

Efficient evaluation of Bernstein-Bézier coefficients of B-spline basis functions over one knot span

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Abstract

New differential-recurrence relations for B-spline basis functions are given. Using these relations, a recursive method for finding the Bernstein-Bézier coefficients of B-spline basis functions over a single knot span is proposed. The algorithm works for any knot sequence and has an asymptotically optimal computational complexity. Numerical experiments show that the new method gives results which preserve a high number of digits when compared to an approach which uses the well-known de Boor-Cox formula.

Keywords: B-spline basis functions, Bernstein-Bézier form, recurrence relations, B-spline curves, B-spline surfaces, de Boor-Cox algorithm.

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