

REAL-TIME FACIAL LANDMARK ANALYSIS FOR FACIAL DROOP DETECTION: A PROOF-OF-CONCEPT FOR EARLY STROKE SCREENING

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INTRODUCTION

Delayed hospital arrival after stroke is often caused by uncertainty in recognizing symptoms, one of which is facial droop. Having a tool to quickly recognize symptoms would certainly help clarify the medical condition. This tool could potentially assist patients or their caregivers with early pre-hospital detection, encouraging them to seek medical help sooner and thereby improving patient outcomes.

OBJECTIVE

The objective of this research is to develop a proof-of-concept application for real-time detection of facial droop. The development of the application using open-source computer vision tools demonstrates its potential use in early stroke screening.

METHODOLOGY

The application detects facial landmarks using a pre-trained 68-point facial landmark model (Fig. 1) and tracks the position of the mouth corners to assess asymmetry during a smile. It first establishes a neutral baseline, then calculates an asymmetry score in real-time.

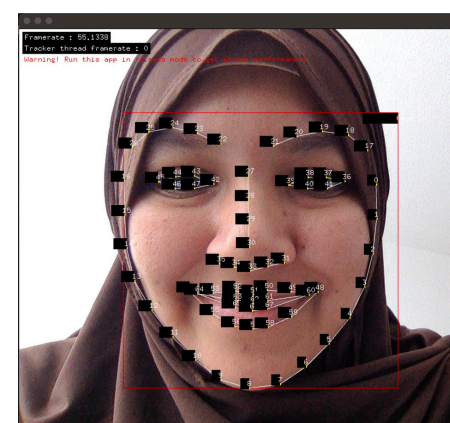


Figure 1. The 68-point facial landmark

The user interface provides immediate feedback, classifying results as "normal" or "abnormality detected," making the detection process simple and accessible for users.

RESULTS

The developed prototype successfully implemented facial landmark detection and asymmetry analysis using a pre-trained 68-point model. To improve the accuracy of mouth corner elevation measurements, an algorithm was added that captures a 1.5-second baseline calibration of the face in a stable, forward-facing position. The asymmetry metric, calculated by comparing the normalized displacement values of the mouth corners on both sides, reliably differentiates smile symmetry under controlled testing conditions across varying lighting and backgrounds (Fig. 3).

To simplify the application's use, visual feedback through a clear color-coded interface and step-by-step guidance improves user interaction and result interpretation. Internal testing on several user profiles yielded consistent results in facial droop detection simulations, demonstrating high responsiveness and minimal processing delay.

