Interpolation Encyclopedia Article

Interpolation

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Contents

Interpolation Encyclopedia Article.....1

Contents.....2

Interpolation.....3

Interpolation

Interpolation involves defining a curve that passes through a set of defined points in a plane. The curve that passes through those points is said to interpolate those points, and the curve is called an interpolating curve for those particular points. In order to define a curve passing through a defined set of points an estimation of a value of a function or series between two known values must be made. These estimated points must conform to the law of the series of known points. The word interpolate is derived from the Latin *interpolat* meaning to touch up or refurbish and is extracted from *interpolis*.

Several different methods are available in order to accomplish estimating values of a function at positions between given values. Some of the most common methods include linear, spline, and cubic spline interpolation methods. Linear interpolation is the simplest form of interpolation where a function is estimated by drawing a straight line between the nearest neighboring given points on either side of a required position. It assumes a constant rate of change between two points. Spline interpolation uses a polynomial that incorporates information from neighboring points to obtain a degree of overall smoothness. It is a bit more complex than simple linear interpolation but yields a smooth fit to the given data points. The last mentioned method of interpolation, the cubic spline interpolation, employs piecewise third-order **polynomials** which pass through the set of given values to obtain the unknown values in between. The second derivative of each polynomial is usually set equal to **zero** at the endpoints. This provides a boundary condition that completes the system of polynomial **equations** so that they can then be solved to give the coefficients of the polynomials and yield an interpolating curve for the given data points. This method is more complex than both the linear and spline interpolation methods but it yields a superior curve fitting the given set of values. There are many other interpolation methods but they are generally more complex than the ones mentioned here but in some cases may yield better fits to the data.