

Title: High-Quality View-Dependent Texture Mapping

Masters or Engineering Internship (6 months)

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Objectives and Methodology

Since its initial inception (Debevec et al 96), view-dependent texturing has allowed very convincing renderings of real-scenes, captured with only a small set of photographs from different views, resulting in images of a very high level of realism. Variants and follow-up methods have been applied to many different kinds of objects, ranging from buildings (Reche et al 2003) to trees (Reche et al 2004). A closely related approach is Unstructured Lumigraph Rendering (Buehler et al 2001), which is a purely image-based approach, and thus much flexible.



Left: synthetic viewpoint (not in original photos), built using 12 input photographs of the building (Debevec et al 96). Right: Tree model, rendered using view-dependent texturing of billboards to represent a real tree (Reche et al 2004).

The common problem of all these methods is that, when rendering, they simply try to “mix colours” from, for example, the three closest views to the current viewing position. Recent advances in image-warping techniques (Gal et al. 2006, Wang et al. 2008), provide an interesting framework which could allow us to achieve much better results, by applying appropriate warping techniques to avoid ghosting and other common artefacts. In addition, we could use texture synthesis (Wei and Levoy 2001) to provide missing detail in regions of the input images where this is necessary. In this internship we will first develop an image-warping variant of the unstructured lumigraph and then investigate improvements using texture-synthesis techniques.

Requirements

The successful candidate should have taken courses in computer graphics and have experience in computer graphics programming, with knowledge of OpenGL or DirectX, and some experience with shading languages such as GLSL/HLSL/Cg. INRIA provides a student stipend for living expenses.

References

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Alex Reche, Ignacio Martin, George Drettakis, *Volumetric Reconstruction and Interactive Rendering of Trees from Photographs*, ACM Transactions on Graphics (SIGGRAPH Conference Proceedings), Volume 23, Number 3 - July 2004 <http://www-sop.inria.fr/reves/Basilic/2004/RMD04/>

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