Intelligent Augmented Lifelike Avatar App for Virtual Physical Examination of Suspected Strokes

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Ingenuously integrates computer vision and senior readings to automate and streamline the NIH Stroke Scale (NIHSS) physical examination is presented. The user interface design is optimized for elderly patients while the app showcases an animated lifelike 3D model of a friendly physician who walks the user through the exam. The standardized NIHSS examination included in LAMA consists of five core tasks. The first two tasks involve rolling the eyes to the left and then to the right, and then smiling as wide as the user can. The app determines facial landmarks and analyzes the pupils of the face. The next task is to extend the arm and hold the phone at the shoulder level, and the smartphone gyroscope is used to detect acceleration to determine possible weakness in the arm. Next, the app tracks the location of the hand keypoints and determines possible atlases based on the precision and accuracy of the locations of the touches. Finally, the app determines the user’s forward acceleration in walking and possible imbalances using the accelerometer. The app then sends analyzed results of these tasks to the neurologist or stroke specialist for review and decisions.

Abstract

The purpose of this test is to quantify the user’s gaze palsy (GCP). To do so, we ask the user to look at the camera, then roll his eyes to the left and right.

Task 1: Rolling eyes to left and right

The purpose of this test is to quantify the user’s arm weakness. The user is asked to hold the phone at shoulder level for 10 seconds.

Task 2: Arm hold still

The purpose of this test is to quantify the user’s arm weakness. The user is asked to touch their nose three times with each of their arms, and we analyze their accuracy (how close the touch is to the nose) and precision (how close the touches are to each other).

Task 4: Touch nose

The purpose of this test is to quantify the user’s visual field. The user is asked to draw a line on a box, and we track the accuracy of the line drawn.

Task 5: Walking in a straight line

The purpose of this test is to quantify the user’s lower body ataxia. The user is asked to walk in a straight line with their phone face up in front, like in (a).

Introduction

1 in 6 PEOPLE will suffer a stroke in their lifetime

BUT: Lack of infrastructure in tracking stroke patients’ recovery after they leave the hospital

AND: Medical practitioners are overloaded with work from COVID-19

SOLUTION: A telemedicine app to help perform National Institutes of Health Stroke Scale (NIHSS) examination

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