Dictionary Based Segmentation in Volumes

We present a method for supervised volumetric segmentation based on a dictionary of small cubes composed of pairs of intensity and label cubes. Intensity cubes are small image volumes where each voxel contains an image intensity. Label cubes are volumes with voxelwise probabilities for a given label. The segmentation process is done by matching a cube from the volume, of the same size as the dictionary intensity cubes, to the most similar intensity dictionary cube, and from the associated label cube we get voxel-wise label probabilities. Probabilities from overlapping cubes are averaged and hereby we obtain a robust label probability encoding. The dictionary is computed from labeled volumetric image data based on weighted clustering. We experimentally demonstrate our method using two data sets from material science – a phantom data set of a solid oxide fuel cell simulation for detecting three phases and their interfaces, and a tomogram of a glass fiber composite used in wind turbine blades for detecting individual glass fibers.

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