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Approximating optimal containment problems

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Abstract

Typical containment problems are computing the smallest enclosing ball, cylinder, slab, box or ellipsoid of a given body. Also the task to cover a point set by several (homothetic, similar, affine, ...) copies of a given body is a containment problem. Many of these problems are very hard to solve (NP-hard, APX-complete, ...) especially the latter ones. However, good and fast approximation algorithms are needed as these problems arise in a variety of applications and often also as subproblems when solving harder variants of themselves.

We show some new ideas for solving hard containment problems by considering the well known geometric k-center problem and some generalisations.