



Max-Product Shepard-Lidstone Operators and Their Approximation Properties

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Abstract

Recently, Shepard operators have been combined with local interpolation operators such as Taylor, Bernoulli, and Lagrange polynomials to improve their approximation properties. Furthermore, nonlinear versions of these combined Shepard operators using the max-product operators [1] have been studied for the approximation of nonnegative functions [2, 3, 4]. Motivated by these results, in this presentation we consider the combined Shepard–Lidstone operators introduced in [5, 6, 7] and improve the convergence result established in [6] by showing that the convergence holds for all $\lambda \geq 1$, whereas the previous result required the condition $\lambda > 2r - 1$. We also present the max-product Shepard–Lidstone operator and establish its rate of convergence together with its approximation properties. The proposed nonlinear operator exhibits improved approximation properties compared with the classical Shepard and Shepard-Lidstone operators. In addition, we apply regular summability methods to suitably modified sequences of operators in cases where classical convergence fails. Finally, we demonstrate the theoretical findings using numerical examples.

Keywords: Max-product operators, Shepard-type operators, Lidstone Polynomials, rates of convergence.

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