Application Overview

This poster showcases the design of an AI-based assistant to be used within a care home or healthcare provider setting. It uses features and techniques such as Machine Learning, Natural Language Processing, Knowledge Representation and Evolutionary Computation to provide patients with an efficient and effective care plan, and to assist staff with these duties.

The application should take inputs from voice-commands, touchscreen and physical inputs to accommodate for a wide range of accessibility requirements and it should output responses on screen displays and audibly where required.

Evolutionary Computation and Knowledge Representation

- Optimise the staff schedule and care routines based on the real-world constraints and requirements.

The application can iterate through many staff schedules and care routines to find the optimal fit - or a close representation of it – for these scheduling problems. This will improve the efficiency of care being given, therefore saving money for the care home or healthcare provider.

Personalised care plans, medical records and patient data could be stored which would allow staff members to effectively access relevant information, assisting in accurate decision-making and personalised care routines for each resident. For example, schedule information for when a patient needs to take medicines could be easily accessed from the knowledge base by staff members or the patient; only the patient that the information relates to should be able to access this information. This knowledge base could also be used to implement automated alerts to the staff or patient which will be helpful to ensure a full treatment plan is adhered to, such as taking a full course of antibiotics.

Use of Artificial Intelligent Methods and Agents

Machine Learning

Machine Learning should be used to predict the patients needs. Detecting changes to the patient's behaviour could be indicative of health problems. The application should continuously learn from the patients' interactions with the application and integrate with other sensor data, such as audio recording devices or cameras, to monitor changes to sleep patterns or detect falls. The application should detect if speech is slurred when the patient issues voice commands, or if the speech and words are coherently formed.

Using data such as known health issues and treatment plans in place already relating to the patient, the application will be able more accurately identify the effectiveness of treatments and suggest any necessary changes to the patients care plan.

A Recurrent Neural Network would be the most suitable choice for analysing changes in a patient’s behaviour over a sequence of time. A classification algorithm such as an SVM could also be implemented to classify patient behaviour into categories such as ‘normal’, ‘restless’ or ‘distressed’. An SVM would be suitable as it can be easily used for outlier detection.

Natural Language Processing

Natural Language Processing will allow the application to understand and respond to voice commands from the patients or staff members and take the appropriate action where needed.

Non-Functional Requirements

Accessibility

Screen and Voice-Based Assistance: For users who are hard of hearing, the application should caption its responses and provide visual cues alongside audio responses. The text should be of a sufficiently large font size to be read at a range of distances by a range of visual acuities. There could be support for a range of alternate input methods, such as touch, voice or physical switches, to accommodate a range of accessibility requirements.

Usability

The application is designed for a non-technical demographic, and so the user interface should be easy and intuitive to use and navigate where needed. The application should be easy to learn for all users.

AI Care Assistant

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