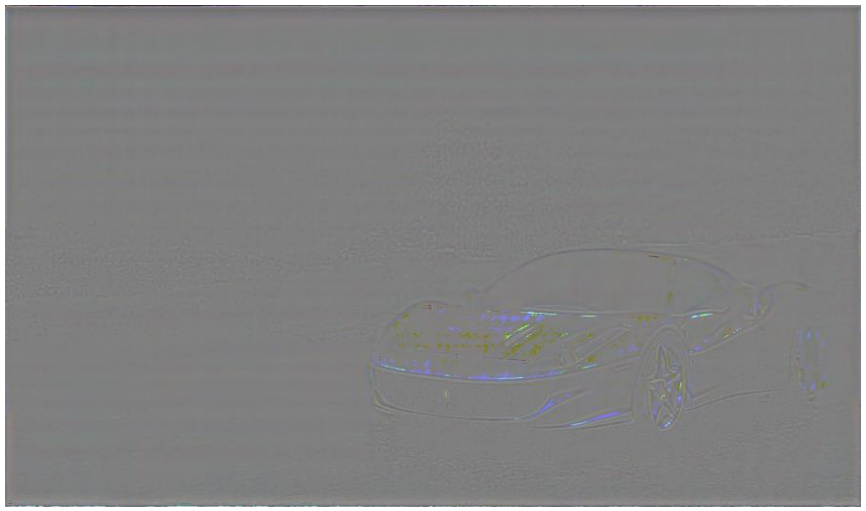
Text2Hologram:
Describe Your Hologram Here



Any description?

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OUTLINE

- ***Introduction***
- ***Pipeline and related works***
- ***Accessibility***
- ***Outcomes***
- ***Discussion***

Introduction

Generate pictures from text

An astronaut riding a horse in photorealistic style.

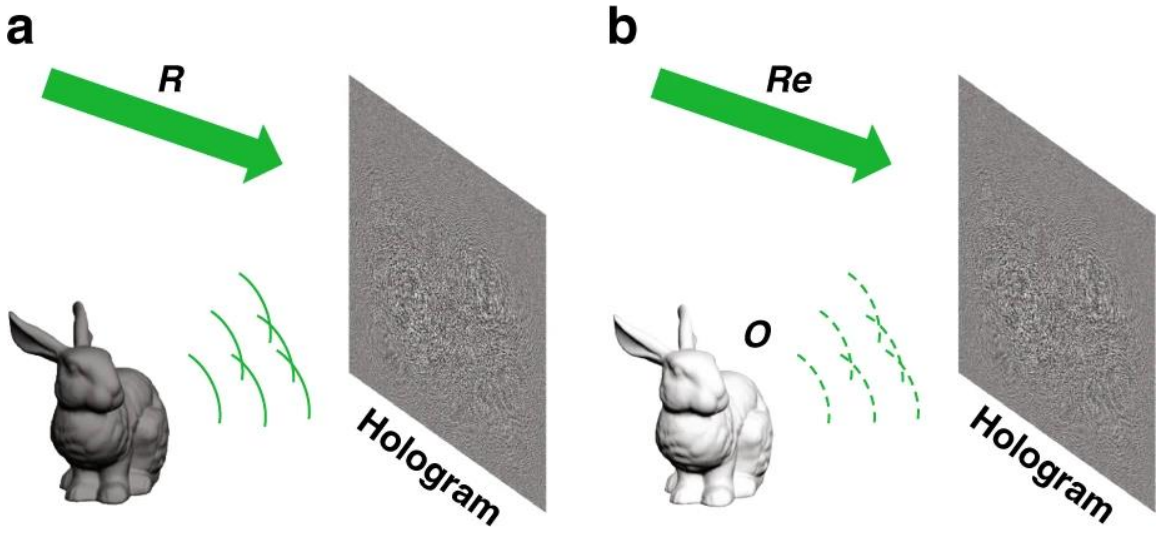
* Image generated using DALL·E 2 by OpenAI, sourced from https://openai.com/dall-e-2

