



CLÉMENT SIEGRIST

clement.siegrist@etu.u-paris.fr

Bag of Tricks for an Extended PiFuHD usage : Testing Robustness, new Applications and a Path Towards Faster Inference



3D Reconstruction of Humans with Images



OUTLINE



3D Reconstruction of Humans with Images

BAG OF TRICKS FOR AN EXTENDED PIFUHD USAGE



Introduction and problematics



I. Selecting Good Images for Inferences on different types of datas



II. Integrating a Neural Transfer Style Pipeline



III. A way Towards Faster Inferences : Methods



Conclusion & Future Works



Prolematics

How to improve rendering based on careful input choices ?

How to create innovative synthetic inputs and outputs with neural style transfer ?

How to speed up inferences to answer embedded constraints and mobile app challenges ?



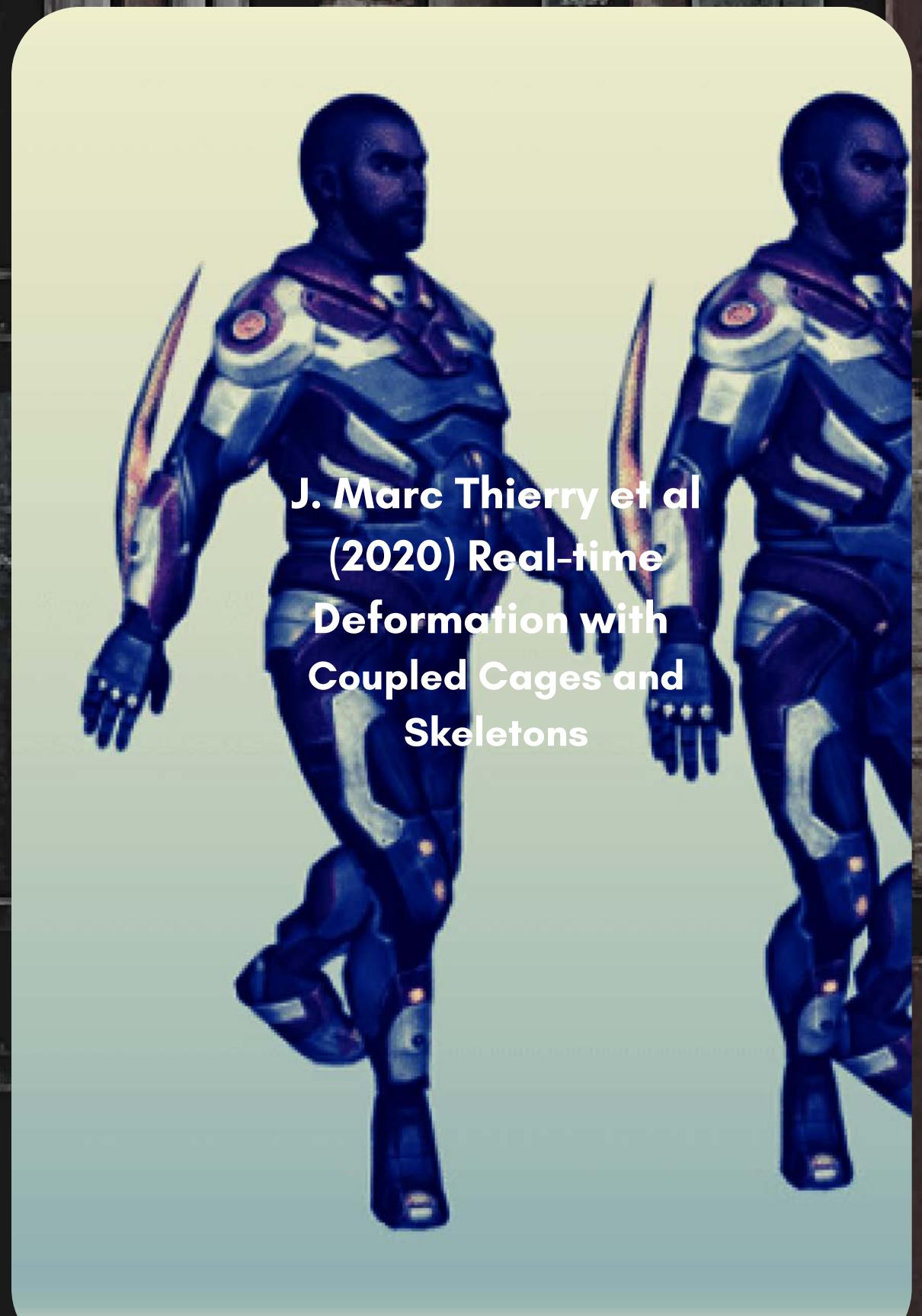
Selecting Good Images for Inferences on Different Types of Datas



