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NASA TECH BRIEF

Polynomial-Smoothing and Derivative-Estimating Formulas for Functions of One or Two Independent Variables

Application of polynomial-smoothing formulas and related derivative-estimating formulas can help to simplify certain linear least-squares problems. A method for solving linear least-squares problems by computer can then be employed.

The report referenced in the note below provides tables of smoothing and derivative-estimating formulas for least-squares polynomial fitting at equally spaced abscissas. In the case of one independent variable, smoothing formulas are given for each odd number m of points up to 11, and for each degree of polynomial approximation such that $1 \leq n < m$. First and second derivative formulas for unit spacing are included. In the case of two independent variables, smoothing formulas are given for 3×3, 3×5, and 5×5 planar arrays of points with linear and quadratic approximations. Derivative formulas are provided for all nonzero partial derivatives.

The tables were calculated on an IBM 7094 with the help of a linear least-squares program. This program can be used to develop smoothing formulas for more than two variables, or formulas based on other sets of functions.

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

Reference:
NASA-CR-98657 (N69-14273), Polynomial Smoothing Formulas and Derivative Formulas for One or Two Independent Variables

Patent status:

No patent action is contemplated by NASA.

Source: Albert J. Semtner of Caltech/JPL under contract to NASA Pasadena Office (NPO-11256)

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