Mathematical Methods for Image Synthesis
Readings/Project 6

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In this class you will need to do one project and one article reading that will be presented at the end of the semester. If you take a project with me, you will need to take a reading from Nicolas's part, and conversely, if you take the reading with me, you'll need to take a project from Nicolas. A project is expected to take between 15 and 30 hours, and can be implemented with any *imperative* programming language you want. Readings go much more in-depth than the class lectures, and are thus more complex.

1   Readings 6 - Lectures 11-12

- Robust Surface Reconstruction via Dictionary Learning, S. Xiong, J. Zhang, J. Zheng, J. Cai, L. Liu, ACM TOG, 2014 `http://staff.ustc.edu.cn/~juyong/DictionaryRecon.html`

- Sparse Modeling of Intrinsic Correspondences, J. Pokrass, AM Bronstein, MM Bronstein, P. Sprechmann, G. Sapiro, CGF 2013 `http://vista.eng.tau.ac.il/publications/PokBroBroSprSapEG.pdf`

- I. Ramirez, P. Sprechmann, and G. Sapiro, "Classification and clustering via dictionary learning with structured incoherence," (CVPR), 2010 `http://ieeexplore.ieee.org/document/5539964/`

2   Project 6

In this project we will synthesize textures based on dictionary learning. The principle for this approach is described in [P08].

- Learn a texture directly from an exemplar, either by encoding all patches first and then by building an ad-hoc dictionary, compare both approaches

- Experiment the texture synthesis using man-made dictionaries such as a dictionary containing strokes. Observe and analyze the effects on the resulting texture.

Assignment   your are allowed a library for reading/writing images. However, you have to implement the chosen dictionary learning and sparse decomposition, no library must be used at this stage. A project report as well as the code should be delivered.

References

[P08] *Sparse Modeling of Textures*, G. Peyré, JMIV 2008