



Optimal consensus set for Annulus fitting

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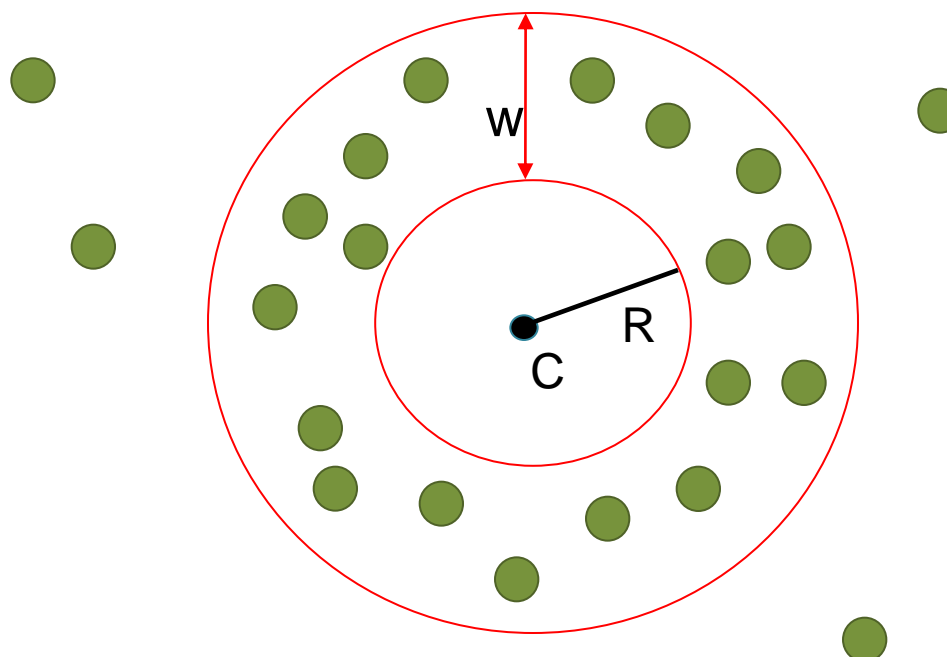
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Contribution

A method for fitting a fixed width annulus to a given sets of points in the presence of outliers

- examines all possible consensus sets,
- guarantees the optimal and exact solution(s),
- has a time complexity $O(N^4)$ with N the number of points.





Annular characterization

Given an Annulus of width ω covering a set of points S , then there exist an annular of same width that covers S and passes through at least 3 points of S .

How to build an annular of width ω from 3 points

There are at most 8 annuli of a given width w passing through 3 given points P_1 , P_2 and P_3 of S .

Method : test all configurations of 3 points and count, for each of the possible 8 configurations, the points inside the annuli. This yields a $O(N^4)$ complexity.

Conclusion and perspectives

- fitting annulus to a set of points while fixing the width of the annulus,
- approach costly in terms of computation time
 - guarantees optimal and exhaustive results
 - improving the complexity, and fitting of 3D annuli.