

# BEYOND CONVEXITY: NEW PERSPECTIVES IN COMPUTATIONAL OPTIMIZATION

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For computational solutions of convex optimization problems, a rich body of knowledge including theory, algorithms, and computational experience is now available. In contrast, nothing of comparable depth and completeness can be offered at the present time, for non-convex problems. The field of convex optimization benefited immensely from pre-existing body of concepts and knowledge from pure mathematics, while non-convex problems seems to require formulation and exploration of entirely new mathematical concepts, as well as new models of computation. The intent of this paper is to describe our efforts in this direction, at a philosophical or conceptual level, without going into specific applications or implementation in software. We also point out connections with other areas, particularly mathematical physics.