

Robust peak detection in long-term photoplethysmography (PPG) signal

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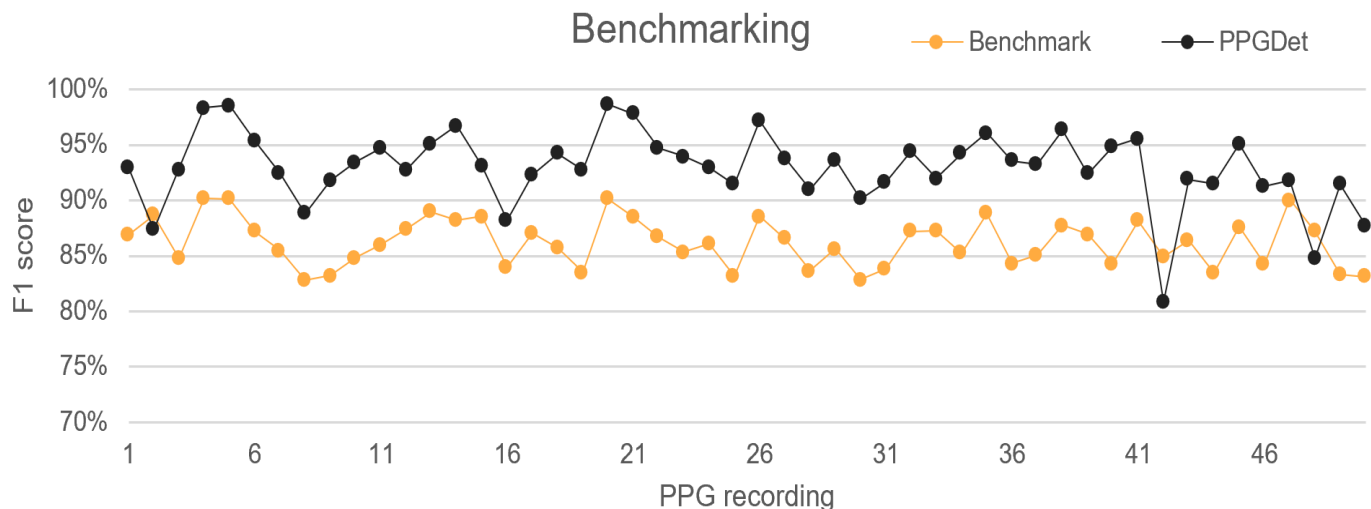
Based on thorough research at the Artificial Intelligence in Medicine Laboratory (AIMLab.), headed by Dr. Joachim Behar, Dr. Marton A. Goda has developed a robust peak detector algorithm for long-term photoplethysmography (PPG) analysis.

PROBLEM

Photoplethysmography (PPG) is commonly performed on the fingertip and provides a cost-effective and convenient way to assess various physiological systems, such as the cardiovascular, respiratory, and autonomic nervous systems. Over the past few years, PPG has gained immense popularity thanks to the advancement of consumer devices such as smart watches. Robust peak detection is crucial for estimating vital signs from the PPG signal.

SOLUTION

In 2022, a top-performing PPG peak detection algorithm was the *Automatic Beat Detection* method developed by *Aboy M. et al.* [1]. Our robust PPG peak detection (PPGDet) is accurate and outperformed this baseline benchmark state-of-the-art approach (see Figure). PPGDet obtained an F1-score of 88.19% when evaluated over 91 million reference beats which is 5% better than the benchmark.



MARKET

According to Statista.com, smartwatches, fitness trackers, and wearables have gained widespread popularity, with a staggering estimated count of 1.1 billion connected wearable devices worldwide as of 2022.

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Related scientific publications

- Charlton, Peter H., et al. "Detecting beats in the photoplethysmogram: benchmarking open-source algorithms." *Physiological Measurement* 43.8 (2022): 085007.
- Goda, Márton Á., Peter H. Charlton, and Joachim A. Behar. "Robust peak detection for photoplethysmography signal analysis." *arXiv preprint arXiv:2307.10398* (2023).