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**MNH: A Derivative-Free Optimization Algorithm Using
Minimal Norm Hessians.**

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We introduce MNH, a new algorithm for unconstrained optimization when derivatives are unavailable, primarily targeting applications that require running computationally expensive deterministic simulations. MNH relies on a trust-region framework with an underdetermined quadratic model that interpolates the function at a set of data points. We show how to construct this interpolation set to yield computationally stable parameters for the model and, in doing so, obtain an algorithm which converges to first-order critical points. Preliminary results are encouraging and show that MNH makes effective use of the points evaluated in the course of the optimization.