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Keynote

Gambling in the Depths of High-Dimensional Spaces

Michael Betancourt

Abstract

Integration is a ubiquitous mathematical tool, and modern applications require integration across increasingly higher dimensional spaces. Unfortunately most of the intuitions that we take for granted in our low-dimensional, routine experiences don't persist to these high-dimensional spaces which makes the development of scalable computational methodologies and algorithms all the more challenging. In this talk I will discuss the counterintuitive behavior of high-dimensional spaces and the consequences for statistical computation, in particular the unique advantages of Hamiltonian Monte Carlo.

Short Biography

Michael Betancourt is the principal research scientist with Symplectomorphic, LLC where he develops theoretical and methodological tools to support practical Bayesian inference. He is also a core developer of Stan, where he implements and tests these tools. In addition to hosting tutorials and workshops on Bayesian inference with Stan he also collaborates on analyses in epidemiology, pharmacology, and physics, amongst others. Before moving into statistics, Michael earned a B.S. from the California Institute of Technology and a Ph.D. from the Massachusetts Institute of Technology, both in physics.

Keynote

Interactive and Off-Line Path Tracing with RenderMan

Per Christensen

Abstract

RenderMan is a modern extensible and programmable path tracer with many features essential to handling the fiercely complex scenes in movie production. RenderMan has traditionally been focused on off-line rendering of high-quality final movie frames, but has recently been overhauled, targeting interactive rendering during modeling, texturing, lay-out, animation, and lighting. Path tracing has gone from being a pure research technique to now being the main rendering technique in many production renderers. In this talk Per Christensen will describe the use of path tracing for animated movies and visual effects, and will also describe advanced path tracing techniques such as bidirectional path tracing, progressive photon mapping, and vertex connection and merging (VCM). He will also touch upon current rendering projects at Pixar such as mixed CPU and GPU rendering and high-dimensional sample sequences specifically targeted at path tracing.

Short Biography

Per Christensen is a principal software developer in Pixar's RenderMan group in Seattle. His main research interests are efficient ray tracing and global illumination in very complex scenes. He received an M.Sc. degree in electrical engineering from the Technical University of Denmark and a Ph.D. in computer science from the University of Washington. Prior to joining Pixar, he worked at ILM in San Rafael, Mental Images in Berlin, and Square USA in Honolulu. He has movie credits in Pixar movies since "Finding Nemo", and has received an Academy Award for his contributions to efficient point-based global illumination and ambient occlusion.