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Multifractal Analysis of Heart Beat Interval Time Series

Due to the multiscale nature of heart beat time series, multifractal analysis is an ideal candidate for studying such time series. We wrote several programs in IDL to calculate the multifractal spectra of data sets, including uniform distributions, Cantor sets, and actual heart data obtained from Physionet.org. We were able to reproduce the spectra of uniform distributions and Cantor sets, but the spectra of heart beat data contradicted current theory on the width of multifractal spectra. Our findings indicated that healthier hearts have narrower spectra than those with congestive heart failure. This most likely indicates that our algorithms are flawed and we don't expect this to overturn current theory. We also saw unexpected linearity in the spectra's dependence on parameters within our programs.