Magic3D : High-Resolution Text-to-3D Content Creation

Chen-Hsuan Lin* Jun Gao* Luming Tang* Towaki Takikawa* Xiaohui Zeng* Xun Huang Karsten Kreis Sanja Fidler† Ming-Yu Liu† Tsung-Yi Lin

*†: equal contributions

NVIDIA

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Overview

Magic3D is a new text-to-3D content creation tool that generates high-quality 3D meshes.

We provide users with new ways to control 3D synthesis, opening up new avenues to various creative applications.

Major benefits

- ✏️ **Fast** (40 minutes, **2× faster** than DreamFusion[1])
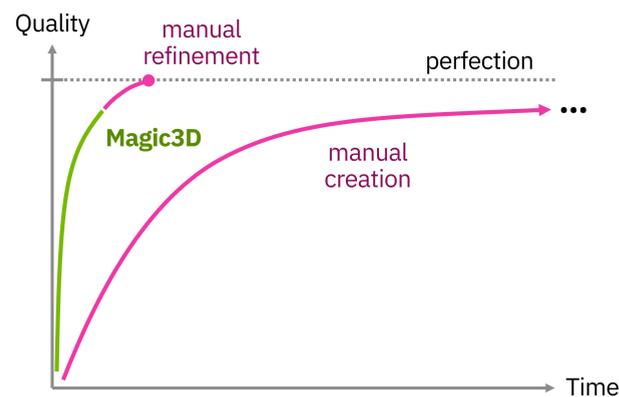- 🖌️ Uses **high-resolution** (512 × 512) diffusion priors

Potential applications

- 🎥 Movie/game production
- 🕶️ Metaverse
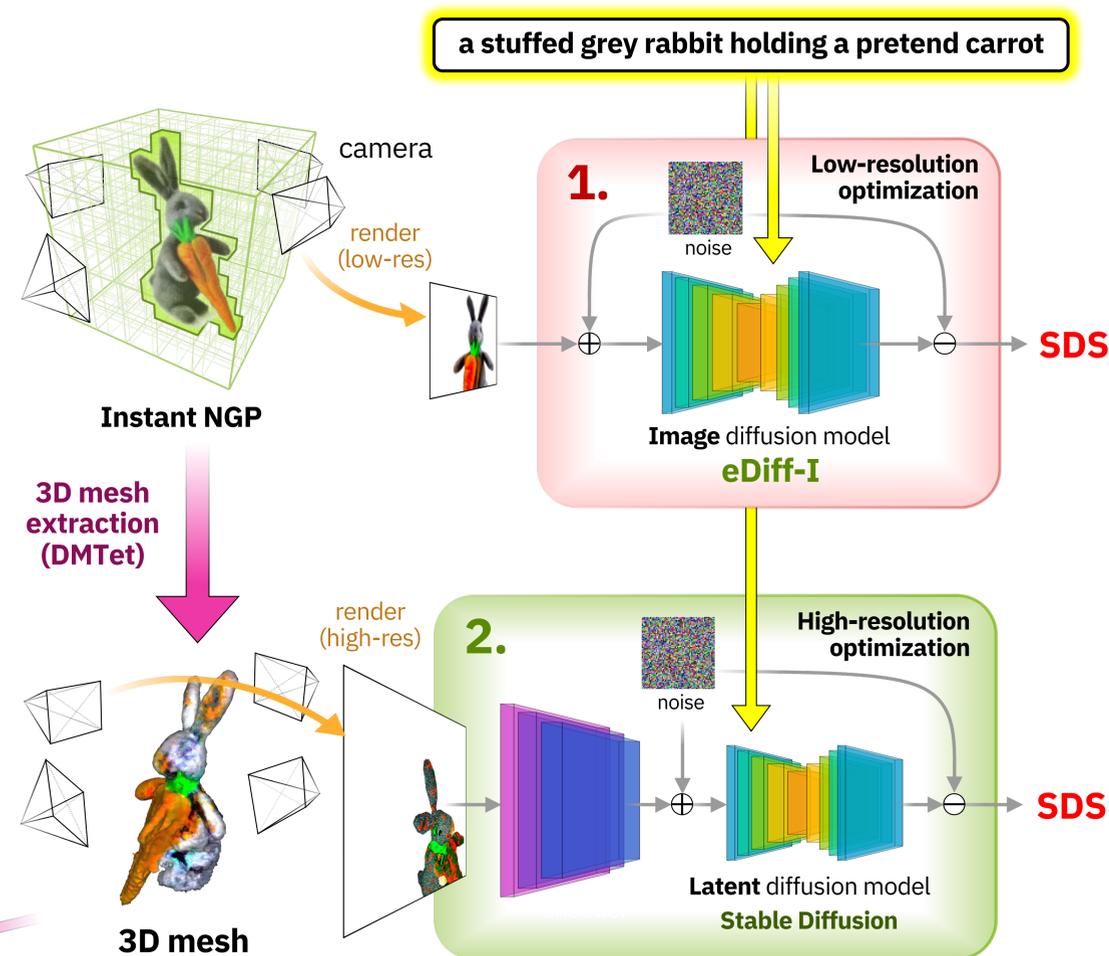- 🤖 Robot/self-driving simulation
- 🔮 3D designs

