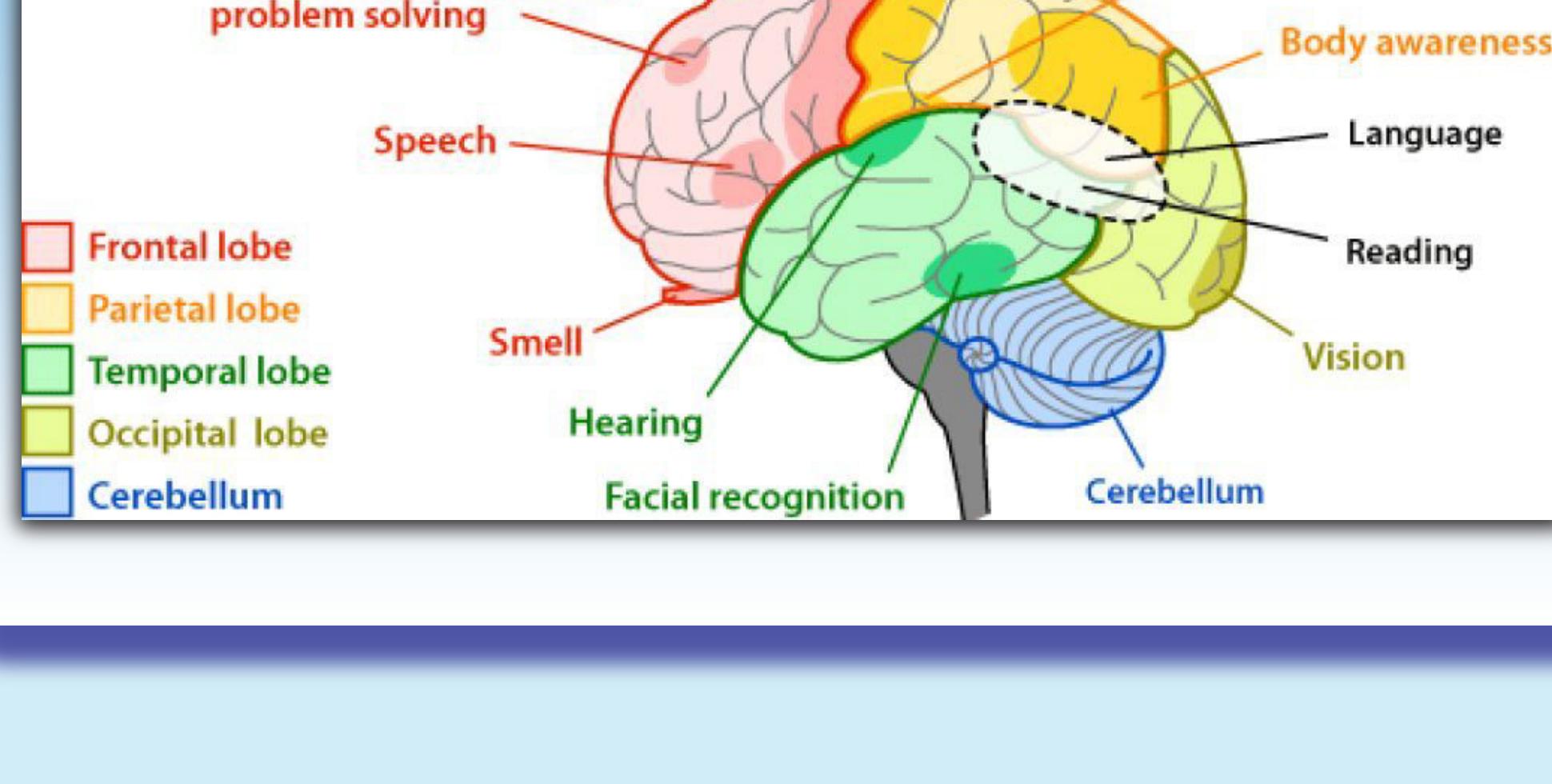




PERSONALIZED SOLUTION FOR DEMENTIA PATIENTS USING REINFORCEMENT LEARNING

BACKGROUND AND LITERATURE

Dementia is a type of a brain disorder which damages to cognitive functionalities of human brain. Attention and concentration, executive functions, language skills, memory skills are those cognitive functionalities.



- Dementia drastically affects to daily routine and personal activities and at the same time it is often associated with behavioural symptoms, personality change and numerous clinical complications [1].
- RL is learning through interaction with the environment by taking different actions and experiencing failures and successes while trying to increase the receiving awards [2].
- The conventional speech recognition systems are based on representing speech signals using Gaussian Mixture Models that are based on Hidden Markov Model [3].

