Statistical Validation of An Automated Method for Calculating Time Domain Heart Rate Variability on The QT Database

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Heart rate variability measures calculated from electrocardiography recordings reflect social competence. Clinical assessments of social skills have found that reduced heart rate variability is related to differences in the development of social skills in children and increase the risk of mental disorders. Limited by widespread manual signal processing and R-peak detection in current clinical assessments, most literature reports only short-term baseline studies, with fewer studies reporting social interaction settings with prolonged recording. There is an urgent need for an automated physiological signal processing toolbox to detect R-peaks and perform heart rate variability measurements in social settings. This paper proposes a modified automated Neurokit2 toolbox with signal processing procedures similar to the MindWare software that requires manual inspection of R-peak locations. We calculate time domain heart rate variability metrics from the publicly available QT database by PhysioNet collected at resting states and under stress tests, mimicking social interaction stress scenarios. Statistical analysis conveys that heart rate variability metrics calculation applying both signal processing approaches using the Neurokit2 toolbox are statistically equivalent in comparison to the hand-labelled R-peaks from the QT database (n= 10 in the normal sinus rhythm group, and n= 6 in the ST Change group). Such validation results are crucial for the adoption of automated toolboxes for heart rate variability measures in social interaction assessments, where more movement and mood changes of participants are expected.