



Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Wissenschaftliches Rechnen IX

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An Efficient Signal Reconstruction Algorithm using Sparsity and Total Variation

An efficient method to solve under-estimated linear inverse problems such as image reconstruction will be presented. Therefore we minimize a model function consisting of a least square data fitting term, the ℓ_1 -norm for using prior information such as sparsity in some domain and the TV_1 -seminorm for smoothness.

$$\min_{x \in \mathbb{C}^N} \frac{1}{2} \|Ax - b\|_2^2 + \mu \|x\|_{TV_1} + \lambda \|\Phi x\|_1$$

We solve this optimization problem by adding additional optimization variables for the finite differences in the TV_1 -seminorm. Thus, we obtain a new composed function consisting of an ℓ_1 -norm and a differentiable function such that we can apply the existing FISTA algorithm. We will compare our algorithm with the method FCSA of Huang [Hua10] in running time and accuracy at the example of 2D and 3D MRI reconstruction and see that the new algorithm results to better reconstruction results.

References

- [Hua10] J. HUANG, S. ZHANG AND D. METAXAS. *Efficient MR Image Reconstruction for Compressed MR Imaging*. Division of Computer and Information Sciences, Rutgers University, NJ, USA 08854, 2010

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Zu diesem Vortrag laden wir Sie herzlich ein.

gez. Prof. Dr. Alfio Borzi