Multi-Label Simple Points Definition for 3D Images Digital Deformable Model

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Introduction

Goal in Image Processing

Deformation w/o topological modification of the partition

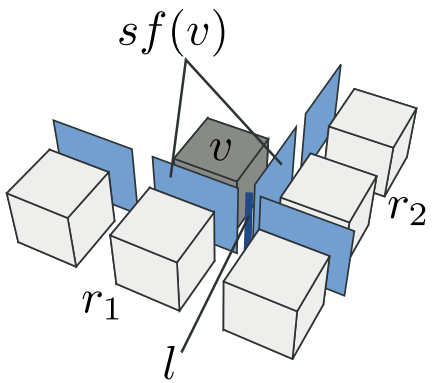
Our Solution

- use intervoxel elements to represent boundaries;
- definition of multi-label simple points (ML-Simple points):
  - allow geometrical modification of faces;
  - forbid geometrical modification around edges and vertices;
- deformation algorithm based on ML-Simple points.

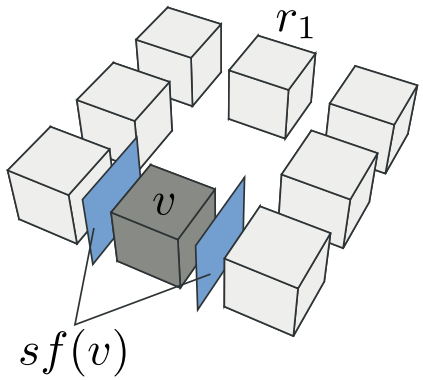
ML-Simple Points

A voxel v is ML-Simple if:

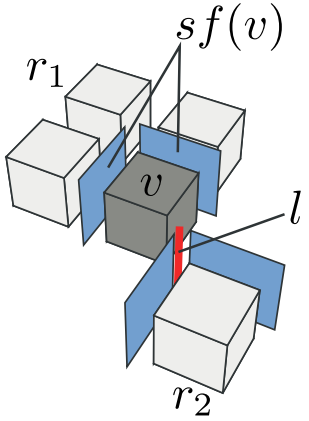
1. $\forall l \in \text{linels}(v), \textit{degree}(l) \in \{0, 2\}$;
2. the body of $sf(v)$ is homeomorphic to a 2-disk;
3. $\forall l \in \text{linels}(v), \textit{degree}(l, v) = 0 \Rightarrow \textit{degree}(l) = 0$.



