

New interior-point algorithm for convex quadratic symmetric cone optimization

Zsolt Darvay, Petra-Renáta Takács

Department of Mathematics and Computer Science of the Hungarian Line
Babeş-Bolyai University, Cluj-Napoca
darvay@cs.ubbcluj.ro

Recently, we have introduced a new short-update primal-dual interior-point algorithm for linear optimization [2]. We have used the method proposed in [1] in order to obtain a new search direction. The characteristic of this algorithm is that the corresponding kernel function is not defined on the whole set of the positive real numbers. In spite of this, we have obtained the same complexity as the one of the best-known interior-point methods for linear optimization.

Nowadays, many researches have been made on generalising interior-point methods for linear optimization to symmetric optimization. Schmieta and Alizadeh considered the possibility of the extension of primal-dual interior-point algorithms to symmetric cones [4]. The theory of the symmetric cones has been studied in the book of Faraut and Korányi [3].

In a more general context we can study the convex quadratic symmetric cone optimization problems that include symmetric optimization and convex quadratic optimization as special cases. Our goal is to extend the method introduced in [2] to convex quadratic symmetric cone optimization using Euclidean Jordan algebras.

References

- [1] Zs. Darvay: New interior point algorithms in linear programming. *Adv. Model. Optim.* **5**, 1 (2003) 51–92.
- [2] Zs. Darvay, Á. Felméri, N. Forró, I.-M. Papp, P.-R. Takács: A new interior-point algorithm for solving linear optimization problems. In: E. Bitay (ed.) *XVII. FMTU*, Transylvanian Museum Society, Cluj-Napoca (2012) 87–90. In Hungarian.
- [3] J. Faraut, A. Korányi, *Analysis on Symmetric Cones*, Oxford University Press, New York, 1994.
- [4] S. Schmieta, F. Alizadeh, Extension of primal-dual interior point algorithms to symmetric cones, *Math. Program., Ser. A* **96**, 3 (2003) 409–438.