

Image Identification for Post Stroke Patients

Egede HI¹, Adebayo OT^{2*} and Adebayo FO³

^{1,3}Department of Computer Science, Federal University of Technology, Akure, Nigeria

²Department of Information Technology, Federal University of Technology, Akure, Nigeria

Corresponding author: Adebayo Oluwafemi Tope, Biomedical/Health Informatics, Department of Information Technology, School of Computing, The Federal University of Technology, Akure, Nigeria, Tel: +2348065; E-mail: adebayoot@futa.edu.ng

Abstract

Most post stroke patients are easily distracted performing tasks. Stroke occurs when part of the brain loses its blood supply and the part of the body that the blood-deprived brain cells controls stops working. Stroke survivors often need to keep track of many things to maintain and improve their health. Mobile apps could help stroke survivors maintain their health. In this paper, an android-based mobile application called AssistMe that can assist in speeding up stroke recovery process is developed. The mobile app is done using Java Android SDK and Google speech to text API was implemented for the voice recognition.

Keywords: *Stroke; AssistMe; Post-Stroke*

Received Date: November 19, 2019; **Accepted Date:** December 24, 2019; **Published Date:** December 31, 2019

Introduction

A stroke occurs when part of the brain loses its blood supply and the part of the body that the blood-deprived brain cells controls stops working. The risk of stroke increases substantially with age as the stroke incidences doubles with each decade after the age of 45 years. Globally, 70% of strokes and 87% of both stroke-related deaths and disability-adjusted life occur in low-and middle-income countries. Despite its enormous impact on countries' socio-economic development, this growing crisis has received very little attention. Common symptoms of stroke include: weakness in the arm or leg, weakness in the muscle of the face, dizziness and loss of consciousness. Depending on the area in which the interruption manifests, resulting impairments vary. Cognitive, emotional and sensory disorders are often present after first-time stroke; however, upper extremity weakness or hemiparesis (partial weakness on one side of the body) are the most common impairments. With regard to the arm, only 10% to 15% of stroke survivors regain complete functional use during activities within 6 months of stroke. Several studies have shown that focusing on functional activities, loss of functional use of the hand and arm causes severe difficulties in personal care activities, especially when those activities involve handling of objects. This limits the independence of stroke survivors and significantly reduces their quality of life with active contribution of the stroke survivor. Thus, the development of a mobile application for individuals that are recovering from stroke. The system will help in improving their cognitive reasoning.

Citation: Adebayo Oluwafemi Tope, Image Identification for Post Stroke Patients. Int J Clin Med Info 2019; 2(2) 82-89.

2582-2268/©2019 The Authors. Published by TRIDHA Scholars.

Related works

A lot of works has been done to help patients in checking the rate of improvement independently. Below is a review of some of the works that has been done relating to a mobile application for stroke patient and their limitations.

Adamovich SV, et al., [1] A virtual reality based exercise system for hand rehabilitation post-stroke.

Limitation: Financial burden due to costly technology.

Mataric MJ, et al., [2] Socially assistive robotics for post-stroke rehabilitation.

Limitation: Getting the materials needed for the project are very expensive.

Tazeen S, et al., [3] Parent aid mobile application.

Limitation: It cannot be used in remote areas.

Fabiyi EF [4] Development of a mobile application for dementia control and management in aged people.

Limitation: The application will be designed to give suggestions on how to measure improvement and not a full cure from the ailment.

Takuro N, et al., [5] Smartphone-Assisted prehospital medical information system for analyzing data on prehospital stroke care.

Limitation: Only prehospital diagnosis can be analyzed.

Leung RCC et al., [6] Serious game design for stroke rehabilitation.

Limitation: The game doesn't guarantee quick recovery, it only measures the level of improvement.

Felicia Lilian JAP et al., [7] AC care mobile application.

Limitation: Unavailability of GPS location in some rural areas

Offermann-van Heek J and Ziefle M [8] They don't care about us! Care personnel's perspectives on ambient assisted living technology.

Limitation: Extra financial burden due to costly technology, Due to our scenario-based approach, the evaluations based on a fiction could have led to an overestimation of potential barriers especially fears concerning data security and a general discomfort of being monitored in intimate (care) situations.

Sethu S and Ramakrishnan R [9] Skill analysis through mobile application.

Limitation: Inability to investigate the effect skill analysis in different ages and for various sport activities.

Ponum M, et al., [10] EasyDetectDisease: An android app for early symptom detection and prevention of childhood infectious.

