Shape Mapping and its Applications in Graphics and Visual Computing

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Abstract:

With the rapid advancement of 3D scanning technologies, high-fidelity geometric datasets of huge size have been acquired through hardware devices. A fundamental and challenging problem is how to build the lowest distorted (surface and volume) mapping between different objects of arbitrarily complicated topological types. Inter-shape mapping, or more specifically, finding non-rigid and stretch-minimized correspondence between two given shapes is a very powerful enabling tool for various applications in digital entertainment, geometric modeling, simulation, vision, medical imaging, and visualization, etc. To seek effective solutions to this fundamental and important problem, we have articulated and developed a general and powerful shape mapping paradigm for objects in different dimensions (from 1D curves, 2D surfaces, to 3D volumetric data) with arbitrary topologies. Compared with existing methods, our work offers an integrated better solution to the inter-shape correspondence problem. We explore great potential of our mapping framework through various valuable applications such as deformation analysis, animation morphing, and information transfer, shape comparison, (re) meshing, texture synthesis, physics-based modeling, and so on. Furthermore, we envision its broader application scopes including scientific simulation, digital medicine, content-driven information retrieval, virtual environments, etc.

Bio:

Xin Li is an assistant Professor in Department of Electrical & Computer Engineering and Center for Computation & Technology. He received the Ph.D. (2008) and M.S. (2005) in Computer Science at Stony Brook University (SUNY), and the B.S. (2003) in Computer Science from University of Science and Technology of China. His research interests include visual computing, computer graphics, geometric modeling and processing, and visualization. His recent work includes curve analysis/comparison, general 3D shape (surface and volumetric data) mapping, and their applications in broad areas of graphics, vision, visualization, physical simulation, and CAGD.
For more information about Xin Li and his research, please visit http://www.ece.lsu.edu/xinli