Netalee Efrat and Meirav Galun

SIGGRAPH Dry-Runs

Abstract:

This Thursday we will have two SIGGRAPH rehearsal talks in the Vision Seminar, one by Netalee Efrat and one by Meirav Galun. Abstracts are below. Each talk will be about 15 minutes (with NO interruptions), followed by 10 minutes feedback.

Talk 1 (Netalee Efrat): Cinema 3D: Large scale automultiscopic display

While 3D movies are gaining popularity, viewers in a 3D cinema still need to wear cumbersome glasses in order to enjoy them. Automultiscopic displays provide a better alternative to the display of 3D content, as they present multiple angular images of the same scene without the need for special eyewear. However, automultiscopic displays cannot be directly implemented in a wide cinema setting due to variants of two main problems: (i) The range of angles at which the screen is observed in a large cinema is usually very wide, and there is an unavoidable tradeoff between the range of angular images supported by the display and its spatial or angular resolutions. (ii) Parallax is usually observed only when a viewer is positioned at a limited range of distances from the screen. This work proposes a new display concept, which supports automultiscopic content in a wide cinema setting. It builds on the typical structure of cinemas, such as the fixed seat positions and the fact that different rows are located on a slope at different heights. Rather than attempting to display many angular images spanning the full range of viewing angles in a wide cinema, our design only displays the narrow angular range observed within the limited width of a single seat. The same narrow range content is then replicated to all rows and seats in the cinema. To achieve this, it uses an optical construction based on two sets of parallax barriers, or lenslets, placed in front of a standard screen. This paper derives the geometry of such a display, analyzes its limitations, and demonstrates a proof-of-concept prototype.

*Joint work with Piotr Didyk, Mike Foshey, Wojciech Matusik, Anat Levin

Talk 2 (Meirav Galun): Accelerated Quadratic Proxy for Geometric Optimization

We present the Accelerated Quadratic Proxy (AQP) - a simple first order algorithm for the optimization of geometric energies defined over triangular and tetrahedral meshes. The main pitfall encountered in the optimization of geometric energies is slow convergence. We observe that this slowness is in large part due to a Laplacian-like term existing in these energies. Consequently, we suggest to exploit the underlined structure of the energy and to locally use a quadratic polynomial proxy, whose Hessian is taken to be the Laplacian. This improves stability and convergence, but more importantly allows incorporating acceleration in an almost universal way, that is independent of mesh size and of the specific energy considered. Experiments with AQP show it is rather insensitive to mesh resolution and requires a nearly constant number of iterations to converge; this is in strong contrast to other popular optimization techniques used today such as Accelerated Gradient Descent and Quasi-Newton methods, e.g., L-BFGS. We have tested AQP for mesh deformation in 2D and 3D as well as for surface parameterization, and found it to provide a considerable speedup over common baseline techniques.

*Joint work with Shahar Kovalsky and Yaron Lipman