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Yuhan Ding, Sou-Cheng T Choi and Fred J Hickernell* (hickernell@iit.edu),
Department of Applied Mathematics, Illinois Institute of Technology, E1-208, 10 W. 32nd St.,
Chicago, IL 60616. *Guaranteed Local Adaptive Interpolation.*

Existing error bounds for function interpolation depend on semi-norms of the function being interpolated. Such semi-norms are often not known a priori. Existing adaptive interpolation methods choose the data sites based on heuristic error estimates—without rigorous justification.

With our collaborators, we have been creating theoretically justified adaptive algorithms for univariate function interpolation, as well as for univariate and multivariate integration and univariate function optimization. Our algorithms determine the effort required from function values, not semi-norms. These algorithms comprise the open source GAIL Matlab toolbox, http://gailgithub.github.io/GAIL_Dev/.

This talk describes a new locally adaptive GAIL algorithm for univariate function interpolation. This algorithm is especially effective when the function being interpolated has a single peak in the domain and is rather flat elsewhere. (Received September 20, 2015)