Cardiac arrest detection through artificial intelligence-based surveillance camera: a working prototype

Tommaso Scquizzato Vita-Salute San Raffaele University, Milan, Italy

✉ t.scquizzato@studenti.unisr.it 🐦 @tscquizzato

Introduction

Treatment of out-of-hospital cardiac arrest (OHCA) requires prompt intervention. Briefer response time is associated with greater survival. OHCA victims suddenly collapse, falling on their backs or face down while remaining unresponsive. When OHCA occurs in remote or uncrowded places, such as parking lots during off-peak hours, EMS activation, CPR and PAD use is delayed. Surveillance cameras with artificial intelligence (AI) and machine learning functions are becoming widespread. This abstract describes how cardiac arrest can be detected using surveillance cameras with AI.

Methods

Video analysis can be carried out using various methods. This prototype is implemented in Python using the OpenCV library. After converting the video into frames, the detection algorithm undergoes four steps: background estimation, moving-object extraction, contour formation, and cardiac-arrest detection.

FIG. 1 Example of background estimation, moving-object extraction, contour formation and human tracking.

Detection is achieved by quantifying body motion and orientation. If the victim was standing in the last frame and in the current frame is lying, sudden collapse is likely. A cardiac-arrest alert is triggered when a threshold time interval without motion elapses.

Results

A working prototype of cardiac arrest detection has been developed. The approach was not systematically tested, but usually fails due to object overlapping, lighting modifications, shadows, and moving background elements.

Conclusions

AI can automatically detect OHCA. Further development is needed to obtain a robust solution for real-time use. Integrated machine learning and modern human tracking technology is fundamental to improve OHCA survival and outcome, especially in remote or uncrowded places.

FIG. 2 Cardiac arrest detection, threshold time interval without motion elapses and cardiac-arrest alert is triggered.

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