1

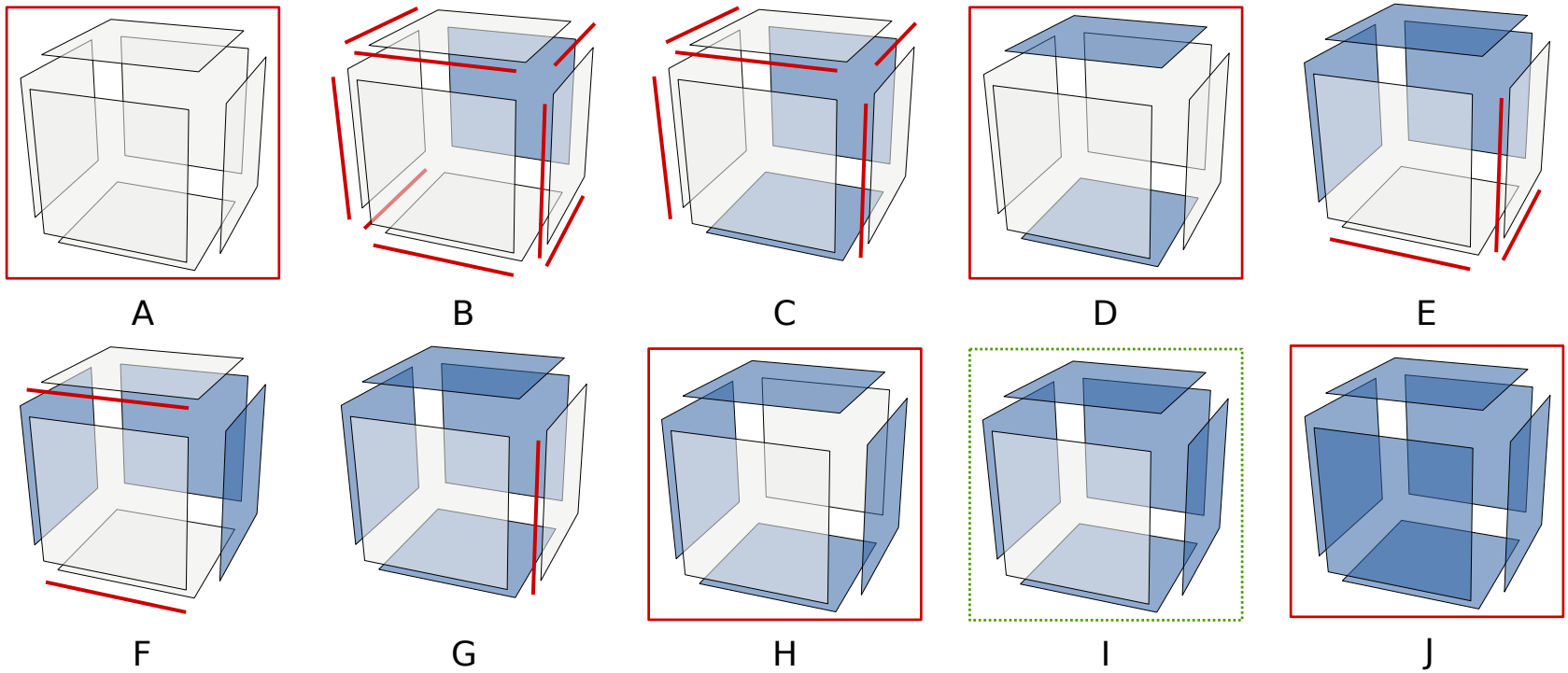


2



3

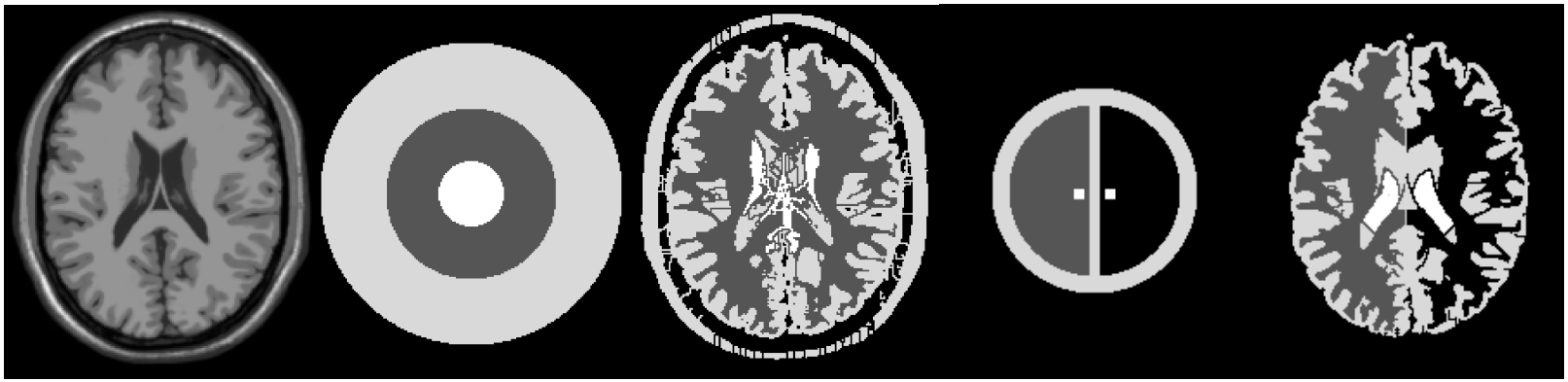
3D Cases



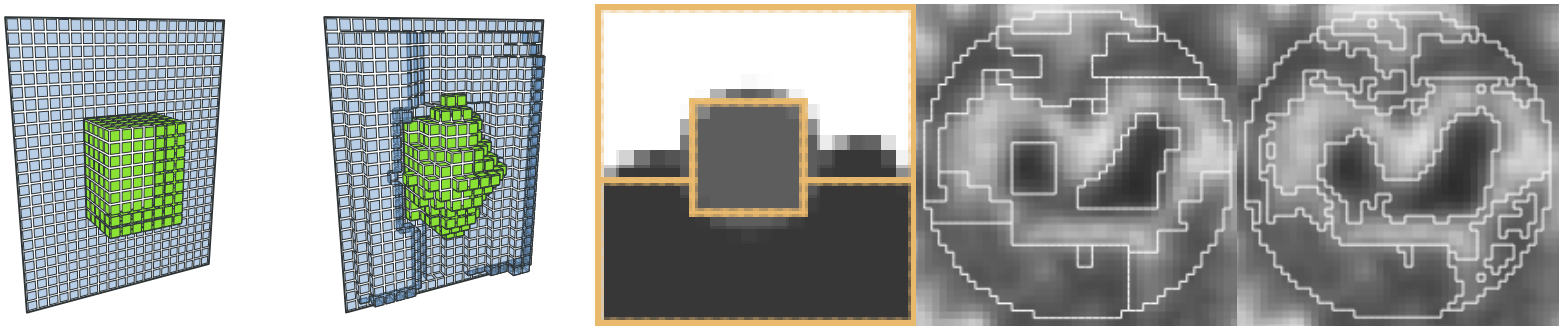
All configurations can be obtained by rotations and symetries.
$\Rightarrow$ simple local detection algorithm.

Deformation of the partition of an image

partition without surface intersections:



partition with surface intersections:



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