CGH: Computer Generated Holography

"holos" (whole)

"graphe" (writing)

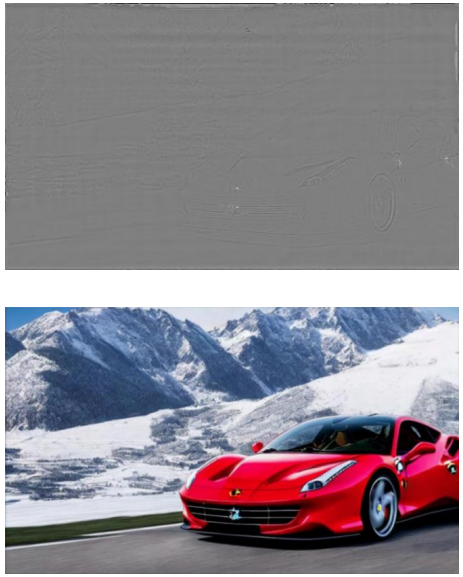
amplitude
phase
of the target



Pi, D., Liu, J. & Wang, Y. Review of computer-generated hologram algorithms for color dynamic holographic three-dimensional display. Light Sci Appl 11, 231 (2022) https://doi.org/10.1038/s41377-022-00916-3

What Are We Aiming For?

A Ferrari sports car running on snowy mountain.



Bonfire burning in the forest.

Any description you like…

Pipeline and related works

OBJECTIVES

- ***To develop a text-to-hologram pipeline***
- ***To be accessible to a broader audience***

