Convex Aggregation Problems in Z^2

Yan Gérard[*][1]

[1]LIMOS – Université d'Auvergne - Clermont-Ferrand I – France

Abstract

We introduce a family of combinatorial problems of digital geometry that we call convex aggregation problems. Two variants are considered. In Unary convex aggregation problems, a first lattice set A ⊆ Z^d called support and a family of lattice sets B^i ⊆ Z^d called pads are given. The question to determine whether there exists a non-empty subset of pads (the set of their indices is denoted I) whose union A ∪_{i∈I} B^i with the support is convex. In the binary convex aggregation problem, the input contains the support set A ⊆ Z^2 and pairs of pads B^i and $\overline{\{Bi\}}$. $ThequestionistoaggregatetothesupporteitherapadBioritscorrespond$ B^i ∪_{i ∉ I} $\overline{\{Bi\}}$ $isconvex.Weprovideafirstclassificationoftheclassesofcomplexitiesofthesetwoproblemsindimension$

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[*]Speaker