Limitation: It will only contain common diseases a child can experience in his or her childhood. And it does not prescribe drugs to be used nor on its dosage. This app is not an alternative for any medical procedures.

Proposed System

This section discusses the steps that would be taken, in order to achieve the aim of this project.

A mobile application for Android phones programmed in Java would be developed using Android SDK tools and for the speech part, Google Speech to Text API is implemented.



Figure 1: System Architect.

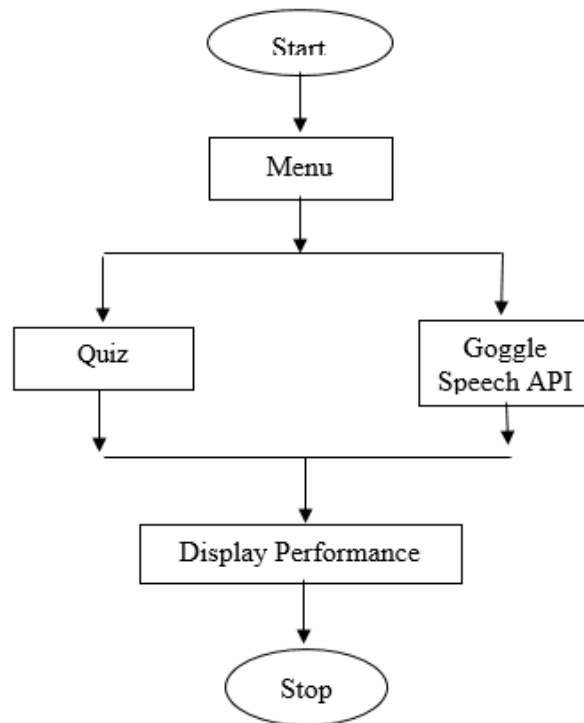


Figure 2: Mobile application for post stroke patient flow-chart.

The system design comprises several pages with dynamic functionality which includes (Main page, Quiz page). The pseudocodes are given below;

Main page

Begin

- Display Images
- Click on a button
- Listening for noise
- Compare recorded voice with image names
- Success
- ELSE
- Failed/Wrong

System Implementation

The mobile devices used for implementing the post stroke app (AssistMe) are android smartphones and tablets. There are specifications such phones must have, these specifications are:

And a phone will be needed with the following specification at minimum;

- i. Android operating system 5.0 and above
- ii. Text-to-speech support

The startup of the “AssistMe” app from a mobile device displays the image to be identified. The user identifies it by clicking on the icon ‘IT IS’. If the user feels He or She cannot identify the displayed image, the He or She can click on the icon ‘NEXT’ to display the next image. The images being displayed helps to harness cognitive and remembering in the memory. Every image aims at helping the patient to improve their thinking faculty, this was achieved by allowing the patient to think before saying their choice option.

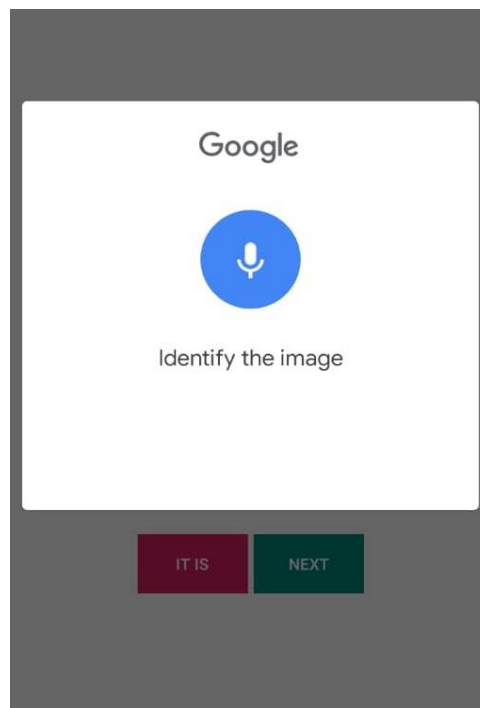


Figure 3: “AssistMe” app Google Speech to text API.

This is being displayed after the user clicks on the icon ‘IT IS’. This screen pops up immediately after the home screen. Images are identified by the user, the user speaks into the phone to identify the image he or she thinks it is. Then it checks with the database to see if the user is correct or not.

As the user speaks to identify the image, the google speech to text API spells whatever it is that the user said. Before identifying if it is correct or not. It spells what it hears. So this particular screen will help put the user’s speech improvement in check.