Pipeline Overview

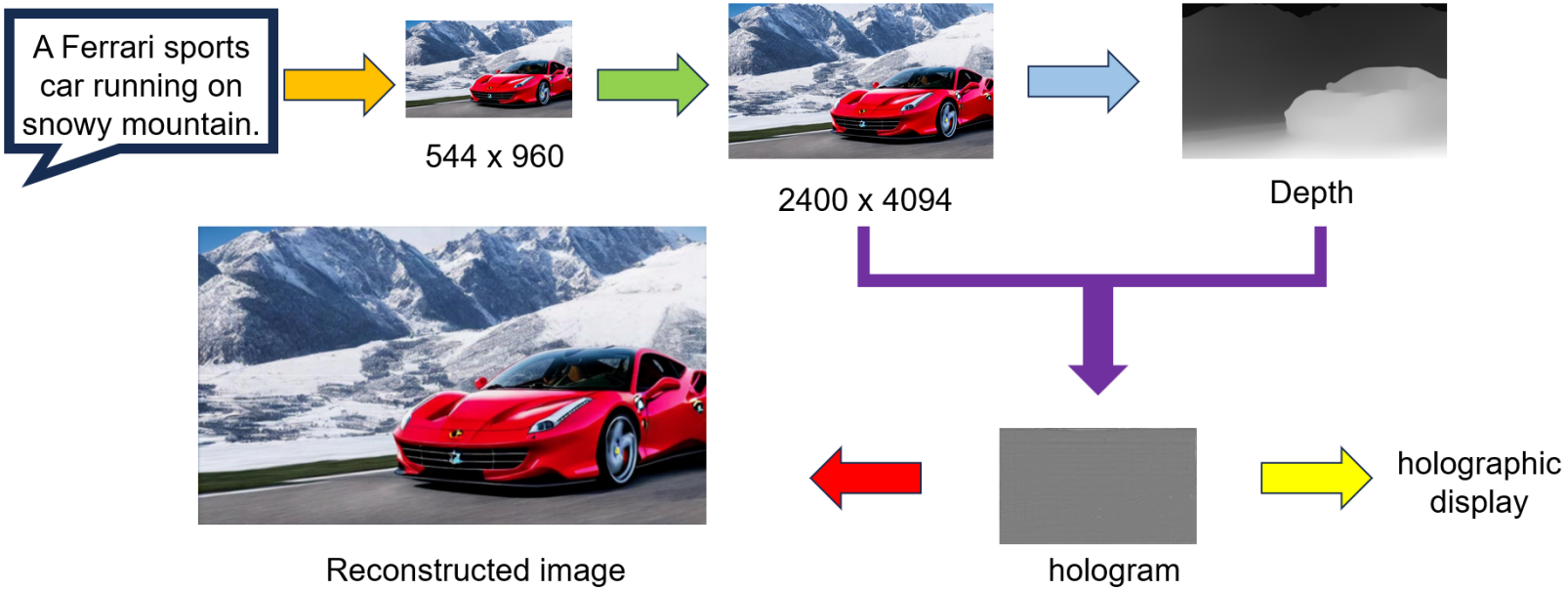
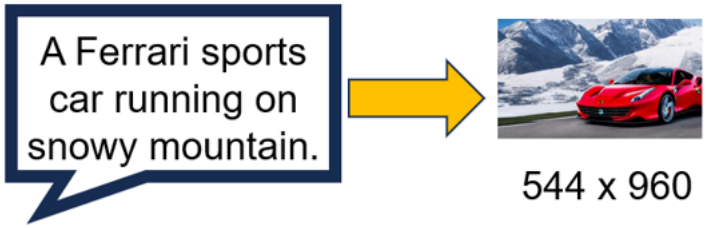
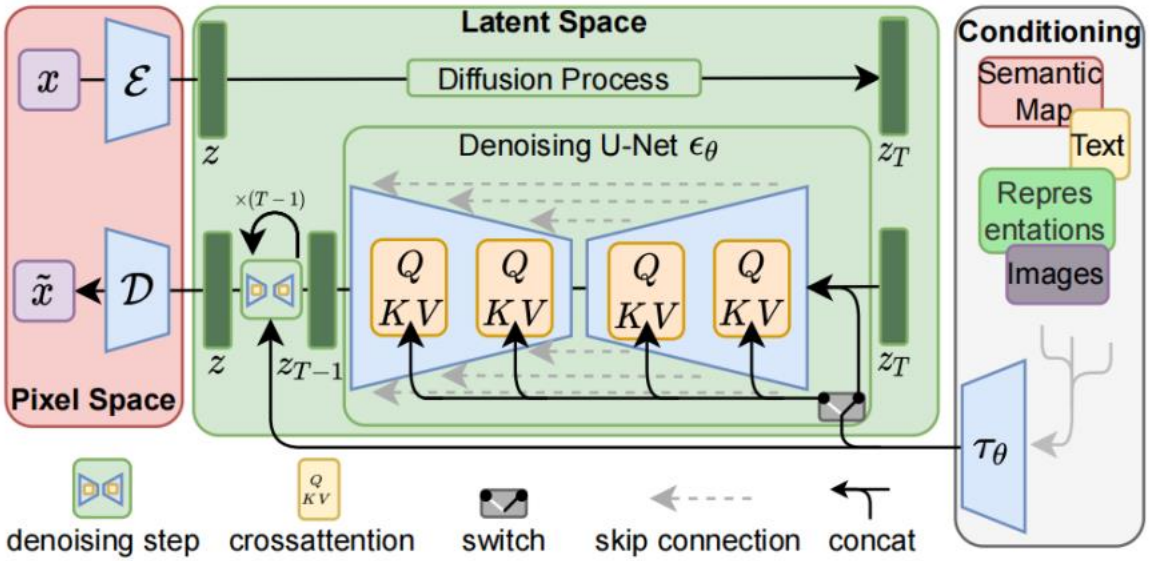


