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Variable sample size method for equality constrained optimization problems, Optimization Letters, 12, pages 485–497(2018)

Scientific paper

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Minimization problem with equality constraints in the form of mathematical expectation is considered within paper. The iterative method is created for solving the approximation (an SAA reformulation) of the considered problem. The method is stochastic, that is, the procedure, in each iteration, use a sample average function instead of the mathematical expectation function, but the sample size is varying throughout the process. Updating the sample size is adaptive. That means, the sample size is determined at every iteration using information from the current iteration. Concretely, the current precision of the approximation of expectation and the quality of the approximation of solution determine the sample size for the next iteration. The iterative procedure is based on the line search technique as well as on the quadratic penalty method adapted to stochastic environment. We show that, under the standard assumptions, the proposed algorithm generates a subsequence which accumulation point is the KKT point of the SAA problem. Results of numerical testing show that algorithm requires smaller number of function evaluations in solving the considered problem comparing to the SAA method with maximal sample size and procedures which use a priori defined update scheme for sample size.

