CS 663 – Project Proposal
(Vector-Valued Image Regularization with PDEs)

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Abstract

We intend to analyse and implement the exciting work of Tschumperle *et al.* [2] on vector-valued image regularization using PDEs, which has applications in color image restoration, color image inpainting, improving lossy compressed images etc.

The paper has techniques on vector-valued image regularization using variational methods and PDEs, inculcating a large portion of the previous work done in the field of PDE-based regularization into a single generic aniostropic diffusion equation. The authors also speak about the numerical methods they have used in the implementation of this method which makes our work a bit easier.

Roadmap

We plan to begin by understanding and implementing the proposed regularization approach, in its crude form, for image restoration and inpainting and move on to other applications if time permits.

Datasets/Benchmarking

For inpainting, we plan to use the TU Munich Image Inpainting Database [1], consisting of 17 base images. These images differ in relation to texture and structure diversity. Each of these images is inpainted by four state-of-the-art inpainting algorithms.

Reconstruction is a very broad problem, and we would be trying to implement the algorithm for images with a significant pixel-data missing. We plan to generate this data randomly, by ourselves.

References

[1] D. Merget P. Tiefenbacher, V. Bogischef and G. Rigoll. Subjective and objective evaluation of image inpainting quality. *Proc. ICIP*, 2015.

[2] David Tschumperle and Rachid Deriche. Vector-valued image regularization with pdes: A common framework for different applications. *IEEE Trans. Pattern Anal. Mach. Intell.*, 27(4):506–517, April 2005.