

Full-Newton Step Polynomial-Time Methods for LO Based on Locally Self-Concordant Barrier Functions

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Abstract: Recently several new search directions for interior-point methods have been introduced, based on kernel functions. Some of these function are so-called self-regular, others not. The best known iteration bounds methods based on kernel functions are $O(\sqrt{n} \ln(n/\varepsilon))$ for small-update methods and $O(\sqrt{n}(\ln n) \ln(n/\varepsilon))$ for large-update methods, respectively.

We present some results of ongoing work that is motivated by the question whether or not such bounds also can be obtained by applying the more elegant theory of self-concordant functions to barrier functions based on kernel functions. A major difficulty that arises when dealing with this question is that in general these barrier functions are not self-concordant. As we will show, however, on the central path and in its neighborhood they behave as being self-concordant; we call them *locally self-concordant*. As a consequence we expect it to be possible to answer the above question positively. In this talk we restrict ourselves to a special case of small-update methods, namely to full-Newton step methods.

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