

Applying Independent Component Analysis to Heart Rate and Blood Pressure Variations

邱泓文;徐建業
Chiu HW;Hsu CY

Abstract

The variations of heart rate (HR) and blood pressure (BP) reflect autonomic control. Most studies used spectral analysis and time-domain statistics to assess autonomic functions. Such methods provide some parameters to represent sympathetic and vagal activities. Independent component analysis (ICA) is a statistical signal processing method for blind separation. Assume that HR and BP pressure variations are linearly composed by some independent hidden signals and these hidden signals represent some meaningful physiological signals such as cardiac nervous outflow and hormonal level. Applying ICA to HR and BP variations signals will be expected to extract these hidden signals. In this study, the HR and BP variations data of six subjects were measured and the beat-to-beat RR intervals, systolic BP, and diastolic BP were considered as the mixed signals to be decomposed. The results from ICA showed that these signals were decomposed to noise component, dominate oscillation component and slow-changed component. Dominate oscillation component is similar to the spectral component observed from traditional spectral analysis but show a de-noised form. The physiological meaning of slow-changed component remains to be further studied. This study shows that ICA will be helpful for HR and BP variation analysis.