RESEARCH PROBLEM



- The current prevalence of Dementia in Sri Lanka and all around the world.
- There are not customized software solutions for Dementia based on user behaviour.
- Dementia cannot be cured by medications.

OBJECTIVES

- Help the Dementia patients by giving rehabilitation in a cognitive way using different kinds of games or activities by learning from the user aspects which will be implemented in this application.
- Decrease the mild and moderate stages of Dementia patients.
- Both patients and caregivers to make their life easier because there is not a special or exact medication for Dementia.

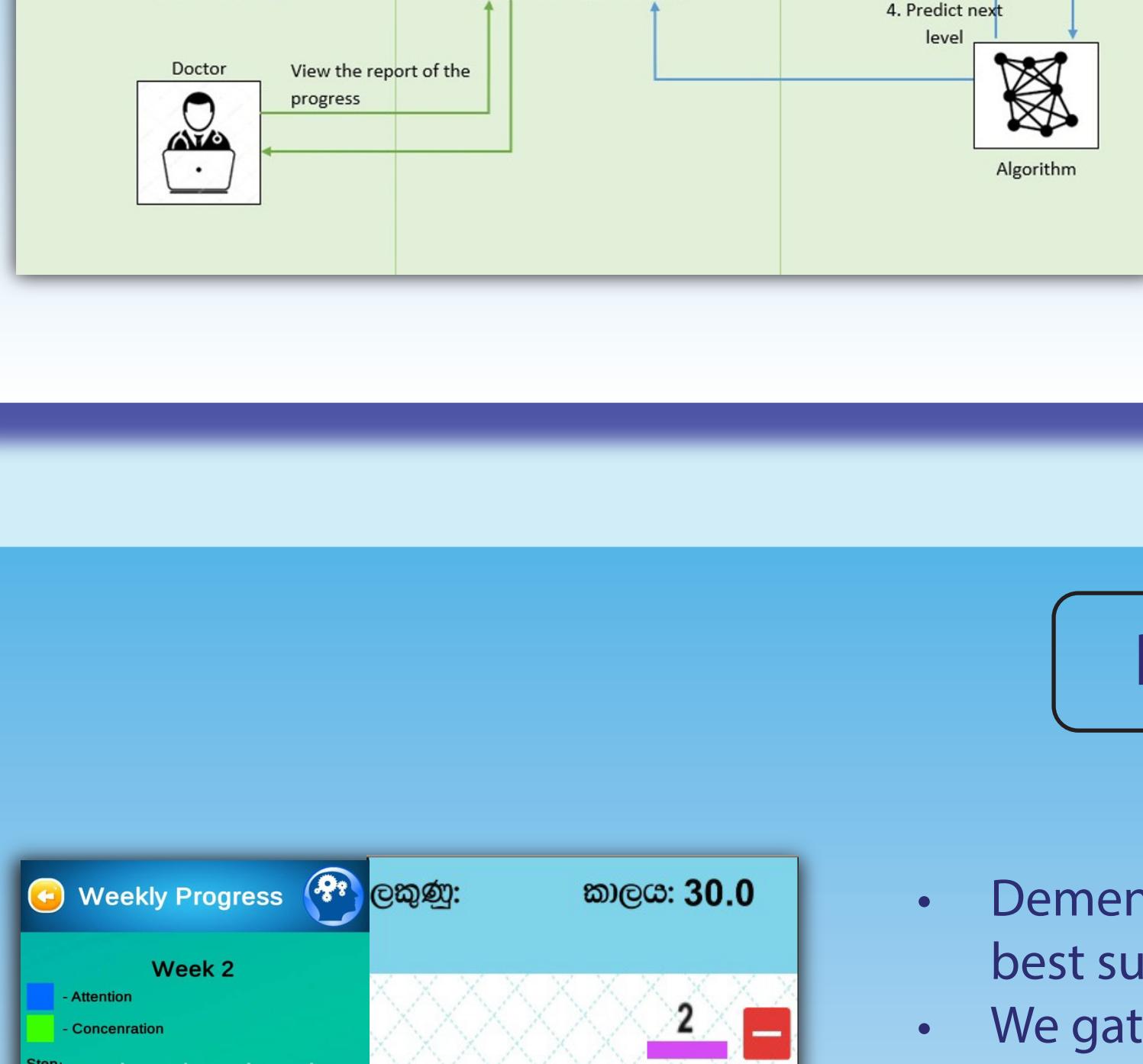
SYSTEM DIAGRAM



SOLUTION

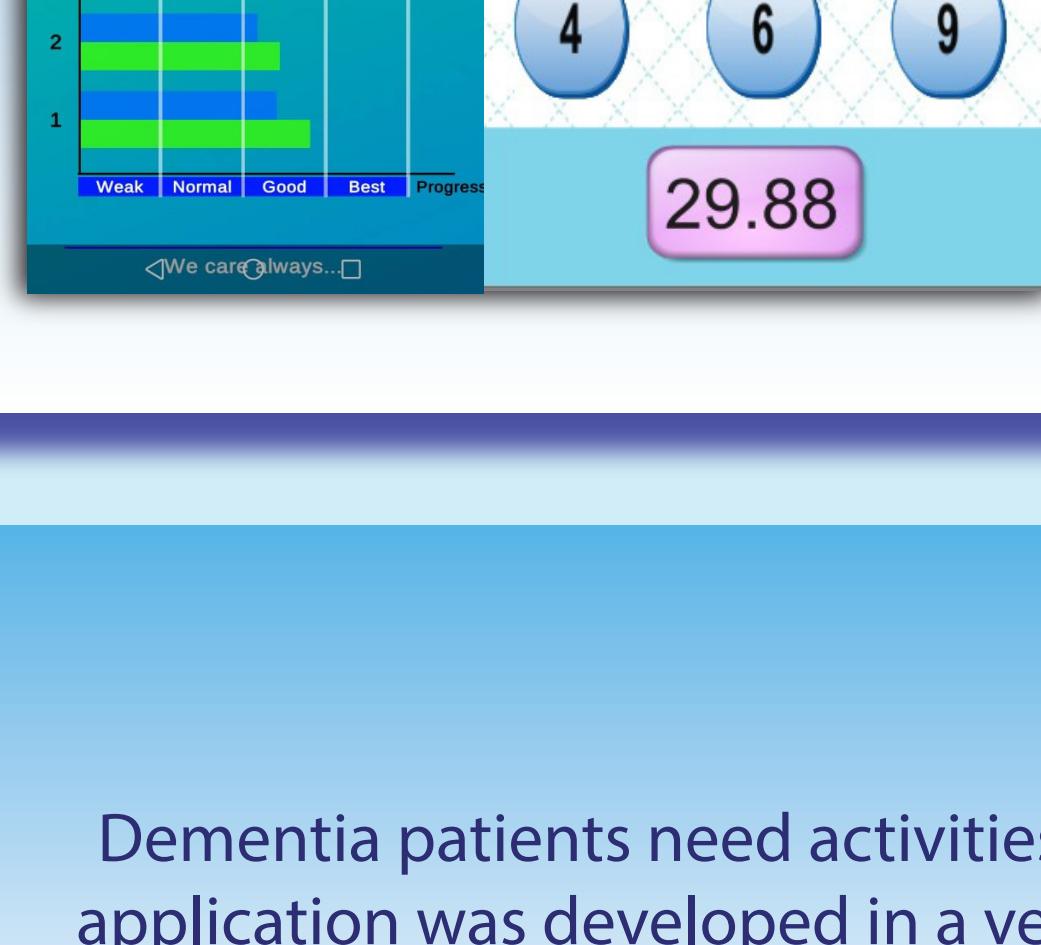
- Develop personalized application consists of games and activities for cognitive rehabilitation.
- Games are implemented using Reinforcement Learning which predict the next level for patients based on user behaviour.
- And there are some activities by using speech to text communication as well.
- These games are mainly focusing the Frontal lobe and Temporal lobe from the cerebral

METHODOLOGY



- Design the games and relevant other interfaces
- Create the database
- Implement the mentioned games and interfaces
- Maintain Attention and Concentration of Dementia patients
- Improve the effectiveness and speed process of Executive Functions
- Reduce the disabilities of Language Skills
- Maintain the registration, recall, recognition of memory
- Using reinforcement learning algorithms and getting positive or negative rewards based on the way how the user plays the game and predict the most suitable next step for the user.
- Generate the relevant reports.

RESULTS AND DISCUSSION



- Dementia patients can use the DCare application to improve their cognitive skills with best suited personalized games and activities.
- We gathered and analyzed the progress results of the users using same application with and without using machine learning technologies. With the results we can say the personalized application shows good results than the other.
- We hope to introduce more games covering the other functional areas related to Frontal lobe and Temporal lobe of the Cerebral cortex. And to include the test to detect the Dementia patients using machine learning.

CONCLUSION

Dementia patients need activities for cognitive rehabilitation. To provide the personalized therapies for patients, through user-friendly application was developed in a very interactive way including games and activities. This will help the patients to receive customized and most suited rehabilitation for the Dementia using machine learning techniques.

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