

EMPIRICAL TIME-FREQUENCY ESTIMATION BASED ON INSTANTANEOUS COMPONENTS

ABSTRACT:

This study presents a new approach for time-frequency analysis of signals using empirical mode decomposition (EMD). The proposed method extracts the instantaneous amplitude and frequency components of a signal using EMD and constructs a time-frequency representation based on these components extracted by Teager-Kaiser energy operator (TKEO) and discrete energy separation algorithm (DESA). The approach is validated using real-world signals for environmental sound classification (ESC), and the results demonstrate promising performance of the proposed method compared to the traditional time-frequency analysis method fast Fourier transform (FFT). The proposed approach can be applied to a wide range of signal processing applications, including speech and audio analysis, biomedical signal processing, and image analysis. The method provides an alternative approach to the time-frequency analysis of signals with non-stationary and non-linear characteristics.