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# Quasi-interpolation Scheme for Arbitrary Dimensional Scattered Data Approximation Based on Natural Neighbors and RBF Interpolation

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**Abstract:** A local quasi interpolation scheme is presented in the paper, which can be applied to arbitrary dimensional scattered data approximation with high accuracy, high efficiency and high stability. Under our new quasi-interpolation scheme, we treat the natural neighbor set of the point to be estimated in a given scattered node set as a local interpolation node set. Based on the local node set, a local radial basis function interpolation with algebraic precision of any degree is constructed through a modified Taylor expansion of sampled function at each natural neighbor to compute approximate values. Given the exclusion of the point to be estimated from its natural neighbor set, i.e. interpolation node set, the interpolation scheme we construct is a local quasi-interpolation scheme, and its approximation error is given. The numerical experimental results show that, when the derivative information is unavailable, our method outperforms the famous natural neighbor interpolation method in both approximation accuracy and efficiency. As algebraic precision increases, the approximation accuracy can be further improved.

**Keywords:** Scattered data, Local interpolation, Natural neighbor, RBF interpolation, Quasi-interpolation, Error analysis.

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