

Bernstein Optimization for Logarithmic Function in Lagrange Polynomials over a Box

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Abstract

In this thesis, we study optimization methods for logarithmic functions given over intervals. The Bernstein expansion is considered for optimizing the range of these functions? Subsequently, transforming these functions into polynomial representations in Lagrange form of maximum degree, where the truncation error can be optimized. We provide properties for the new form of the logarithmic function in Bernstein form. Furthermore, we generalize our results to the bivariate case over a box. Finally, the logarithmic functions in Lagrange-Bernstein are optimized by the minimum and maximum coefficients of Bernstein in the discrete form.

We study a technique for calculating accurate limits on the domain of a multivariate logarithmic function over a defined region. The method is investigated by which tight bounds on the range of a multivariate logarithmic function over a box can be computed. The approach relies on the expansion of Lagrange polynomial in Bernstein form.

Keywords: logarithmic functions, Lagrange polynomials.