Efficient Photorealistic Avatars using ML/AI

Milestone 3

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Agenda

- Problem Statement
- Old Solution
- Final Solution
- Improvements

Problem Statement

Goal: Rendering a photorealistic avatar with

- Monocular camera input ✅
- Using neural networks to render avatar ✅
- introducing neural heads as solution for facial expressions ✅
- running in a docker to avoid operating system problem ✅
- User interface to increase usability ✅

Old Solution (Nerf)

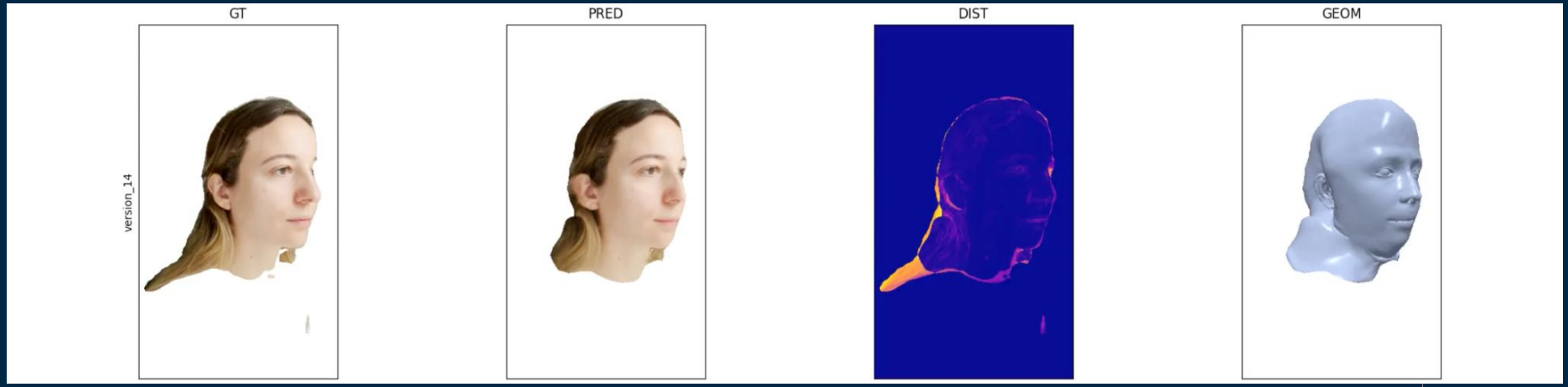
Input

Git: Source Code

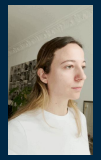
Output

BUT: Realisation of facial expression hard

Final Solution (Neural Head)



Final Solution (Neural Head)



Input Video

Preprocessing

- Frame Extraction through **OpenCV**
- Face and landmark detection with **face-detection-tflite**
- Annotation of the landmarks with **face_aligment lib**

Render Avatar

- **FLAME** head model as geometric backbone
- **Geometry Refinement Network** for facial details and hair
- **novel appearance model** which generates a photorealistic texture

