

3D Generative Modeling: How it Works and Where it's Used

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Abstract

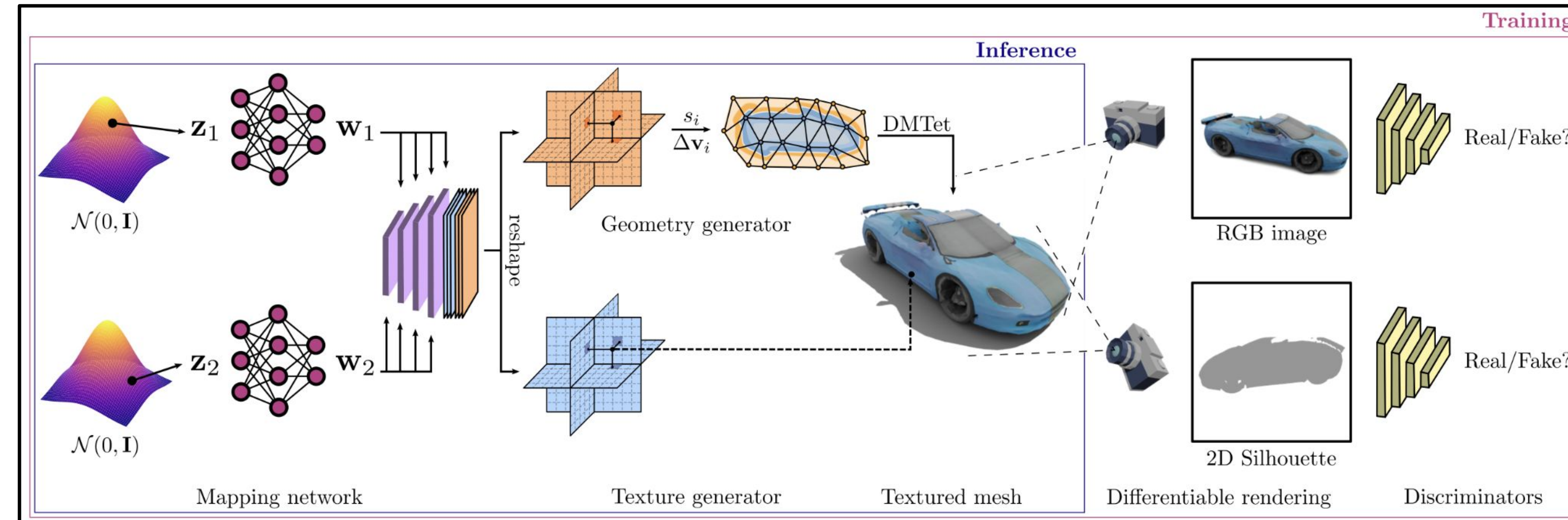
The usage of Artificial Intelligence (AI) in real-world workflows is very quickly becoming the norm, driven by tools such as ChatGPT and Gemini. Among the many areas of generative AI, one such form waiting to be incorporated into work-flows is 3D generative modeling, which aims to create a 3D mesh based off of a user's prompt, or from flat 2D images. In this poster, we'll be going over what 3D generative AI is, how it functions, and how it can be incorporated into real-world workflows across various industries, as well as briefly describe how this form of generative AI works.

What it is

- AI-driven technology that creates **3D meshes**
- Generated from:
 - Text-prompts
 - Data sketches
 - 2D images

