Cellular Automata for Analyzing Patterns in Idealized Material Blocks

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Talk Abstract

Cellular automata are computational models consisting of a lattice of cells, where each cell can occupy one state from a finite set. The state of each cell evolves in discrete time steps according to a specific set of transition rules that depend on the states of its neighbouring cells. These models are widely utilised for simulating and analysing dynamic systems and processes across diverse scientific domains [1], [2], [3] and [4]. This study aims to analyse patterns resembling fractures by characterising specific forms within idealised material blocks. We explore a generic probabilistic cellular automaton and apply refinement techniques to optimise probability distributions. This refinement process can integrate empirical data or predefined behaviours, enabling adjustable modifications to the cellular automaton's rules [5] .

Keywords: elementary cellular automaton, dynamical systems, probability distribution, patterns.

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