

Master Thesis

Image Segmentation in 3D

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Abstract:

The thesis presents an algorithm of segmentation in three dimensions (3D), that uses a pyramid based on an octree, where the presence of noise in the space of attributes that causes class-overlap is going to be reduced at the expenses of the image resolution. Thus at the coarsest level the separation between classes is increased and the within-class variance reduced. At this level is applied the algorithm of clustering without any constraints of connectivity, gearing the prototypes of the classes and creating the image of labels. Also at this level the possibility of isolated voxels and/or insignificant classes could come up. These voxels or classes are attributed to their neighbours in one passage by a deterministic process that guarantees the spatial connectivity. The resolution is increased by the projection down the labels. At each level (under) appears the uncertainty of the classification of the boundary voxels. This is minimised by using a dynamic restriction of the boundary voxels in function of the boundary direction. The classification of the rest of the boundary voxels to the near classes prototypes is made by an orientated adaptive procedure based on a Butterfly 3D filter in several directions. The algorithm is tested in a great variety of images such as seafloor sonar images.