Technology Improves Stroke Assessment

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May 28, 2018

Stroke is the third leading cause of death in Sweden, the leading cause of immobilization in the world and the most expensive condition treated by the Swedish healthcare. An initial assessment of stroke is often completed by paramedics in the ambulance care, also called the prehospital care. Few quantitative signs of stroke are known and many stroke mimicking conditions are present. Based on this, the aim has been to examine the possibilities of decreasing the interrater variability and over-triage by implementing digital video analysis supporting the prehospital stroke assessment.

By including video analysis in prehospital stroke assessment eight additional parameters for stroke detection can be partly or fully identified. The current prehospital stroke assessment tests three parameters, to use more parameters has previously been determined as too time-consuming. Including more parameters while not affecting the time will increase quality and precision of stroke assessment.

The most important parameter for stroke recovery is the time from symptom onset until care is given. A faulty initial assessment of stroke has been seen to increase the time and thereby directly worsen the outcome of stroke recovery. The initial assessment determines where the patient is transported and what level of care is given. Treatment of stroke can not start before a diagnosis is made at a hospital due to the need of CT- and MR-imaging.

Functions affected by stroke are usually activities of daily living. With a growing and an aging population, better resources to assess stroke are needed. Traditional stroke assessment is completed by healthcare professionals through the use of checklists, called stroke scales. There are no vital signs or other measurements that indicate a stroke and therefore current stroke scales consists of qualitative data. Current stroke scales have low sensitivity which creates an over-triage, resulting in sending too many non-sick patients to the hospital. Inter-rater variability is high, meaning different professionals conclude different assessments for the same patient.

The suggested system, see figure 1 for an example of the facial analysis, aims to create an augmented reality clinical support system to reduce the current over-triage of prehospital stroke assessment. The suggested system should create a more equal, patient oriented, cost-effective and knowledge based care. It would provide a support for paramedics and on-call doctors as well as reducing the interrater variability of stroke assessment. Thoroughly discussed are also complexities with implementing new technologies and solutions in the prehospital care as well as the collaboration between hospitals and the Swedish prehospital care.

The methods used to derive the conclusions are interviews, observations and literature studies. The area of video analysis for stroke assessment is a novel area with no clinically implemented solutions. Implementing video analysis as a support system is a step in the digitalization of healthcare including e-health and ensuring the healthcare professionals and patients best interest.

By including a video-monitoring system patients may express a loss of privacy and distress of being monitored, but the information withheld by the system is entirely used to ensure the safety of the patient. Parameters improving the prehospital assessment have been discussed and suggestions of hardware placements are given.

The suggested system is sought for by users and it is possible to create a solution that could be tested in clinical trials, however, all issues with prehospital stroke assessment have not been solved. The next step is to create a system implemented in a clinical environment. Other areas of use could be the in-house healthcare, health centres and remote care facilities.

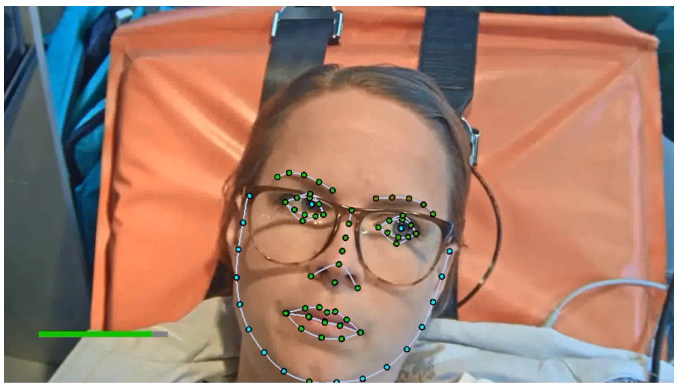

Figure 1. Demo of Facial Landmark Detection.