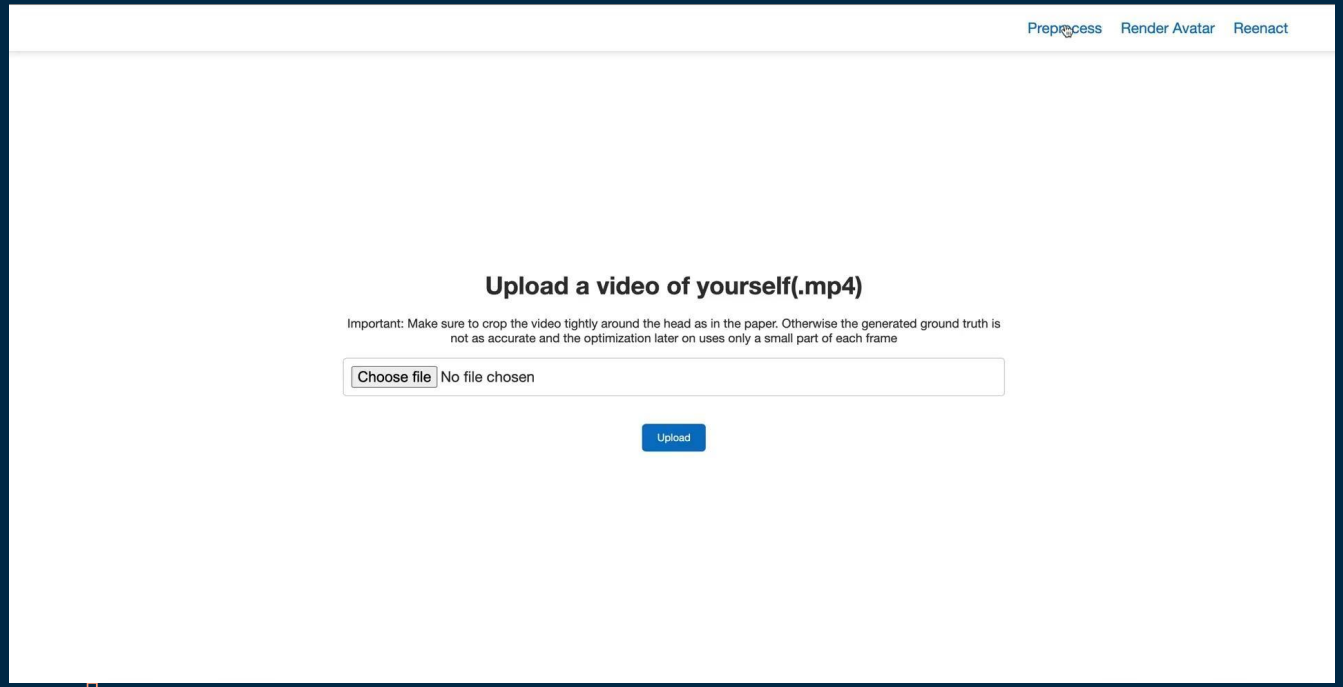
Reenact Expressions

- Loading avatar from ckpt file (binary results of training)
- Weighted with facial expression + viewing position + Neck position

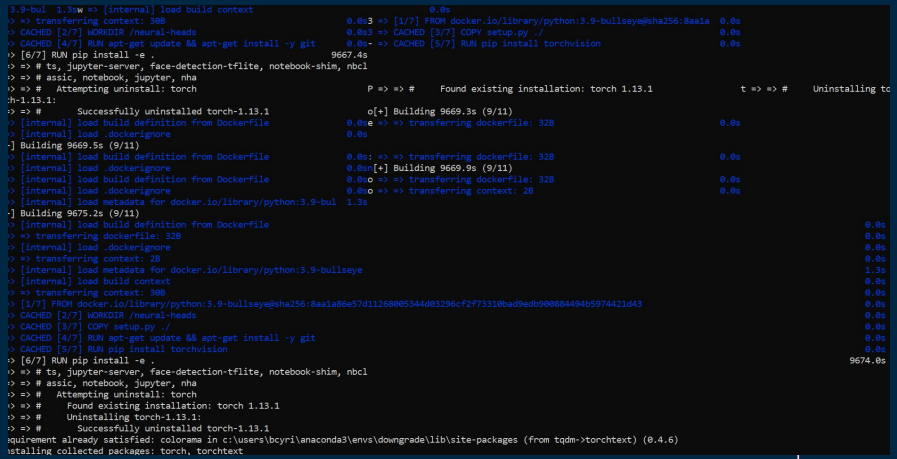
2D image of rendered 3D object with facial expression

PNG

User interface



- To avoid issues with operating systems
- Github pages asume dependencies
- Increase usability



Improvements

- Returning/rendering and Textures of an 3D model not just an image of the model
- Run emotion detection model to map the facial expression parameters correctly

Thank You!