MONOTONICITY OF QUADRATIC-APPROXIMATION ALGORITHMS

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Abstract. It is desirable that a numerical maximization algorithm monotonically increase its objective function for the sake of its stability of convergence. It is here shown how one can adjust the Newton-Raphson procedure to attain monotonicity by the use of simple bounds on the curvature of the objective function. The fundamental tool in the analysis is the geometric insight one gains by interpreting quadratic-approximation algorithms as a form of area approximation. The statistical examples discussed include maximum likelihood estimation in mixture models, logistic regression and Cox's proportional hazards regression.