder app (MRA) will first require the data (names, age, health condition, etc., etc.) and credentials (username and password) for registration and login of the User to store in its database which after will start with the pre-processing to determine medication schedules and feedback on effectivity of the medication and treatment.
- Database linking: The Medication reminder app (MRA) will also link with the User data at the doctor or hospital database with authorization from the state through their ID number to record the prescription and changes made by the doctor and enforce the feedback reminders for the client or patient to follow.
- Medical background checks and prediction: Along with the assistance from the database linking the Medication reminder app (MRA) will be able to check the User's medical history and be able to predict relevant outcomes and detect danger with time series analysis on data sequence.
- Reinforcement and updates: The application is programmed to continuously update its system, enforce security, and improve recommendations based on User feedback every month which will also make it more effective and efficient.
- Evaluation and reporting: As the application reinforces and updates every month, an evaluation of the app and the user's health condition will take place afterward, and the report to the app technicians/ analyst who will overview changes to keep the app stable. The set of the app algorithm will iterate from data collection to the evaluation and reporting stage every month as well.

DATA

Evidence that data relevant to the solution has been clearly articulated.

An example of all forms of data that are relevant to the solution is accurate.

- Data relevancy of the application has shown to be clearly articulated as the application can capture the details of the User with accuracy and deny false information.
- The application database can link to the doctor or hospital database under state authorization and retrieve precise medical information of the User.
- The application has illustrated the capability of predicting adherence where hence historical data can be tracked down and refine predictions on past adherence patterns so that changes in routine can be adjusted.
- User can be able to get feedback on their medical condition problem as the data captured would be relevant and they can be reminded to take their medication accordingly.
- User monitoring and review have illustrated accuracy in checking the user's well-being from time to time and delivering relevant data.

Example of forms and data:

- User Information ○ User ID (unique identifier): 12345 ○ Name: John Doe ○ Age: 35
    - Medical Conditions: Diabetes, Hypertension ○ Medication List:
    - Medication 1: Metformin (Diabetes) ○ Medication 2: Lisinopril (Hypertension)
- Medication Data ○ Medication ID (unique identifier): M001 ○ Medication Name: Metformin ○ Dosage: 500mg ○ Frequency: Twice a day ○ Time: 8:00 AM, 6:00 PM ○ Duration: Ongoing ○ Prescription Date: 2022-01-01 ○ Refill Date: 2022-02-15
- Reminder Data ○ Reminder ID (unique identifier): R001 ○ Medication ID (foreign key): M001 ○ Reminder Time: 7:55 AM, 5:55 PM ○ Reminder Type: Push Notification, SMS ○ Reminder Status: Active

- Adherence Data ○ Adherence ID (unique identifier): A001 ○ Medication ID (foreign key): M001 ○ Dose Taken: Yes/No ○ Date: 2022-01-05 ○ Time: 8:05 AM
- Additional Data ○ User Location: Latitude: 37.7749, Longitude: -122.4194 ○ Weather Data: Temperature: 65°F, Humidity: 60%

Model

It is clear how the AI Model that is developed will be evaluated for accuracy.

- AI model for the application will be evaluated by technicians through testing the model upgrades and checking what needs to be fixed, the application will be evaluated for performance analysis on how effectively the application interacts with the user and lastly, the technicians will evaluate the application model feedback and system report it gives and monitor the accuracy level.

Time Series Analysis on Data

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

- The time series analyst on data of the application model will work with scheduling reminders or timestamps for when the user will take the medication and show when was the medication taken or missed, the time series analyst on data will also analyze adherence patterns of user prediction (e.g. when will the user stop using treatment for a certain illness or how long will it take the

user to collapse if they didn't take their medication) all this series analysis and predictions are based on 84% on the user medical history and 16% on the doctors current diagnosis.

Solution Techniques

The software uses supervised machine learning, natural language processing (NLP), and integration with electronic health records (EHR) to manage drug scheduling.

1. Introducing

- Supervised Machine Learning**:** Analysis of Behavioural Patterns: The software examines past data on drug adherence, mood swings, and behavioral trends using supervised artificial intelligence. This enables the app to determine and forecast the best times to send notifications for prescription collection.
- Adaptive Reminders**:** The software continually adjusts the number and duration of reminders to better meet user needs through learning from interactions and responses. For example, the software can recommend alternate hours or increase the frequency of notifications if a user routinely ignores reminders at a specific time.