Y. Lin et al (2020)
RobustFusion, Human
Volumetric Capture.



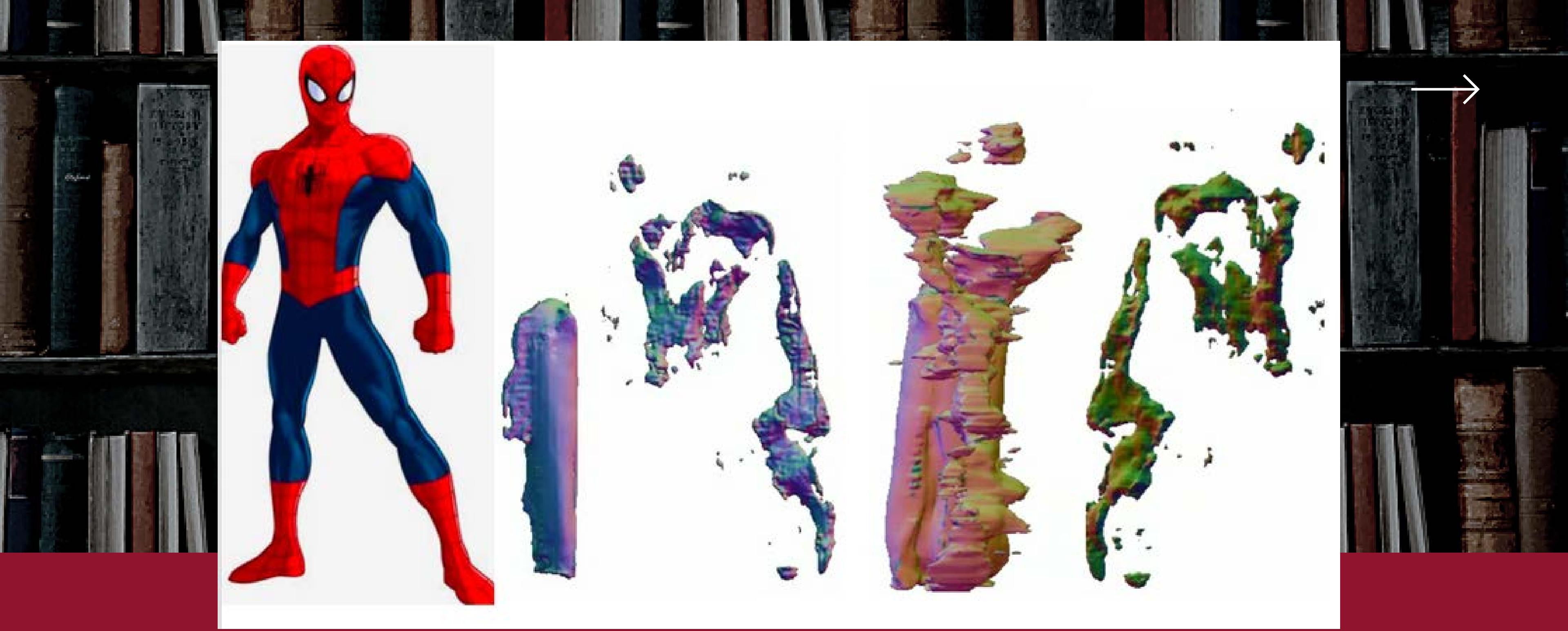
T. Vu (2020) GanAnime:
Generating Anime and
Manga Characters from
Drawings



J. Marc Thierry et al
(2020) Real-time
Deformation with
Coupled Cages and
Skeletons

Rendering Humans with super-hero costumes, mangas and comics

- Few studies exists
- Few datasets, both of 2D images and 3D models available
- Massive applications to video games, graphics, cinema, comics, instagrams filters, FX ...
- Way to confirm generalization ability

