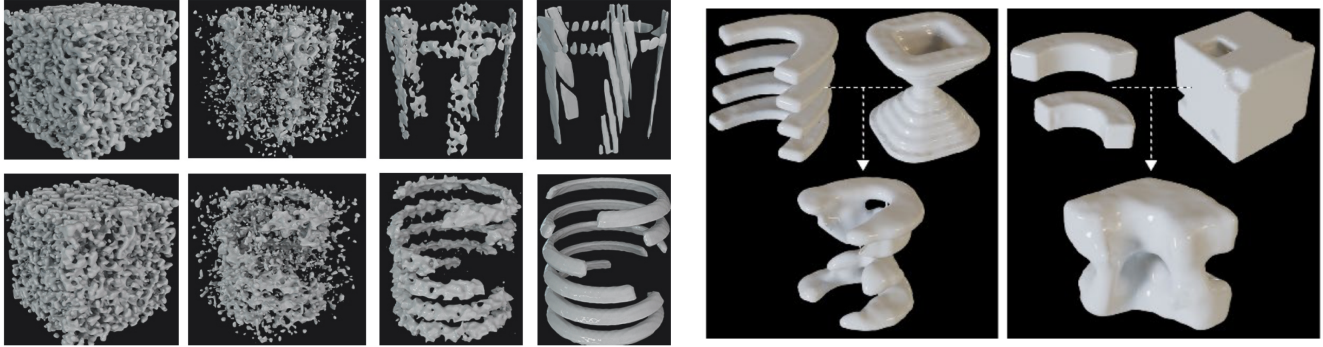


Artificial Architectural Intelligence: Generating 3D Geometries with Diffusion Models



Generative deep learning with diffusion models attracted high attention in the field of image generation. Together with our colleagues from the Institute of Architecture and Media, in the context of a Graz Center for Machine Learning (GraML) collaboration, we have recently developed prototypes which bring a diffusion model into the third dimension, with the purpose of generating architectural geometries for conceptual design [1,2]. Our early works suggest future options to develop generative 3D deep learning tools for architectural design. In this project, we will explore novel geometry-informed input data representations and natural language driven model conditioning.

[1] A. Sebestyen, O. Özdenizci, R. Legenstein, U. Hirschberg, “Generating conceptual architectural 3D geometries with denoising diffusion models”, Proceedings of the 41st Education and Research in Computer Aided Architectural Design in Europe (eCAADe) Conference 2023.

[2] A. Sebestyen, O. Özdenizci, R. Legenstein, U. Hirschberg, “AI-Infused Design: Merging parametric models for architectural design”, Proceedings of the 41st Education and Research in Computer Aided Architectural Design in Europe (eCAADe) Conference 2024.

Goals & Tasks

- Review of the state-of-the-art on 3D generative diffusion models.
- Experimenting with diffusion models using PyTorch and the NVIDIA Kaolin Library.
- Developing novel conditioning approaches for diffusion models on custom datasets.

Contact

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Qualifications

- Interest in generative deep learning.
- Experience with Python and PyTorch deep learning library.
- Registered to one of the following:
 - ☐ Bachelor Thesis
 - ☒ Seminar Project
 - ☒ Master Thesis

