Gaussian local correlation as a measure of nonlinear dependence

Tjøstheim, Dag Bjarne

Department of Mathematics, University of Bergen, Norway
Dag.Tjostheim@math.uib.no

The most commonly used dependence measure for random variables is the correlation; in the time series case the autocorrelation function. It is very easy to find nonlinear examples where the correlation completely fails to describe the dependence involved. The concept of correlation is primarily useful for Gaussian variables. We introduce a new measure of local dependence by locally approximating the joint density of two (or more) random variables by a family of Gaussian densities and by using the correlation of the approximating Gaussian as a local correlation. The usefulness of this concept will be demonstrated in a number of different contexts and for real and simulated data sets.