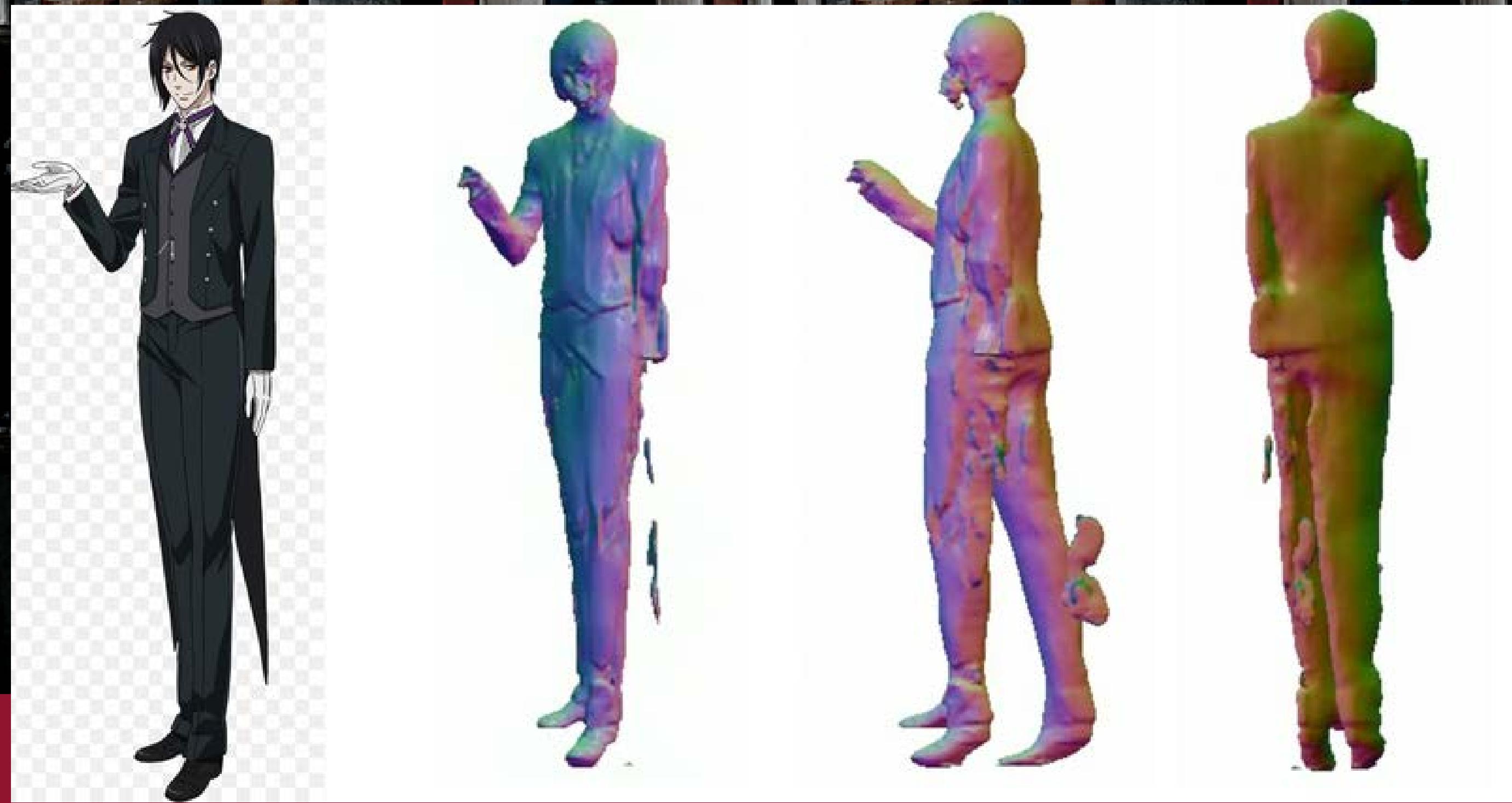


3D Reconstruction of Humans with Images

What not to do



3D Reconstruction of Humans with Images
Quality, face profile, but only upper body



