

Abstract

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Refining ROI Selection for real-time remote photoplethysmography using adaptive skin detection

Remote Photoplethysmography (rPPG) is a very promising technique for measuring the cardiovascular parameters. It is attracting a widespread interest due to its ability to acquire the heart rate (HR) using low-cost RGB cameras without any physical contact with the subject. This emerging method is based on extracting HR from the small periodic color variations in the skin accompanying heartbeats. Therefore, Selecting a suitable Region of Interest (ROI) for the rPPG-based HR measuring is essential and challenging first step, and it has a direct impact on the accuracy and reliability of the overall algorithm. Non-skin areas have no contribution to the HR information however, few researchers have addressed the issue of non-skin pixels included in the ROI. This paper focuses on refining the quality of the extracted cardiovascular wave by using skin segmentation for defining the ROI, which enable us to estimate the HR from skin pixels only. Using adaptive skin detection for ROI definition is investigated, then it is compared with respect to our previous real-time rPPGbased method, in which face detection only was used to define the ROI. Furthermore, we examine the effect of segmenting the face skin into three ROIs (forehead, left cheek and right cheek), then extracting the HR from these three ROIs by fusing their resultant HR signals. Finally, we compare our rPPG measurements with ground truth values obtained from a commercial pulse oximeter. The results derived from the experiments showed that using skin segmentation can significantly improve the accuracy of the rPPG method.