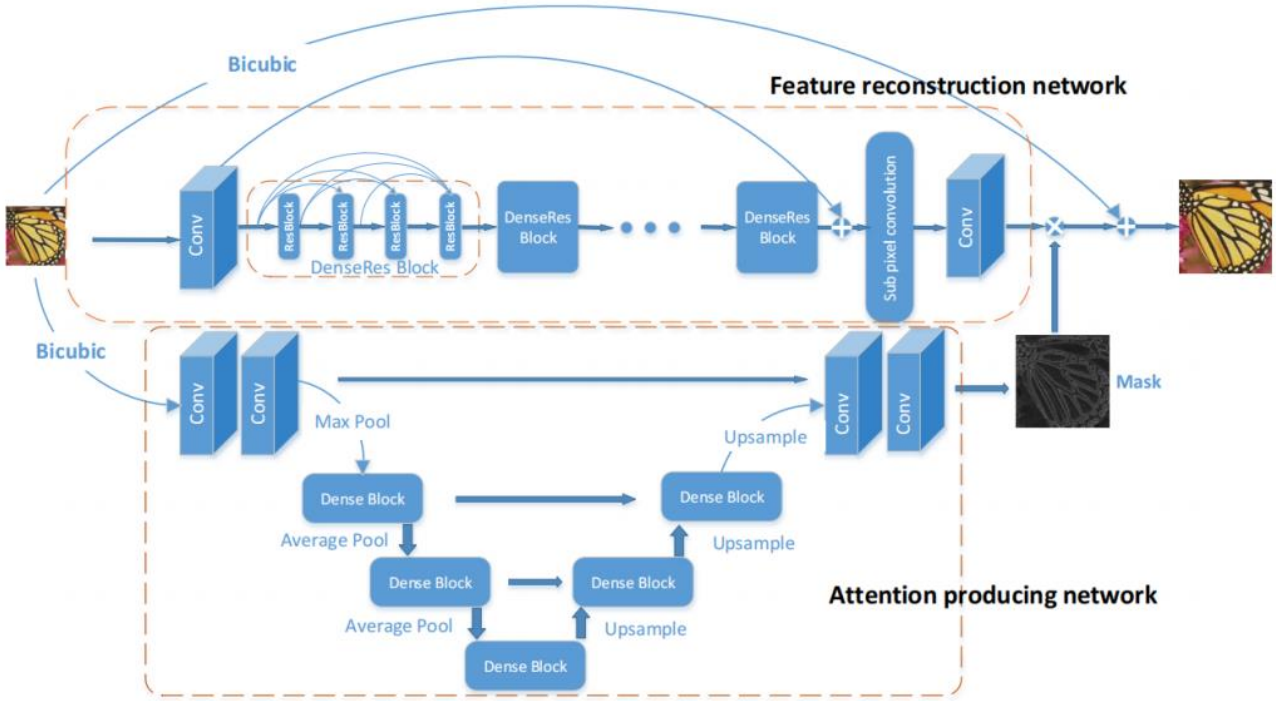
Image generation





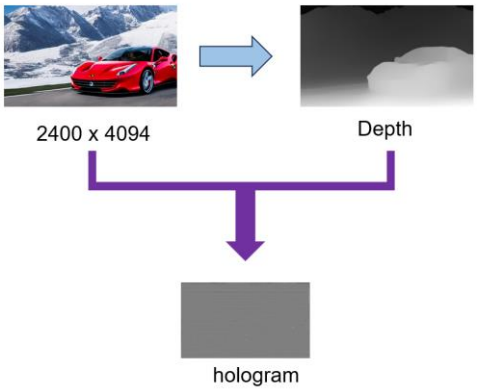
Rombach R, Blattmann A, Lorenz D, et al. High-resolution image synthesis with latent diffusion models[C]//Proceedings of the IEEE/CVF conference on computer vision and pattern recognition. 2022: 10684-10695.

