THE RECURRENCE RELATION OF B-WAVELETS

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The study of wavelet functions is a relatively new area in mathematics. It is a topic of interest for both mathematicians and engineers, and applications can be seen in a wide area where Fourier transforms were used traditionally.

The wavelet functions can be used to perform the decomposition in L^2 space, the collection of all square integrable functions. This can be done with the aid of compact support functions called the B-spline functions. The B-splines act as scaling functions in order to construct specific wavelet functions - the B-wavelets.

B-spline functions as piecewise polynomials with compact supports can be relatively smooth, and their Fourier transforms possess some properties like the Dirac Delta functions. Thus B-wavelets as the dilations and translations of B-splines can be used to reproduce and to analyze signals both in the local time and local frequency domains. In addition, we can expect to find a recurrence relation of the B-spline functions with different order. Hence B-wavelets of any order can be constructed successively from the lower order ones.

My project is on constructing B-spline functions and B-wavelet functions by their recurrence relations. A program was written in Pascal in order to calculate the Bernstein-Bezier coefficients of the B-spline functions of different order, and the graphs of these functions were drawn using Mathematica. From these coefficients of the B-splines, the coefficients of corresponding B-wavelength functions were found.