

Title: An introduction to Euclidean Distance Geometry

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Abstract: Distance Geometry is concerned with the study of Euclidean geometry focusing in the concept of distance (instead of lines, planes, etc). Its central problem is the one of recovering a configuration of points from a subset of their pairwise distances. Such a problem, known as Distance Geometry Problem, finds application in many areas such as statistics, engineering and chemistry, to name a few. In this mini-course we will study the basic theory of Distance Geometry, discuss some algorithms for special classes of the Distance Geometry Problem and present some applications.

A background on analytic geometry, linear algebra and calculus is enough to follow this mini-course.

The proposed schedule is:

- Session 1: Introduction, Existence conditions, Cayley-Menger determinants;
- Session 2: Euclidean distance matrices, algorithms for complete graphs;
- Session 3: Algorithms for K-laterative graphs, an application in protein structure determination.

This mini-course is based on the notes (in Portuguese) published by SBMAC in the series "Notas em Matemática Aplicada" (<https://www.sbmac.org.br/noma-titulos-da-serie/>) which are publicly available at

https://www.sbmac.org.br/wp-content/uploads/2022/08/livro_91.pdf

or

http://mtm.ufsc.br/~douglas/Livro_DG/ (updated version)