

Mathematical Methods for Image Synthesis - Reading/Project 3

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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 Julie's part, and conversely, if you take the reading with me, you'll need to take a project from Julie. 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 – weeks 3-4

You can choose between these 3 options :

- Gradient-Domain Path Tracing, Kettunen et al. 2015
https://mediatech.aalto.fi/publications/graphics/GPT/kettunen2015siggraph_paper.pdf
- The Visual Microphone : Passive Recovery of Sound from Video, Davis et al., 2014 <http://people.csail.mit.edu/mrub/VisualMic/>
- A Neural Algorithm of Artistic Style, Gatys et al. 2015
<https://arxiv.org/pdf/1508.06576v2.pdf>

2 Project

This project consists in the implementation of 3 papers which are each easy to code. If you paid attention to the lecture, this should take less time than the other projects. You will need to implement :

- Poisson Image Editing. We only require the functionality of this paper, and not necessarily the exact implementation. However, you should implement

and show a comparison of solving the problem via a multi-scale approach (not necessarily a full multigrid, but just a coarse-to-fine resolution) and a conjugate gradient.

- Image inpainting using texture synthesis. Again, we do not require an exact reimplementation of the image-by-number approach of “Image Analogies” but the functionalities of a texture-synthesis based image inpainting which principles we have seen in class.
- Seam Carving. Similarly, we just want basic functionalities for content-aware resizing. For instance, it is fine if a simple edge-detector is used or if the image can be resized only in one direction.