

Phase-based ghosting removal in image-based rendering

Adrien Bousseau and George Drettakis, REVES – INRIA Sophia Antipolis
adrien.bousseau@inria.fr, <http://www-sop.inria.fr/members/Adrien.Bousseau/>
george.drettakis@inria.fr, <http://www-sop.inria.fr/members/George.Drettakis/>

Context and Research Goal

Image interpolation is the process of generating intermediate images between two or more similar images. Problems related to image interpolation arise in many computer graphics applications, such as image morphing [1], video re-timing [2] (Figure 1), image-based rendering [3,4]. Most interpolation methods rely on computer vision algorithms to estimate correspondences between the images to interpolate, such as optical flow in video re-timing or multi-view stereo in image-based rendering. Unfortunately, such vision algorithms are prone to errors, especially in the presence of large displacement between the images. These errors yield misalignment in the interpolated images, often called *ghosting artifacts* (Figure 2). The goal of this project is to correct for these artifacts in the context of image-based rendering.



Figure 1: interpolation between image A and B, after [2]

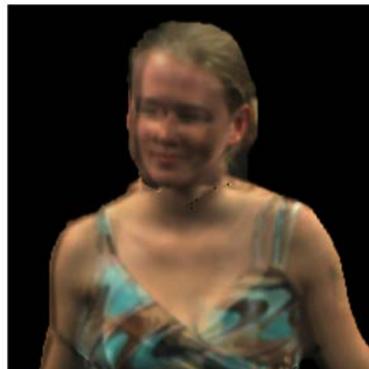


Figure 2: ghosting artifact in image-based rendering. The shirt and face appear blurry because of small misalignment between the interpolated images, after [3]

Approach

Recent work on *motion magnification* [5] has shown the potential of phase analysis to process motion without the need for computing explicit correspondence between video frames. The intuition behind this work is that the phase of an image encodes information about the image edges, so that modifying the phase can give the illusion of moving the edges, as illustrated in the seminal paper on *motion without movement* [6]. The goal of this internship will be to explore the use of phase manipulation for removing ghosting artifacts in image-based rendering [4] and image interpolation.

Requirements

The successful candidate should have taken courses in computer graphics and/or computer vision.

Situation

The internship will take place at INRIA Sophia Antipolis, on the beautiful French riviera. INRIA provides a student stipend/salary of 1100 euros per month to cover living expenses.

The project will start in March 2014, for 5 to 6 months.



References

[1] View Morphing

Steve Seitz, Chuck Dyer

Siggraph 1996

<http://homes.cs.washington.edu/~seitz/vmorph/vmorph.htm>

[2] Moving Gradient: A Path-Based Method for Plausible Image Interpolation

Dhruv Mahajan, Fu-Chung Huang, Wojciech Matusik, Ravi Ramamoorthi, Peter Belhumeur

Siggraph 2009

<http://people.csail.mit.edu/wojciech/MovingGradients/>

[3] Floating Texture

Martin Eisemann, Bert De Decker, Marcus Magnor, Philippe Bekaert, Edilson de Aguiar, Naveed Ahmed, Christian Theobalt, and Anita Sellent

Eurographics 2008

<http://graphics.tu-bs.de/projects/floating-textures/>

[4] Depth Synthesis and Local Warps for Plausible Image-based Navigation

Gaurav Chaurasia, Sylvain Duchêne, Olga Sorkine-Hornung, George Drettakis

ACM Transactions on Graphics 2013

<http://www-sop.inria.fr/reves/Basilic/2013/CDS13/>

[5] Phase-Based Video Motion Processing

Neal Wadhwa, Michael Rubinstein, Fredo Durand, William T. Freeman

Siggraph 2013

<http://people.csail.mit.edu/nwadhwa/phase-video/>

[6] Motion Without Movement

William T. Freeman, Edward H. Adelson and David J. Heeger

Siggraph 1991

http://www.cse.yorku.ca/~kosta/Motion_Without_Movement/Motion_Without_Movement.html

<http://dl.acm.org/citation.cfm?id=122721>