

A Skewed Version of the Robbins-Monro-Joseph Procedure for Binary Response

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Abstract: The Robbins-Monro stochastic approximation procedure has been used for sensitivity testing. Joseph (2004) recognized that it is not well suited for binary data and proposed a modification which gives better performance for p between 0.1 and 0.9. However, for extreme p values, say $p \leq 0.01$ or $p \geq 0.99$, the Joseph version does not perform well. To overcome this difficulty, we propose a modification based on an asymmetric quadratic loss function. The new procedure can speed up convergence by employing different penalties for undershooting and overshooting to reduce the expected loss. Simulation comparisons show the clear advantages of the new procedure for extreme p values.

Key words and phrases: Asymmetric loss function, Bioassay, Extreme quantile, Sensitivity testing, Stochastic approximation.