

Mutational and Morphological Analysis

Tools for Shape Evolution and Morphogenesis

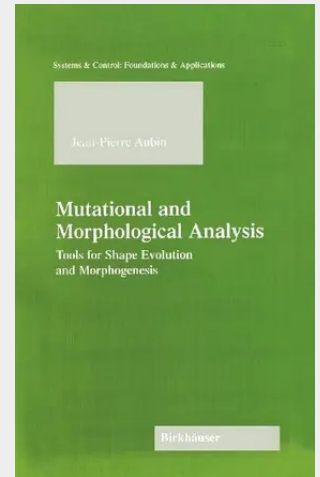
The analysis, processing, evolution, optimization and/or regulation, and control of shapes and images appear naturally in engineering (shape optimization, image processing, visual control), numerical analysis (interval analysis), physics (front propagation), biological morphogenesis, population dynamics (migrations), and dynamic economic theory.

These problems are currently studied with tools forged out of differential geometry and functional analysis, thus requiring shapes and images to be smooth. However, shapes and images are basically sets, most often not smooth. J.-P. Aubin thus constructs another vision, where shapes and images are just any compact set. Hence their evolution -- which requires a kind of differential calculus -- must be studied in the metric space of compact subsets. Despite the loss of linearity, one can transfer most of the basic results of differential calculus and differential equations in vector spaces to mutational calculus and mutational equations in any mutational space, including naturally the space of nonempty compact subsets.

"Mutational and Morphological Analysis" offers a structure that embraces and integrates the various approaches, including shape optimization and mathematical morphology.

Scientists and graduate students will find here other powerful mathematical tools for studying problems dealing with shapes and images arising in so many fields.

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