3D Reconstruction of Humans with Images
Face profile, whole body, few elements on face



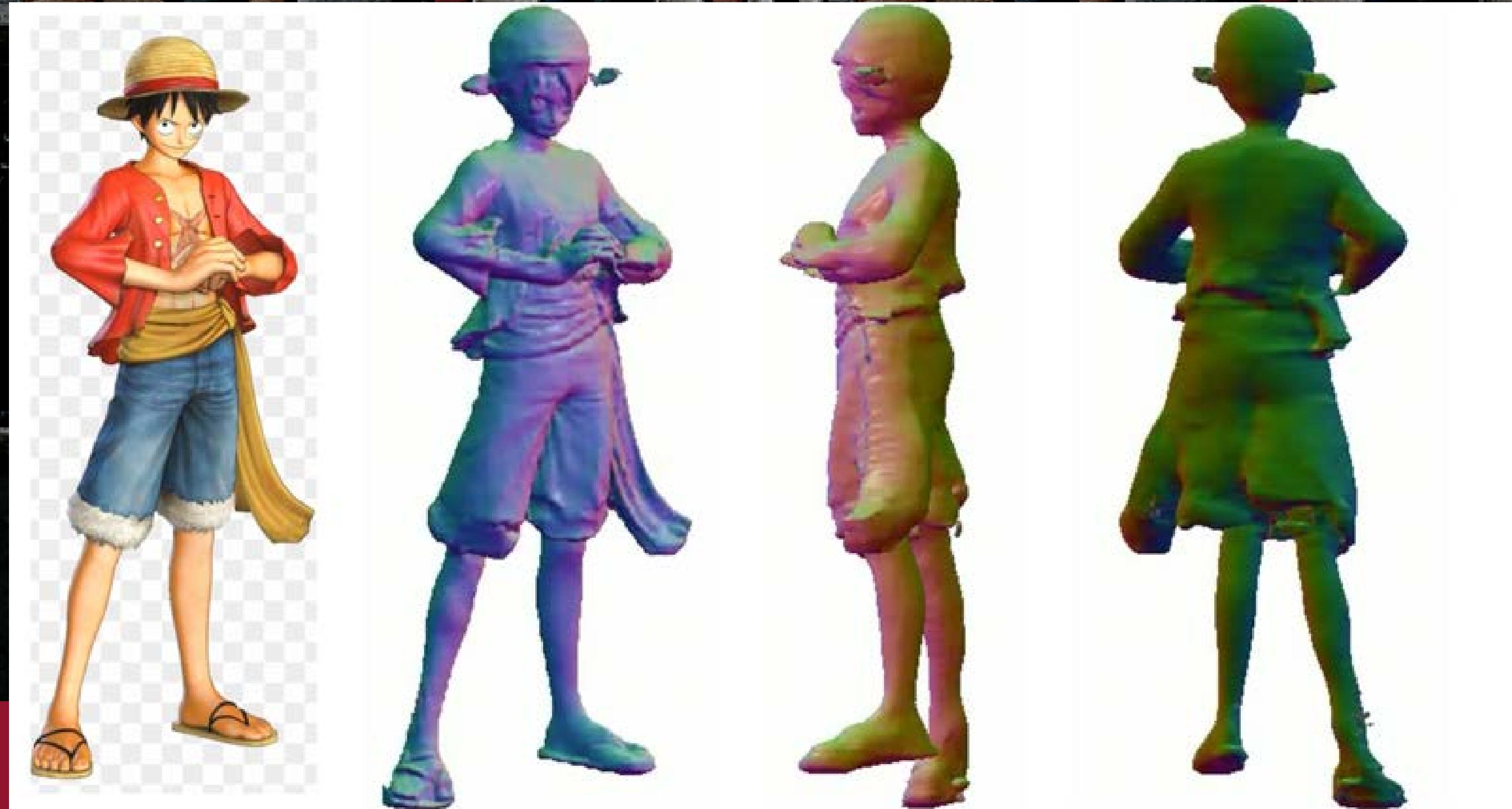
3D Reconstruction of Humans with Images

Face profile but with slight rotation, whole body, lot of textures but too many accessories



3D Reconstruction of Humans with Images

What to do : High Res Picture, good textures, contrasts,
shadows



3D Reconstruction of Humans with Images

What to do : High Res Picture, good textures, contrasts,
shadows



3D Reconstruction of Humans with Images
Color reconstruction with Pifu 2019.





