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Measures of heart rate complexity

For nearly three decades, human heart rate variability (HRV) has been consistently shown to display intriguing and puzzling characteristics, to a large degree defying satisfactory explanation and posing challenges for both modelling and clinical treatment. Recent findings confirm that the HRV regulatory system represents a prominent example of a biological complex system and remains a benchmark of biocomplexity.

Continued theoretical and experimental effort is required to achieve a thorough understanding of this systems complexity. From the point of view of control engineering, such an understanding should be capable of explaining regulatory mechanisms. Within a physics approach, it should reveal striking properties of universality. From a clinical perspective, it should demonstrate the utility of prognostic and predictive algorithms.

In my talk, I will provide a review of the measures of complexity utilised in various aspects of HRV signal processing, focusing on those providing a unifying thread for the challenges above. Particular stress will be laid on the most up-to-date multi-time and multiscale evaluation of non-Gaussian properties of HRV.