

MODELLING THREE-DIMENSIONAL GEOSCIENTIFIC DATASETS WITH THE DISCRETE VORONOI DIAGRAM

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ABSTRACT:

Geoscientific datasets are often formed by scattered samples in 3D space having highly anisotropic distribution. To model the continuity of the phenomena they represent (e.g. temperature of a body of water, or percentage of a chemical in the air) raster structures are in most cases used. To overcome the shortcomings of rasters the Voronoi diagram (VD) has been proposed as an alternative. However, while in theory the VD is a sound solution, its use in practice is hindered by the fact that it is complex to construct and to manipulate (removal of samples, interpolation, etc.), and spatial tools have to be built. We propose in this paper a "middle" solution: the 3D discrete Voronoi diagram (DVD). We investigate the properties of the 3D DVD, we propose algorithms to construct and manipulate it, and we demonstrate its use in practice with a prototype that we have built. Our prototype uses existing tools for visualisation and further analysis of DVDs.

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