

Title: DMESH: A Structure-Preserving Diffusion Model for 3D Mesh Denoising

Presenter: Sanghoon Lee, Yonsei University

Abstract: Denoising diffusion models have shown a powerful capacity for generating high-quality image samples by progressively removing noise. Inspired by this, we present a diffusion-based mesh denoiser that progressively removes noise from mesh. In general, the iterative algorithm of diffusion models attempts to manipulate the overall structure and fine details of target meshes simultaneously. For this reason, it is difficult to apply the diffusion process to a mesh denoising task that removes artifacts while maintaining a structure. To address this, we formulate a structure-preserving diffusion process. Instead of diffusing the mesh vertices to be distributed as zero-centered isotopic Gaussian distribution, we diffuse each vertex into a specific noise distribution, in which the entire structure can be

preserved. In addition, we propose a topology-agnostic mesh diffusion model by projecting the vertex into multiple 2-D viewpoints to efficiently learn the diffusion using a deep network. This enables the proposed method to learn the diffusion of arbitrary meshes that have an irregular topology. Finally, the

denoised mesh can be obtained via refinement based on 2-D projections obtained from reverse diffusion. Through extensive experiments, we demonstrate that our method outperforms the state-of-the-art mesh denoising methods in both quantitative and qualitative evaluations.

Bio



Sanghoon Lee received the B.S. in Electronic Engineering from Yonsei – University in 1989 and the M.S. in Electronic Engineering from KAIST in 1991. From 1991 to 1996, he worked for Korea Telecom. He received his Ph.D. in Electronic Engineering from the University of Texas at Austin in 2000. From 1999 to 2002, he worked for Lucent Technologies. In March 2003, he joined the faculty of the Department of Electrical and Electronics Engineering, Yonsei University, Seoul, Korea, where he is a Full Professor. He has been a Chair of the IEEE P3333.1 Quality

Assessment Working Group (2011-), a Deputy Editor-in-Chief of the IEEE Trans. Multimedia (2024-), a Member of the Senior Editorial Board of the IEEE Signal Processing Magazine (2022-), and a BoG member in Asia-Pacific Signal and Information Processing Association (APSIPA).