

Abstract

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Optimizing Remote Photoplethysmography Using Adaptive Skin Segmentation for Real-Time Heart Rate Monitoring

Choosing a proper Region of Interest (ROI) for Remote Photoplethysmography (rPPG) is essential and a challenging first step, and it has a direct effect on the accuracy and reliability of the overall heart rate (HR) algorithm. Non-skin areas have no contribution to the HR information however, few works have tackled the issue of non-skin pixels included in the ROI. First, this paper considers improving the quality of the rPPG signal by filtering out non-skin pixels included within the ROI. The feasibility of employing skin segmentation for ROI definition is demonstrated. Then, this technique is compared with our previous real-time rPPG-based method. Moreover, we explore the effect of extracting the HR from three ROIs using signal fusion. Second, we give a comprehensive account of the examined methods in our algorithm for face detection, face tracking, skin detection, and blind signal separation. Finally, we compare our rPPG measurements with ground truth values obtained from a commercial pulse oximeter. Based on the simulation results, the proposed algorithm significantly improves the quality of the rPPG technique.