Creation of 3D Structures from 2D Images Using Artificial Intelligenc

iPAT
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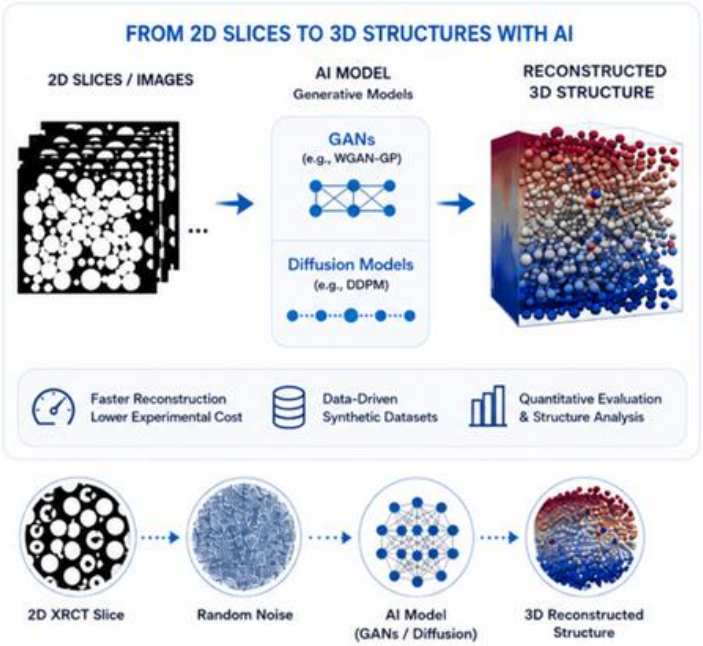
Studies- and master thesis

Powders and particle systems are often characterized by X-ray computed tomography (XRCT), which provides detailed 3D structural information from stacks of 2D slices. However, XRCT measurements and reconstruction are time-consuming and expensive. In this project, artificial intelligence is used to generate realistic 3D particle structures from representative 2D images. The goal is to develop data-driven methods that accelerate reconstruction and reduce experimental effort.



What You Will Do:

- Contribute to the development of an AI framework for 2D-to-3D reconstruction
- Prepare and preprocess experimental or simulated datasets
- Train and evaluate generative models for 3D structure generation
- Compare generated structures with reference data using quantitative metrics

Methods & Tools

- Deep learning and generative AI
- CNNs, GANs / WGAN-GP, diffusion models
- Image processing and segmentation

Requirements:

- Interest in AI, image analysis, and particle technology
- Basic Python programming skills
- Prior knowledge of machine learning is helpful

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