2019 Cover Image

Ballet

"Ballet" by Kai Lawonn and Tobias Günther.

Description: This image shows a triangulation of three ballet dancers at sunset. The stylization was obtained with the interactive and user-centered image triangulation algorithm. In the shown image, the degree of abstraction increases from left to right as the transition between linear gradients and constant colors, while fading out a visualization of the underlying triangulation.

The art of representing images with triangles is known as image triangulation, which purposefully uses abstraction and simplification to guide the viewer's attention. The manual creation of image triangulations is tedious and thus several tools have been developed in the past that assist in the placement of vertices by means of image feature detection and subsequent Delaunay triangulation.

With the presented approach, the authors formulate the image triangulation process as an optimization problem. They provide an interactive system that optimizes the vertex locations of an image triangulation to reduce the root mean squared approximation error to the given image. Along the way, the triangulation is incrementally refined by splitting triangles until certain refinement criteria are met. Thereby, the calculation of the energy gradients is expensive and thus they proposed an efficient rasterization-based GPU implementation. To ensure that artists have control over details, the system offers a number of direct and indirect editing tools that split, collapse and re-triangulate selected parts of the image. For final display, the authors provide a set of rendering styles, including constant colors, linear gradients, tonal art maps and textures. The authors believe that their tool can serve as platform to explore other stylizations.

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Tobias Günther joined the Computer Graphics Laboratory (CGL) at the ETH Zürich as a postdoctoral researcher in 2016. He received his M.Sc. in Computer Science in 2013 and his Ph.D. in 2016 both from the University of Magdeburg. His research interests include scientific visualization, progressive light transport and real-time rendering.

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