Some Recent Advances in Biorhythm Analysis and Clinical Applications

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Abstract

Compared with the snapshot health record information, long-term and high-frequency physiological time series provides health information from the other dimension. To extract useful biorhythm features from these time series for clinical usage, we encounter several challenges — the time series is usually composed of multiple oscillatory components with complicated statistical features, like time varying amplitude, frequency and non-sinusoidal pattern, and the signal quality is often impaired by inevitable noise. I will discuss recent progress in dealing with this kind of time series by the nonlinear-type time-frequency analysis, synchrosqueezing transform (SST), along with the recent statistical results for the inference purpose. I will also demonstrate its application to extracting physiological status from the peripheral venous pressure signal during surgery, and how to apply it to determine the standardized nonlinear phase function for quantifying the cardiopulmonary coupling.