How to rotate digital images without losing information ?

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Résumé

While rotations are bijections that preserve distances and angles in Euclidean space, these geometric properties are not preserved in general when rotations are applied to digital images. In this talk, we particularlly focus on bijection and topology, which are also generally lost. With regard to bijections, we present the set of rotations that give bijective rotations in Zˆ2 and Zˆ3. We also show the characterization of such rotations in Zˆ2. Turning to topology, we present the class of 2D digital images whose topology is preserved under any rotation, known as (digital) "regular" images, along with "regularization" methods based on an up-sampling strategy. We also show that this notion of regularity cannot be extended to 3D since counter-examples exist.

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