The system displays the image being identified specifying if the user is right or wrong. If it is wrong, ‘You are wrong’ is being displayed on the screen. And it then tells the user what the proposed image is by displaying ‘it is: Sheep’ .It shows the user was wrong about the image he or she identified. This system automatically traps the user’s cognitive level. The user is motivated to see his/her performance which creates a challenge to always want to try again which apparently boost brain cognition.

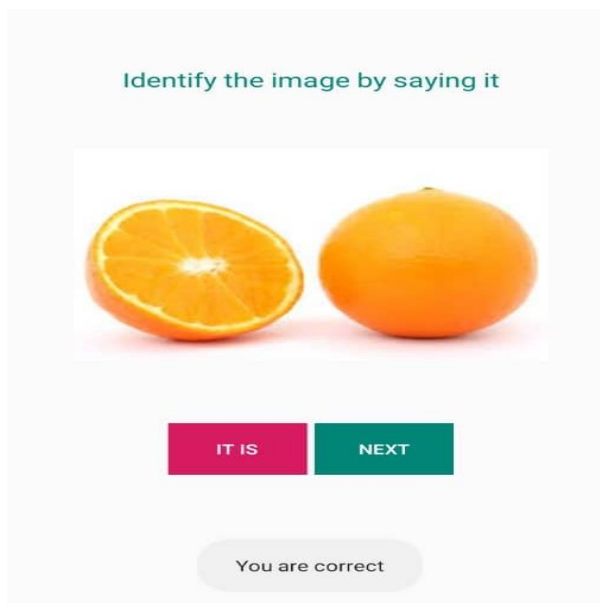


Figure 4: “AssistMe” app displays the correct result.

In the Figure 4, it displays the correct result being said by the user.

S/N	Name	Age	Sex	Status	Ability to use “AssistMe” app
1	Helen	60	Female	Sitting down	Yes
2	Samuel	52	Male	Standing	No
3	Esther	56	Female	Lying down	Yes
4	Joy	65	Female	Sitting down	Yes
5	Peace	50	Female	Sitting down	Yes
6	Adrian	40	Male	Sitting down	Yes
7	Mabel	45	Female	Standing	No
8	John	60	Male	Sitting down	Yes
9	Richard	62	Male	Sitting down	Yes
10	Sarah	52	Female	Sitting down	Yes

Table 1: “AssistMe” app Testing.

From table 1 above, it can be concluded based on the test result that the AssistMe app works fine when the patient is sitting down.

Conclusion

Many technologies have been developed to improve the quality of life for people with stroke. These help a person remain independent, control their environment, aid communication, keep them safe or support the people caring for them. Any technological solution needs to be the right solution for an individual at a particular time in their stroke journey. There is a need to involve our aged parents in the use of mobile technology and also use touch screen to give level of maintenance to stroke.

References

1. Adamovich SV, Merians AS, Boian R, et al. (2003) A virtual reality based exercise system for hand rehabilitation post-stroke: transfer to function. International Workshop on Virtual Rehabilitation, New Jersey, USA.
2. Mataric MJ, Eriksson J, Feil-Seifer D, et al. (2007) Socially assistive robotics for post-stroke rehabilitation. *Journal of NeuroEngineering and Rehabilitation* 4.
3. Tazeen S, Upadhyay J, Naik C, et al. (2014) Parent aid mobile application. *International Journal on Recent and Innovation Trends in Computing and Communication* 2(1): 141-143.
4. Fabiyi EF (2015) Development of a mobile application for dementia control and management in aged people.
5. Takuro N, Kataoka H, Kuwata S, et al. (2014) Smartphone-Assisted prehospital medical information system for analyzing data on prehospital stroke care. *Stroke* 45: 1501-1504.
6. Leung RCC, Zhang H, Tao X (2017) Serious game design for stroke rehabilitation. *International Journal of Information Technology* 23(1): 1-25.
7. Felicia Lilian JAP, Anant Krishnan K, Joseph C (2017) AC care mobile application. *Global Research & Development Journal of Engineering*.
8. Offermann-van Heek J, Ziefle M (2018) They Don't Care About Us! Care Personnel's Perspectives on Ambient Assisted Living Technology Usage: Scenario-Based Survey Study. *JMIR Rehabilitation and Assistive Technologies* 5(2):e10424
9. Sethu S, Ramakrishnan R (2018) Skill analysis through mobile application. *Research Review International Journal of Multidisciplinary* 3(7).
10. Ponum M, Hasan O, Khan S (2019) EasyDetectDisease: An android app for early symptom detection and prevention of childhood infectious. *Interactive Journal of Medical Research* 8(2): e12664.