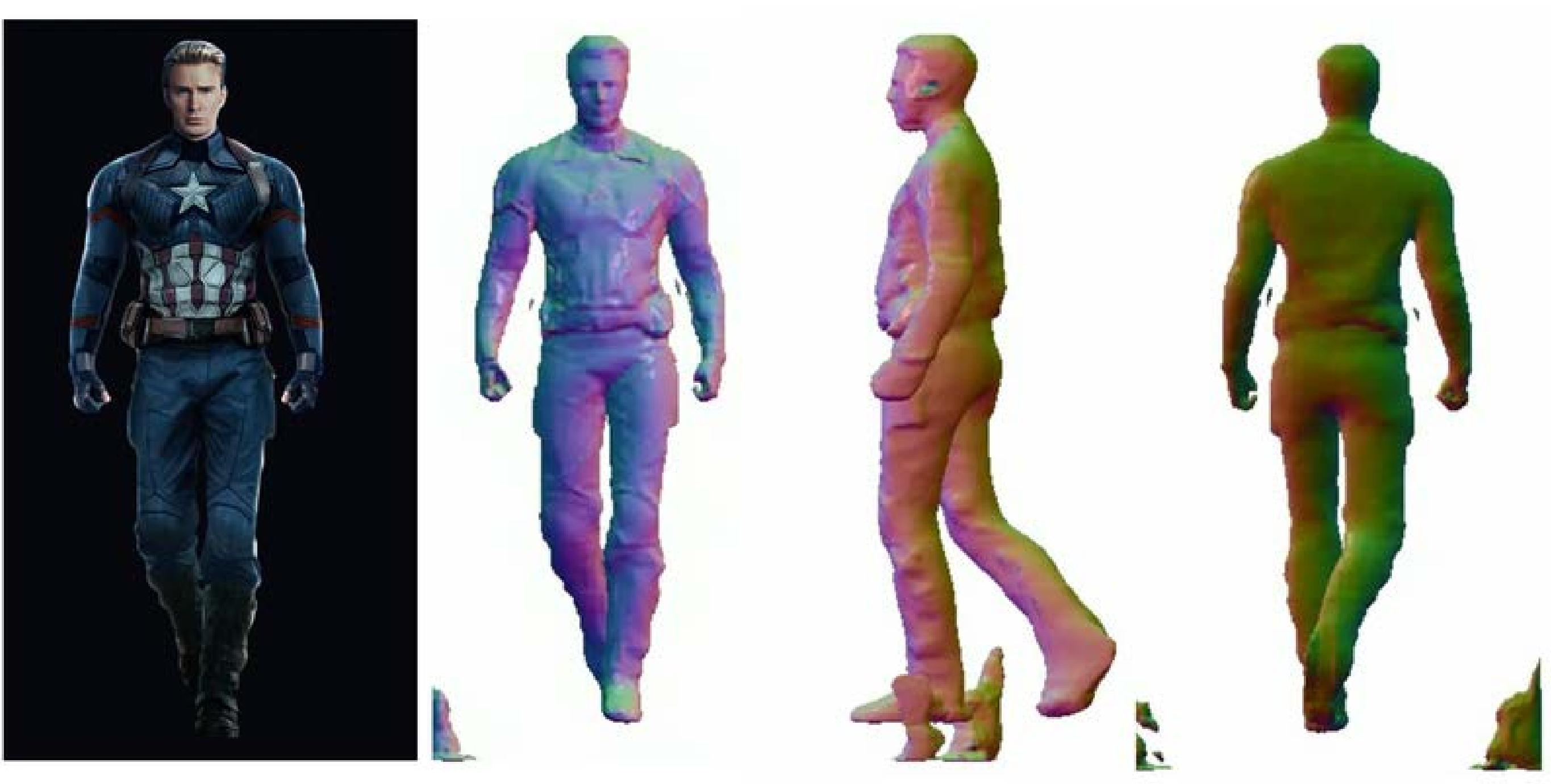
3D Reconstruction of Humans with Images
Cape and accessories create artifacts





3D Reconstruction of Humans with Images
Cape create artifacts symbol not well rendered





3D Reconstruction of Humans with Images
Costumes if they fit to the body seem to render well



How to create innovative synthetic inputs and outputs with neural style transfer ?