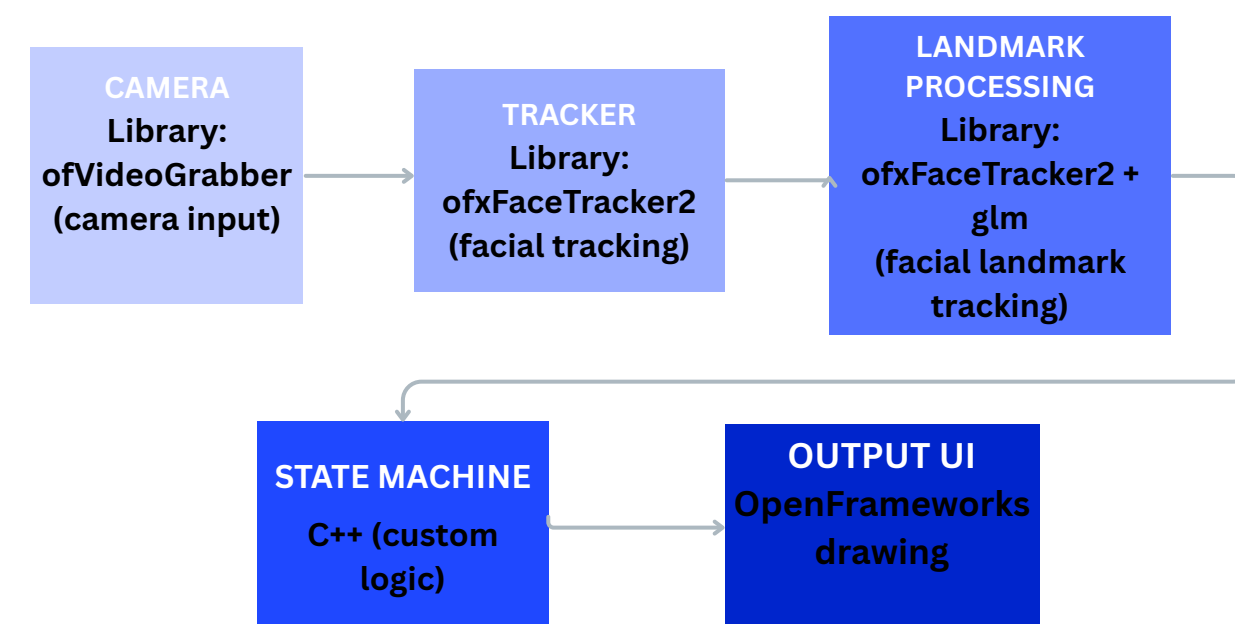


Figure 2. Application architecture

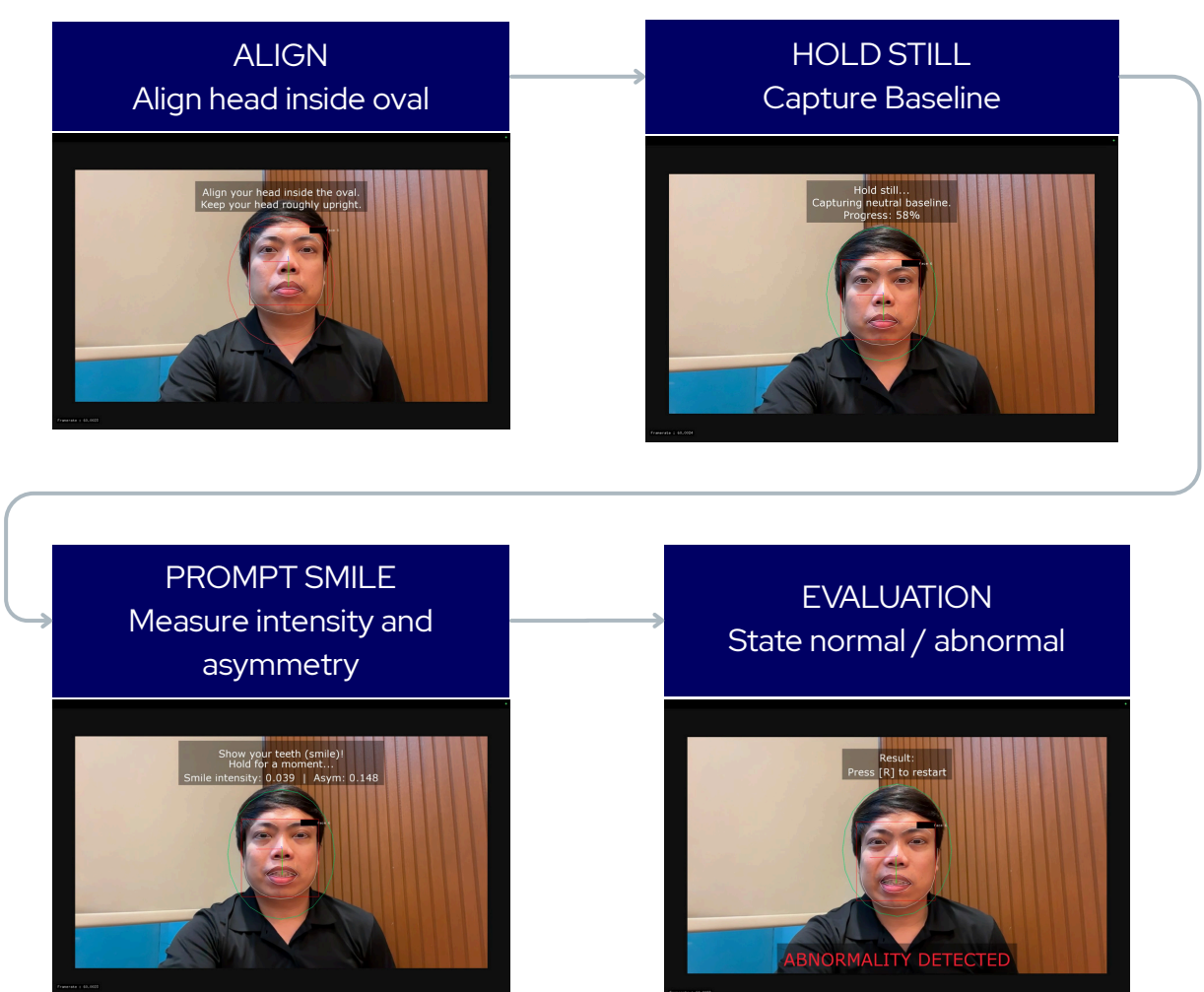


Figure 3. Application flow (state machine)

CONCLUSION

This work presents an initial proof-of-concept for digital health applications targeting stroke awareness. It demonstrates the feasibility of lightweight, open-source tools combined with an intuitive interface for detecting facial droop in real time, supporting early stroke screening.

RELATED LITERATURE

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- Chandel, R., Bhowmick, R., & Hariharan, U. (2023). A comparison of face landmark detection techniques. In 2023 4th International Conference on Computation, Automation and Knowledge Management (ICCAKM) (pp. 1-6). IEEE.
- Ribo, M., Reznik, A., Ciolli, L., Ohanyan, S., Brancaloni, L., Sanhueza, D., & Sivan-Hoffmann, R. (2020). Artificial Intelligence-Based Application to Detect and Quantify Stroke Symptoms. Stroke, 51(Suppl_1), A94-A94.