Example Models

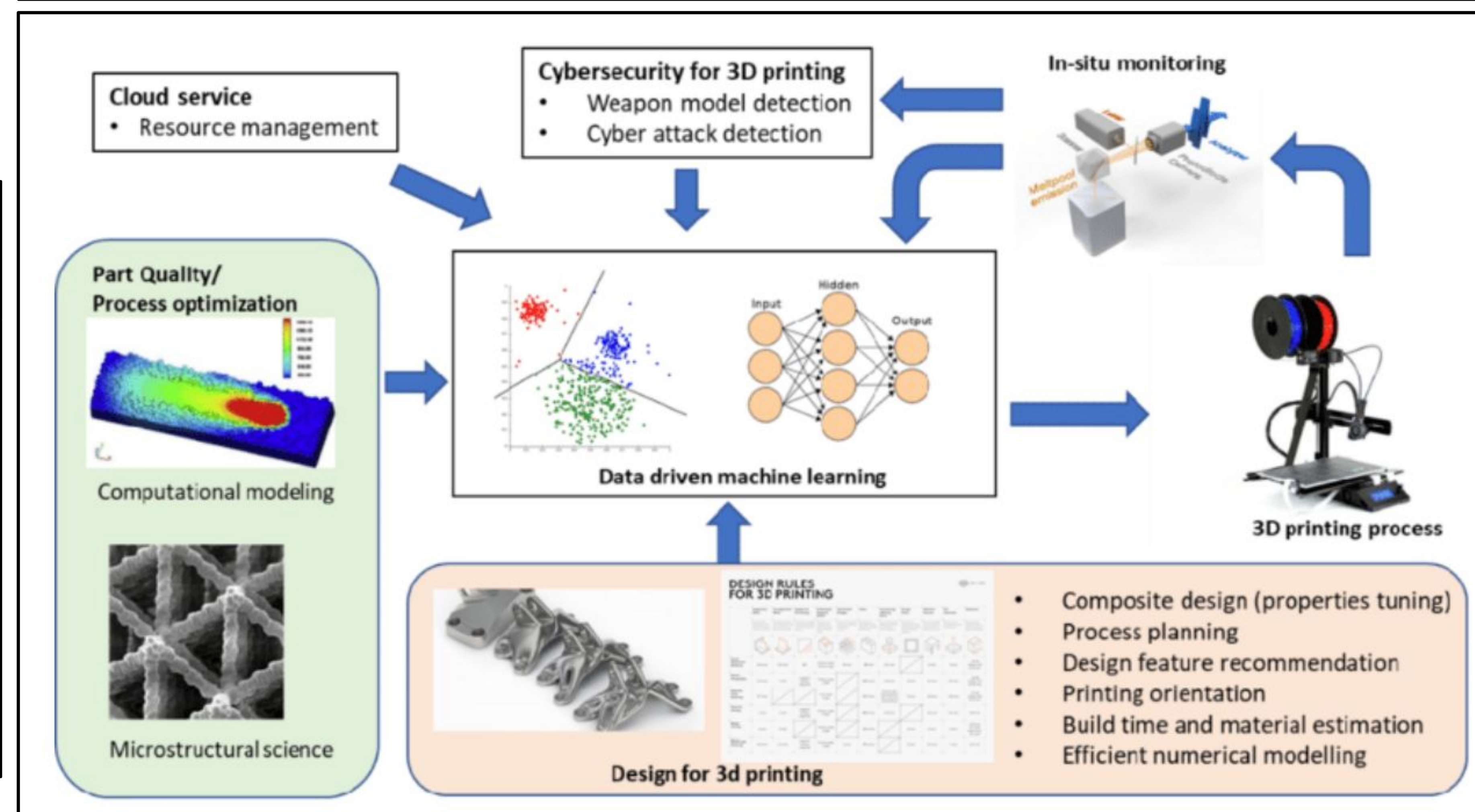
- Meshy
- Tripo AI
- 3DALL-E
- Make-a-Scene
- CLIP-Sculptor
- Dream Fusion
- Point-E



Credit: GET3D: A Generative Model of High Quality 3D Textured Shapes Learned from Images (2022)

What's happening (step by step)?

1. Make a random **noise**
 - a. Think of noise as a random set of numbers that act as the “code” of the object.
2. Use a **Neural Network** to turn the noise into a 3D shape.
 - a. A Neural Network is a system that learns patterns and can transform inputs (like random noise) into structured outputs (like 3D objects)
3. Render the 3D shape into 2D images from random camera angles
4. Compare those images to real (or target) images to check how realistic they are
5. Adjust the model based off those differences and repeat the process



Credit: A Conceptual Framework for AI-Enhanced 3D Printing in Architectural Component Design (2021)

Usage in the World

3D Generative modeling has already seen use in numerous different workflows. Some of which include:

- Mechanical engineering
- 3D printing
- Filmmaking
- Video game development
- Education and training
- Healthcare and biotechnology
- Manufacturing

Conclusion/reflection

With the uprising of AI, we have seen revolutionary change in real-world workflows—both positive and negative. Regardless, AI has proven to be a highly valuable tool in 3D workflows across the board.

While generative modeling still has room for optimization, and the ethical implications of its use in creative workspaces (like art, or filmmaking) remain under debate, the usefulness and versatility of it cannot be denied.

References

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