McDonald, John Alan; **Owen, Art B.**
Smoothing with split linear fits. (English) Zbl 0626.65010
Technometrics 28, 195-208 (1986).

Let (x_i, y_i), $x_i \leq x_{i+1}$ $(i = 1, 2, ..., n)$ be the data to be smoothed. If one prescribes a set of windows of mutually different sizes then the steps of the split linear smoothing algorithm may be roughly outlined as follows: 1. At each point x_i each window of size k is placed with three different orientations σ (entirely to the left of x_i, centered on x_i and entirely to the right of x_i) and a linear fit is accomplished over it to get a fitted value f(i,k,σ). 2. For each x_i, k and σ a weight w(i,k,σ) is evaluated which is based on a goodness-of-fit value of the linear fit over the relevant window. 3. For each x_i the smooth value is $s_i = \sum_{k,\sigma} w(i,k,\sigma) f(i,k,\sigma)$. 4. Steps 1-3 are applied to the pairs (x_i, s_i) once more to get the final smooth.

Both simulated examples and an application to practical data obtained as daily records of sea surface temperature prove the capability of the split linear smoother (unlike other methods using only central windows or running medians) reliably to detect qualitative features such as smoothness, discontinuities, peaks and troughs in moderately large samples. Two-dimensional variants of the split linear smoother are suggested for edge detection in image processing.

Reviewer: V.Veselý

MSC:

65D10 Numerical smoothing, curve fitting
65C99 Probabilistic methods, stochastic differential equations
62J02 General nonlinear regression

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