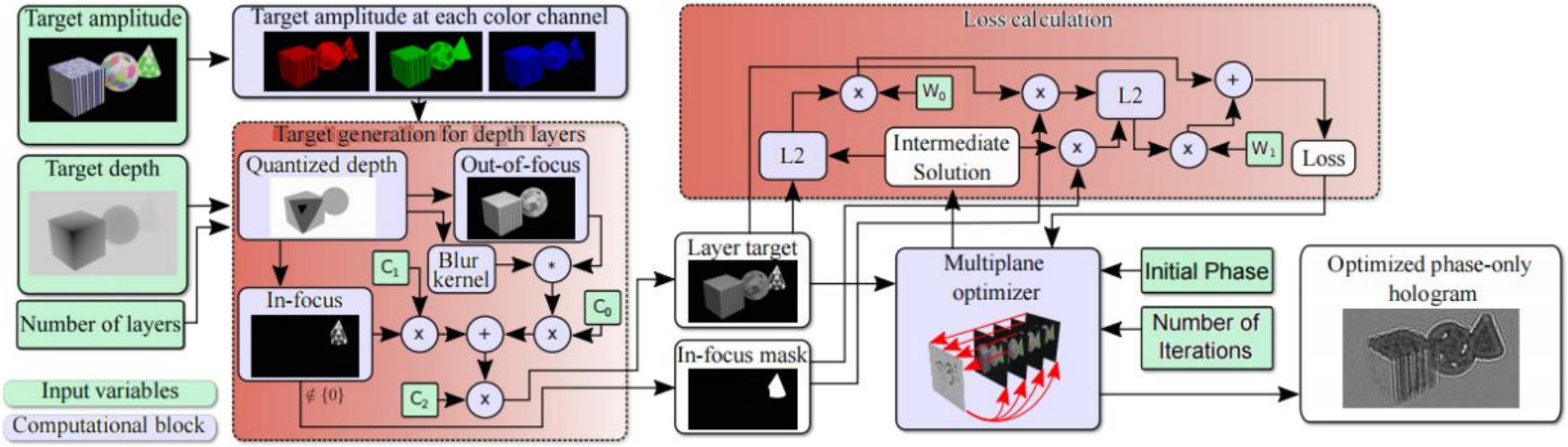
Super-resolution



Liu Y, Wang Y, Li N, et al. An attention-based approach for single image super resolution[C]//2018 24Th international conference on pattern recognition (ICPR). IEEE, 2018: 2777-2784.

