Optimization Theory in Glushkov Institute of Cybernetics NASU (Kiev) with special reference to Nondifferentiable Optimization

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Abstract

We present a short histopy of Optimization Theory in Glushkov Institute of Cybernetics, its development and overview of some selected results and methods. These includes: Method of sequential analysis of variants (SAV); Generalized Gradient Descent (GGD); Methods of interval algebra and interval analysis to study of optimization problems. We study Minkowski's conjecture about the critical determinant of the domain $|x|^p + |y|^p < 1, p > 1$ as a problem of parametric minimization on a non-compact real surface and present corresponding results. Diophantine approximation explores and establishes connections between local and global fields, in the classical case, the approximation of real numbers by rational ones. H. Minkowski in his monograph "Diophantische Approximationen" raise the question about minimum constant such that some Diophantine inequalities has integer solutions other than origin. Minkowski with the help of his theorem on convex body has found a sufficient condition for the solvability of Diophantine inequalities in integers not both zero. But this result is not optimal, and Minkowski also raised the question of how to improve this constant. For this purpose, Minkowski suggested using a critical determinant. Critical determinant is one of the main notion of the geometry of numbers. It has been investigated in the framework of problem of Minkowski in papers by Mordell, by Davis. by Cohn, by Watson, by Malyshev and by Malyshev with the author of the abstract.

We then give an overview of some selected notions, methods and results of Nondifferentiable Optimization. These include: subgradient; r-algorithms of non-differentiable optimization; Lagrangien bounds; matrix problems. Numerical examples are included.