

Aggregation algorithms for models with hexagonal geometry

Abstract

The main goal of this dissertation is to propose new methods for comparing and aggregating structures whose shape is based on a hexagonal grid, as well as to analyze the properties of the resulting methods and their potential practical applications. We represent paths in the considered space using binary sequences, where the bit 0 denotes a left turn angle between consecutive edges, and the bit 1 denotes a right turn angle. We divide the examined structures into paths and organize them into a ternary tree, which is then represented using extended binary sequences. We compare the objects represented this way by employing metrics and partial orders and then aggregate them by determining, respectively, the medoid, as well as the smallest and largest, minimal and maximal elements, along with the infimum and supremum. We analyze the usefulness of the proposed methods in practical applications such as game theory, distributed knowledge, and organic chemistry.