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 MR application, we will be using Convolutional Neural Networks (CNNs)

- 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.
- This independence provides a huge advantage.

Application

Natural Language Processing (NLP)

NLP will be our main application 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.

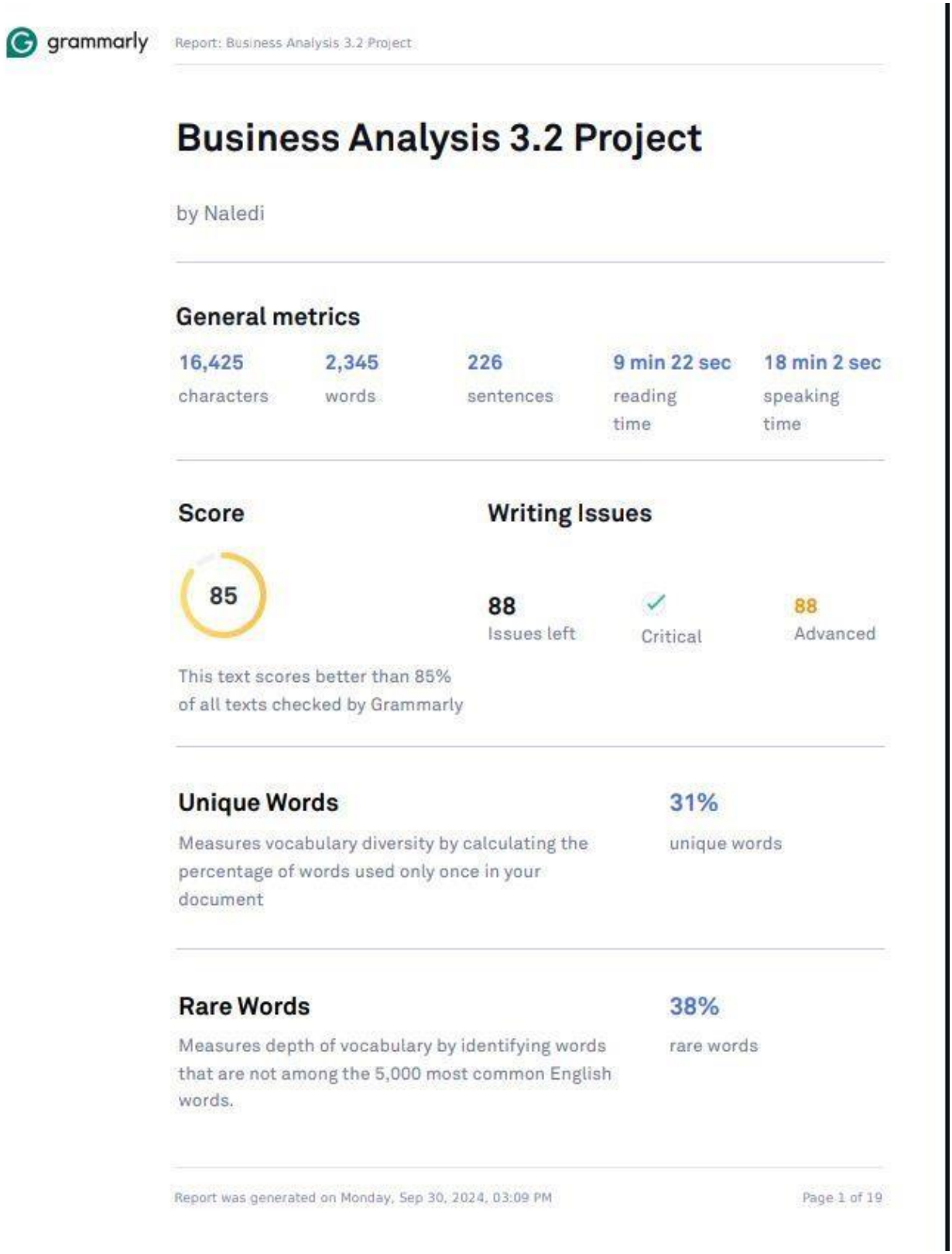
Users can engage with a sophisticated **chatbot** for mood tracking, symptom reporting, and crisis support, while also receiving personalized guidance (Check-up date reminders and so on).

Furthermore, live therapy sessions and goal setting are enabled through humanassisted support. Secure messaging and video conferencing capabilities 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



Word Length Measures average word length	5.3 characters per word
Sentence Length Measures average sentence length	10.4 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.

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