Our goal

- 💚 Turbocharge expert 3D artists
- 🧑‍🎨 Facilitate 3D content creation for novices

High-resolution
3D mesh

[1] Poole et al. "DreamFusion: Text-to-3D using 2D Diffusion." ICLR 2023.

Approach

a stuffed grey rabbit holding a pretend carrot

camera
render (low-res)

Instant NGP

3D mesh extraction (DMTet)

render (high-res)

3D mesh

1. Low-resolution optimization
noise → **Image** diffusion model **eDiff-I** → **SDS**

2. High-resolution optimization
noise → **Latent** diffusion model **Stable Diffusion** → **SDS**

We optimize the 3D content over pretrained text-to-image diffusion models with SDS (Score Distillation Sampling) loss in a coarse-to-fine fashion, with the following procedure:

1. Use a **low-resolution** image diffusion prior and optimize a neural field representation to obtain the coarse model.

2. Extract a textured 3D mesh from the density/color neural fields.

3. Fine-tune the mesh with a **high-resolution** latent diffusion model.
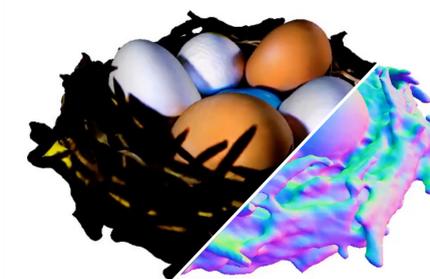
Results

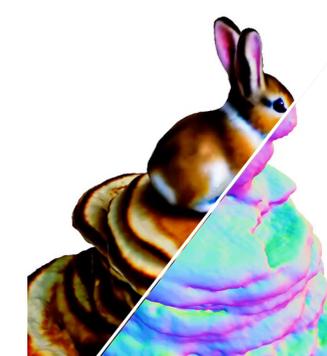Neuschwanstein castle, aerial view.

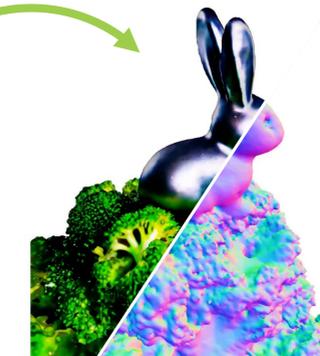A car made out of sushi.

An imperial state crown of England.

A nest with a few white eggs and one golden egg.

An iguana holding a balloon.

continue optimization with modified prompt

A baby bunny sitting on top of a stack of pancakes.

A metal bunny sitting on top of a stack of broccoli.

A sphinx sitting on top of a stack of chocolate cookies.