Minimization of a Mumford-Shah Model for X-ray Tomography

By Meraj, Muhammad Asad

Condition: New. Publisher/Verlag: VDM Verlag Dr. Müller | by using shape sensitivity analysis and Newton-type Algorithm | In this work we tread upon the classical two-dimensional X-ray tomography problem modeled by the Radon transform. We have focused on the problem of simultaneously inverting the Radon transform and segmenting the density distribution into homogeneous regions directly from the sinogram data i.e. from the attenuation data of X-rays passing through the body. We have used modified Mumford-Shah model for piecewise constant densities. The segmenting curves are described by a suitable level-set function and the problem of optimal adjustment of the curves to the actual contours of objects in the density distribution is achieved combining shape sensitivity techniques with level-set based transport of geometrical objects. The novel contribution of this work is the use of second order shape sensitivity analysis to construct a Newton-type descend direction for the solution of the resulting shape optimization problem. To construct an algorithm which performs the reconstruction and segmentation simultaneously from the measured data was the prime motivation of this work. | Format: Paperback | Language/Sprache: english | 235 gr | 168 pp.

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