

Kolloquium der Informatik

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"Fuzzy Recurrence Plots and Networks in Medicine"

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Abstract:

The notion of recurrence plots of time series was introduced in chaos and nonlinear dynamics for studying the recurrence of dynamical systems. A recurrence plot can be visualized as a square image with binary dots and lines. Recurrence networks can be derived from recurrence plots to capture useful graph properties of dynamical systems. The concepts of fuzzy recurrence plots and weighted recurrence networks of time series have recently been introduced and extended to multi-channel images. A fuzzy recurrence plot displays grayscale texture, which is informative for pattern analysis. Networks derived from fuzzy recurrence plots are scalable and can be naturally modeled as either unweighted or weighted. This talk presents the concepts of fuzzy recurrence plots and fuzzy recurrence networks. Applications in the analysis of physiologic signals for pattern classification and histology images in cancer are presented to illustrate the effectiveness of the new methods.