

CORR 2001-22

**Approximating Subdifferentials by Random Sampling
of Gradients**

J.V. Burke*, A.S. Lewis, M.L. Overton*

Abstract Many interesting real functions on Euclidean space are differentiable almost everywhere. All Lipschitz functions have this property, but so, for example, does the spectral abscissa of a matrix (a non-Lipschitz function). In practice, the gradient is often easy to compute. We investigate to what extent we can approximate the Clarke subdifferential of such a function at some point by calculating the convex hull of some gradients sampled at random nearby points.

Keywords nonsmooth analysis, Clarke subdifferential, generalized gradient, bundle method, stochastic gradient, eigenvalue optimization, spectral abscissa

AMS 2000 Subject Classification

Primary: 90C46, 49K40

Secondary: 65K05, 15A42