Einladung zum

Mathematischen Kolloquium

Am Dienstag, 3. Mai 2011

spricht

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über

From Data to Images, a shape based approach

When solving inverse problems we typically have physical data given and are looking for an image (which might be 2D or 3D) which reproduces these data in some specified sense. Typically these images represent coefficients of a Partial Differential Equation, called the forward model, and a simulator is used in order to verify the data fidelity of any given image which is proposed as a possible solution.

Classical inverse problems theory tells us that inverse problems are ill-posed, and a well-defined unique image which fits the data either does not exist, or the direct reconstruction of a useful image from data is unstable, or (typically) both. Then, in most deterministic approaches for calculating candidate images, regularization schemes are employed which provide images from a certain class, in most cases smooth images. Certainly, natural images are not necessarily smooth, but might contain discontinuities which provide the image with structure. This structure is of high importance in many applications. It might represent different lithologies in geophysical applications, or different materials in non-destructive testing, or different organs or tissue types in medical imaging applications. Structure can be imposed by brute force on the already reconstructed images by applying off-the-shelf or tailor-made image segmentation techniques. However, this approach has various drawbacks in many applications, and might simply not work at all.

We propose in this talk a novel level-set based approach for finding such structured images (i.e. containing sharp interfaces between different characteristic regions) directly from the given data without making the detour via image post-processing techniques. Several examples from medical imaging, petroleum engineering and non-destructive testing applications are presented that show the performance of this novel technique in realistic situations.

Der Vortrag findet statt um 16 Uhr c.t. im Raum 1090, 1. Ebene des Mehrzweckhochhauses (MZH) der Universität Bremen, Bibliothekstraße.
Zuvor gibt es Kaffee/Tee und Gebäck im Raum 7140.

Alle Interessierten sind herzlich eingeladen.
R.-E. Hoffmann als Kolloquiumsbeauftragter.