CGH

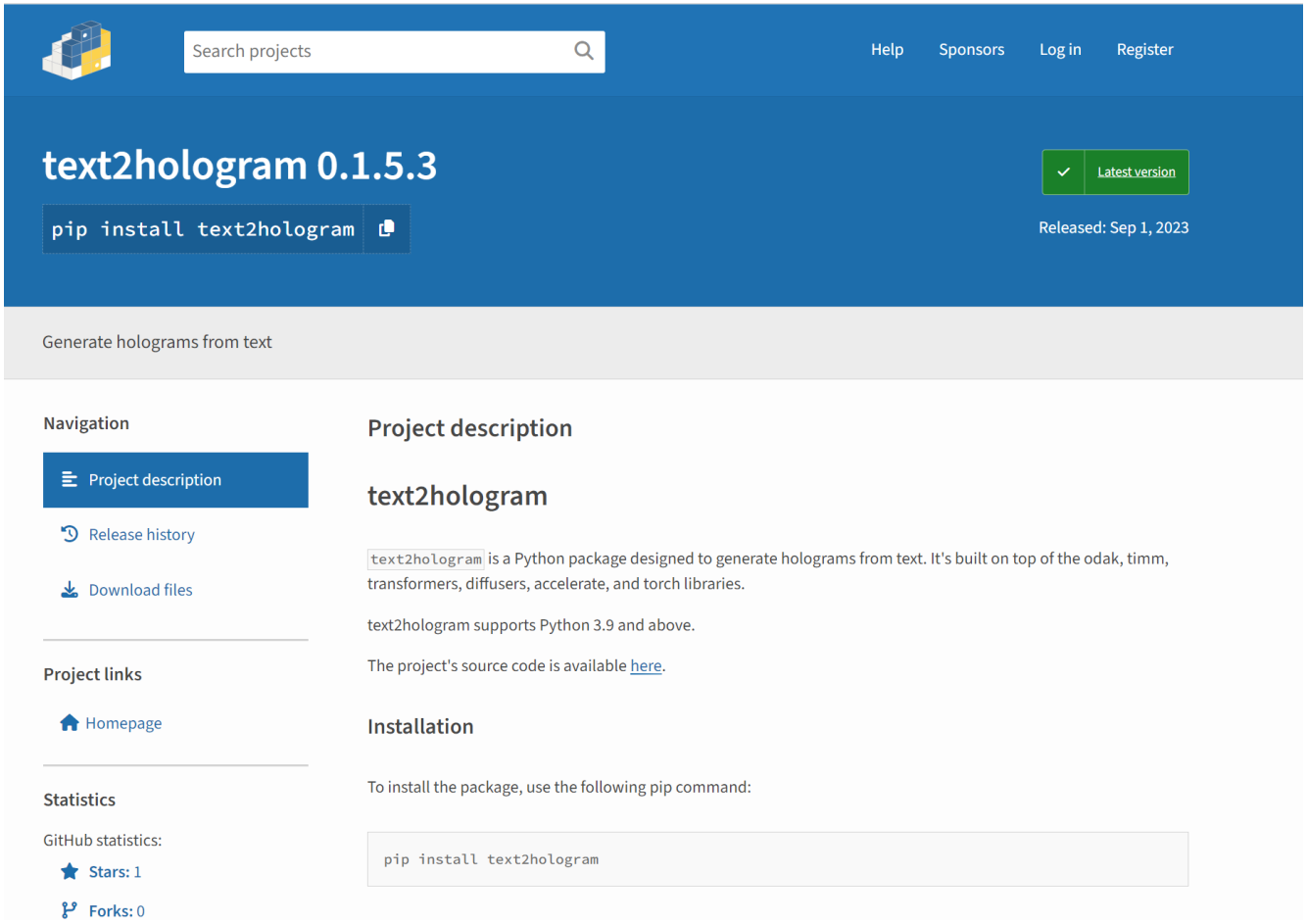




Kavaklı K, Itoh Y, Urey H, et al. Realistic defocus blur for multiplane computer-generated holography[C]//2023 IEEE Conference Virtual Reality and 3D User Interfaces (VR). IEEE, 2023: 418-426.

Accessibility

Ease-of-use Focus




```
>pip install text2hologram
```

Ease-of-use Focus

```
C:\Users\lipengze>pip show text2hologram
Name: text2hologram
Version: 0.1.5.3
Summary: Generate holograms from text
Home-page:
Author:
Author-email: Pengze Li <linsonng@163.com>
License:
Location: f:\programs\python\lib\site-packages
Requires: accelerate, diffusers, odak, openvino, timm, torch, transformers
Required-by:
```

```
Name: text2hologram
Version: 0.1.5.3
```

- ***Diffusers:*** *Diffusion model*
- ***Openvino:*** *Super resolution*
- ***Odak:*** *Optical scientific computing*
- ***Torch, Accelerate, Timm…***

Simple Mode

▸ Simple Mode

prompt: " A guitarist playing near a hot-air balloon at sunset.

Custom Mode

▸ Custom Mode

prompt: " A cyberpunk waterfall

For generative model:

inference_steps: 40

output_directory: " CGH_output/

For computer generated holography:

number_of_planes: 5

cgh_iterations: 200

Display options:

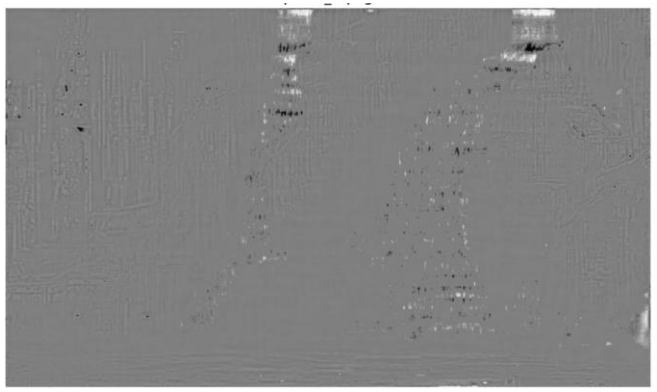
display_generated_image: ☑

display_depth_planes: ☑

display_phase_only_hologram: ☑

display_colored_reconstruction: ☑

A cyberpunk waterfal.jpg



Researcher Mode

- Researcher Mode - Setups
- Researcher Mode - Pipeline - image generation
- Researcher Mode - Pipeline - super-resolution
- Researcher Mode - Pipeline - depth estimation
- Researcher Mode - Pipeline - computer generated holography
- Researcher Mode - Pipeline - reconstruction
- Researcher Mode - Pipeline - display

