

Computing the smallest enclosing ball of balls

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Abstract

We consider the problem of computing the smallest ball enclosing a set of balls. There is an elegant randomised algorithm due to Welzl (1991) that computes the smallest ball enclosing a set of *points*: it was shown by Fischer and Gärtner (2003); Fischer (2005) that a natural extension of Welzl’s algorithm to sets of balls does not work in general. The aim of this note is to point out that a trivial modification to this algorithm makes it work correctly.

1 Welzl’s algorithm

2

3 Proof of correctness

4 Practical considerations

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5 Move-to-front

[Can we say anything about whether the move-to-front heuristic has the effect that recursive calls are always tight?]

References

Kaspar Fischer. *Smallest enclosing balls of balls*. PhD thesis, Swiss Federal Institute of Technology, ETH Zürich, 2005.

Kaspar Fischer and Bernd Gärtner. The smallest enclosing ball of balls: Combinatorial structure and algorithms. In *Proceedings of the Nineteenth Annual Symposium on Computational Geometry*, SCG ’03, pages 292–301, New York, NY, USA, 2003. ACM. ISBN 1-58113-663-3. doi: 10.1145/777792.777836. URL <http://doi.acm.org/10.1145/777792.777836>.

Emo Welzl. Smallest enclosing disks (balls and ellipsoids). *New Results and New Trends in Computer Science*, pages 359–370, 1991.