ON ESTIMATING THE BOX COUNTING DIMENSION FROM DATA STREAMS

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Despite well-known limitations which suggest rather large data sets as a mere necessary condition, the estimation of fractal dimensions remains a topic of much interest. This paper revisits the problem of estimating the box counting dimension d_0 from a time series in the context of a *data stream*, specifically when a technically endless time series is made available. Previous conjectures by Grassberger (On the fractal dimension of the Henon attractor, *Phys Lett A* **97** 224-226 1983) are investigated utilising the improvements in computational performance made over the past score years. Standard algorithms are generalized to allow the analysis of data streams.
Several specific strange attractors are considered, each previously well studied using large finite data sets, with a view towards determining how our estimates of d_0 converge as the size of the data set increases without limit, whether can we detect this convergence in general, and if there is, indeed any evidence of convergence at all (Doctoral Thesis: Nonlinear Times Series Analysis of Data Streams, L. Clarke 2003). Indeed, it is illustrated that in some cases no coherent bounds can be placed beyond those known a priori, specifically that the dimension is greater or equal to zero and less than or equal to the dimension of the dynamical system. The question of whether or not this is always the case is discussed.