Functionality	Simple Mode	Custom Mode	Researcher Mode
Text Prompt	√	√	√
Inference Steps		√	√
Output Directory		√	√
Number of Planes		√	√
CGH Iterations		√	√
Display Options		√	√
Advanced Settings			√
Model Switching			√

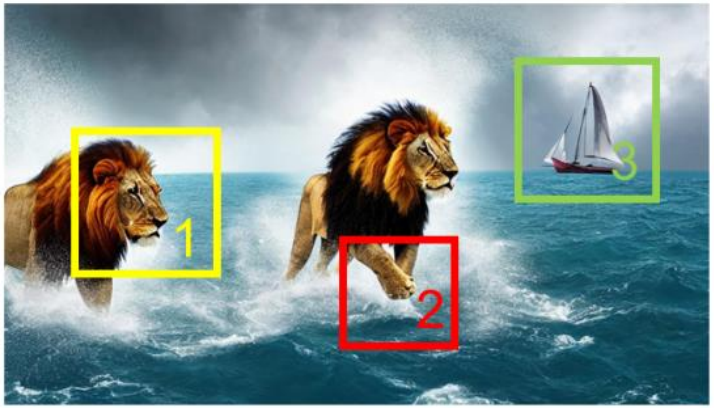
Outcomes

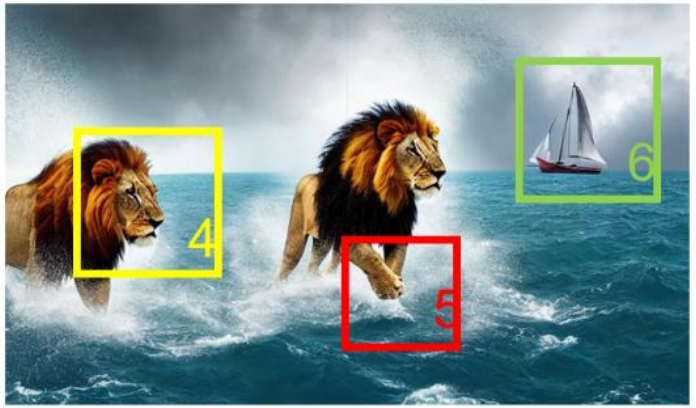
Text-to-image

```
# Generate images
image_path, images = generate_images(pipe, prompt, settings, device)
```

A cyberpunk waterfall.

Super-resolution

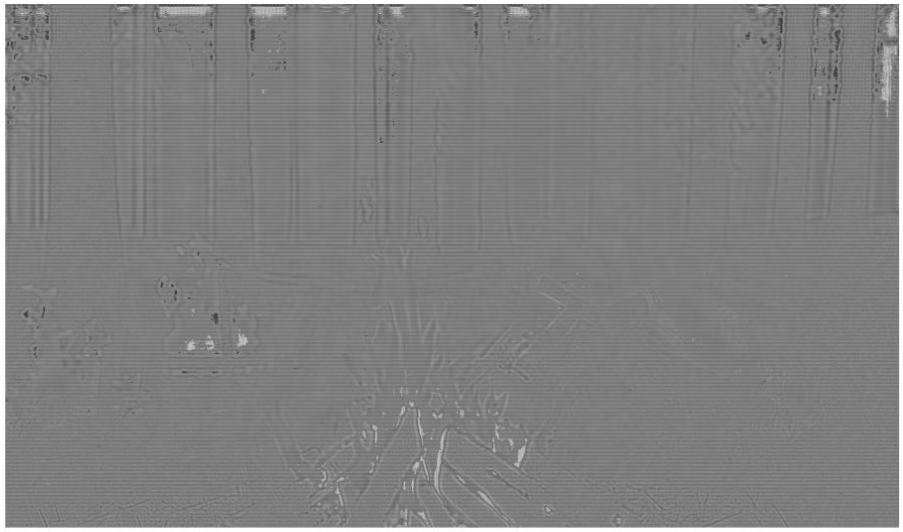




Computer Generated Holography

(a) The 4k image.

