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Noise Filtering: the Ultimate Solution

Yuri Kalambet1, Yuri Kozmin2, Sergey Maltsev1
1Ampersand Ltd.,Moscow, Russia
2Institute of Bioorganic Chemistry RAS,Moscow, Russia

The final solution of the problem “Which smoothing method is better” is offered. A methodof noise filtering based on confidence interval evaluation is described. In the case ofthe approximation of a function, measured with error by a polynomial or other functionsthat allows estimation of the confidence interval, the minimal confidence interval is usedas a criterion for the selection of the proper parameters of the approximating function. Inthe case of the polynomial approximation optimized parameters include the degree of thepolynomial, the number of points (window) used for the approximation, and the positionof the window center with respect to the approximated point. The special considerationson confidence interval evaluation and quality of polynomial fit using noise properties ofthe data array are discussed. The Method provides the lowest possible confidence intervalfor every data point.The Method is demonstrated using generated and measured data. Improvement ofnoise reduction compared to competing methods can vary depending on the input data,but always exists. Excellent noise reduction properties are combined with conservedobject shape (e.g. chromatographic peak, photographic object) without artifacts. Themethod requires extra computations, which can be easily paralleled.