Department SEMINARS

Generalized Optimization Algorithms for M-estimation of complex models

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A B S T R A C T

By generalizing the classical Newton-Raphson method, we put forward a new optimization algorithm that we call generalized inexact Newton method (GINM). We select P points of the parameter space in a neighborhood of \boldsymbol{\theta}^{\left(i\right)} and we estimate the objective function through a regression. Then, we identify the true value \boldsymbol{\theta}^{\star} using the inexact Newton method. We extensively discuss the theoretical and the computational aspects of the GINM.

The results apply to both deterministic and stochastic approximation schemes. Building on these results, we also provide a new estimation method for complex models. We give new general results related to the machine learning literature, i.e. we study the convergence of the stochastic gradient descent. Then, we focus on the situation in which the objective function to be optimized is highly irregular and/or the stochastic equicontinuity hypothesis is violated. Examples are common in quantile regression, dynamic discrete choice models and in simulation models such as network models. The theory is supported by some Monte Carlo experiments and an application.

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