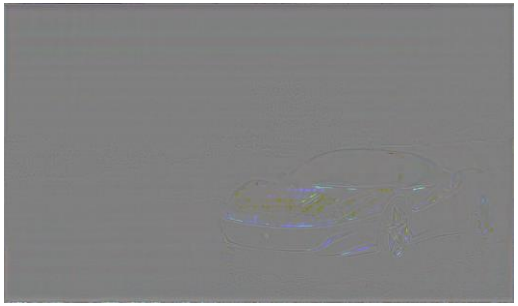
(b) The depth map.



(c) Hologram

A Ferrari sports car running on snowy mountain.

Reconstruction

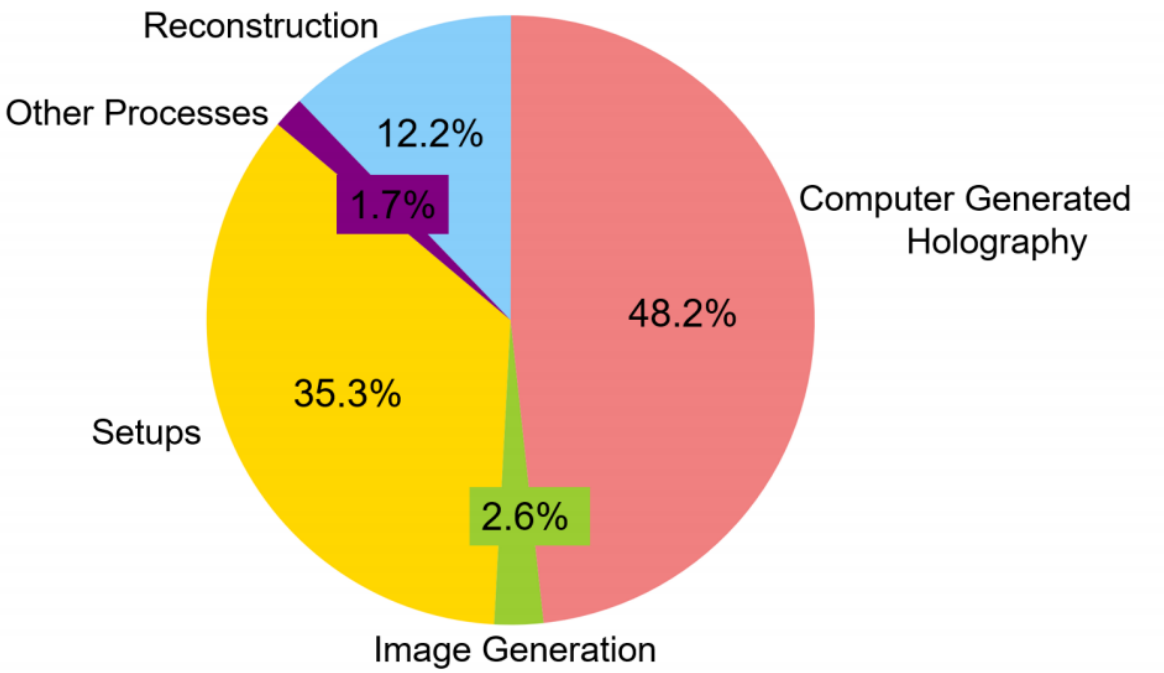


Discussion

Future development?

- ***Memory requirements***
- ***Better text-to-image model***
- ***Time consuming***

Time consuming?



Thanks!