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LASSO-inspired variants of weighted orthogonal matching pursuit with applications to sparse high-dimensional approximation

Motivated by recent developments in sparse high-dimensional approximation from Monte-Carlo sampling, we propose a new weighted variant of the Orthogonal Matching Pursuit (OMP) algorithm. The associated greedy selection criterion is inspired by the square-root LASSO, and further extends the previous work based on the LASSO. We show the efficacy of the proposed algorithm in the context of high-dimensional polynomial approximation and numerically assess its robustness by analyzing the sensitivity of its tuning parameter with respect to noise.