Node Subsampling for Multilevel Meshfree Elliptic PDE Solvers

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Subsampling of node sets is useful in contexts such as multilevel methods, polynomial approximation, and numerical integration. On uniform grid-based node sets, the process of subsampling is simple. However, on non-uniform node sets, the process of coarsening a node set through node elimination is nontrivial. A novel method for such subsampling is presented here. Additionally, boundary preservation techniques and two novel node set quality measures are presented. The new subsampling method is demonstrated on the test problems of solving the Poisson and Laplace equations by multilevel radial basis function-generated finite differences (RBF-FD) iterations.

Joint work with Morten E. Nielsen and Bengt Fornberg.