+ Illumination

+ Pose

- Age

+ Expression

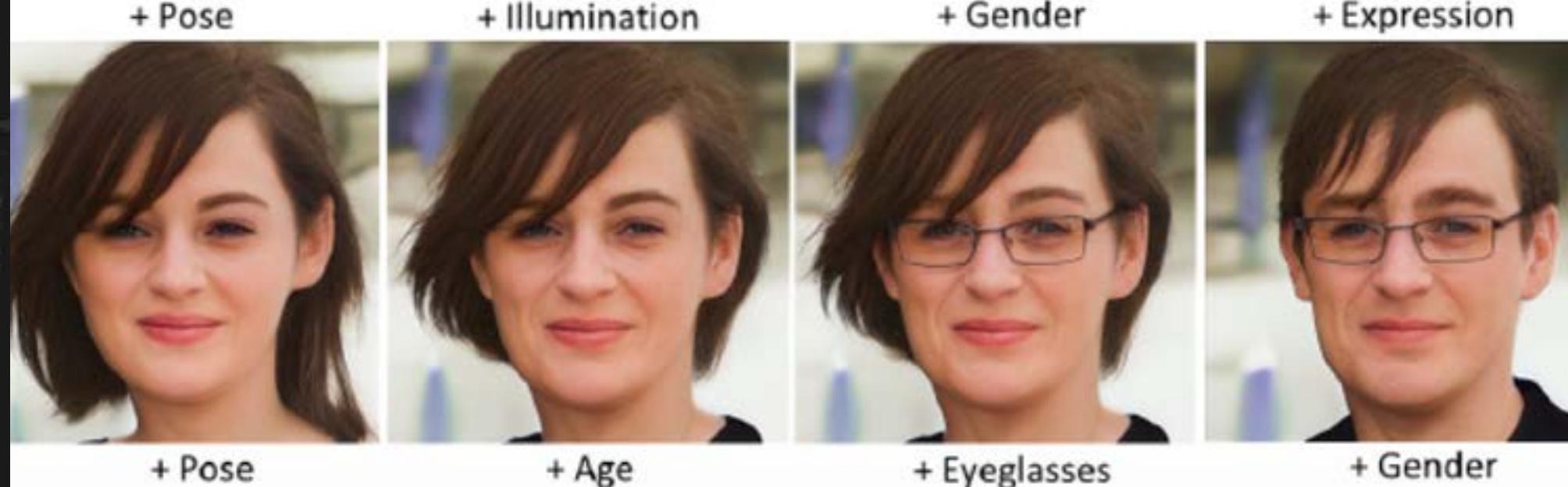


+ Pose

+ Illumination

+ Gender

+ Expression



+ Pose

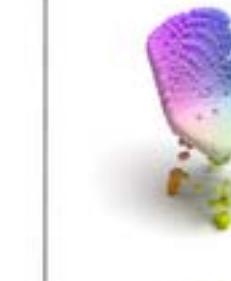
+ Age

+ Eyeglasses

+ Gender

II. Integrating a Neural Transfer Style Pipeline

- Few studies exists but a growing number
- Generate innovative and really new images, models, shapes , colors ...
- Massive applications to video games, graphics, cinema, comics, instagrams filters, FX, fashion, arts ...
- Some well known business used them for 2D like Zalandoo, FaceApps, Gradient

Inputs		Reconstruction		Style Transfer	
Armchair (A)	Chair (C)	A→A	C→C	A→C	C→A
					
					
					
					
					

II. Integrating a Neural Transfer Style Pipeline

- Few studies exists but a growing number
- Generate innovative and really new images, models, shapes , colors ...
- Massive applications to video games, graphics, cinema, comics, instagrams filters, FX, fashion, arts ...
- Some well known business used them for 2D like Zalandoo, FaceApps, Gradient

Inputs		Reconstruction		Style Transfer	
Jet (J)	Fighter (F)	J→J	F→F	J→F	F→J
					
					
					
					
					

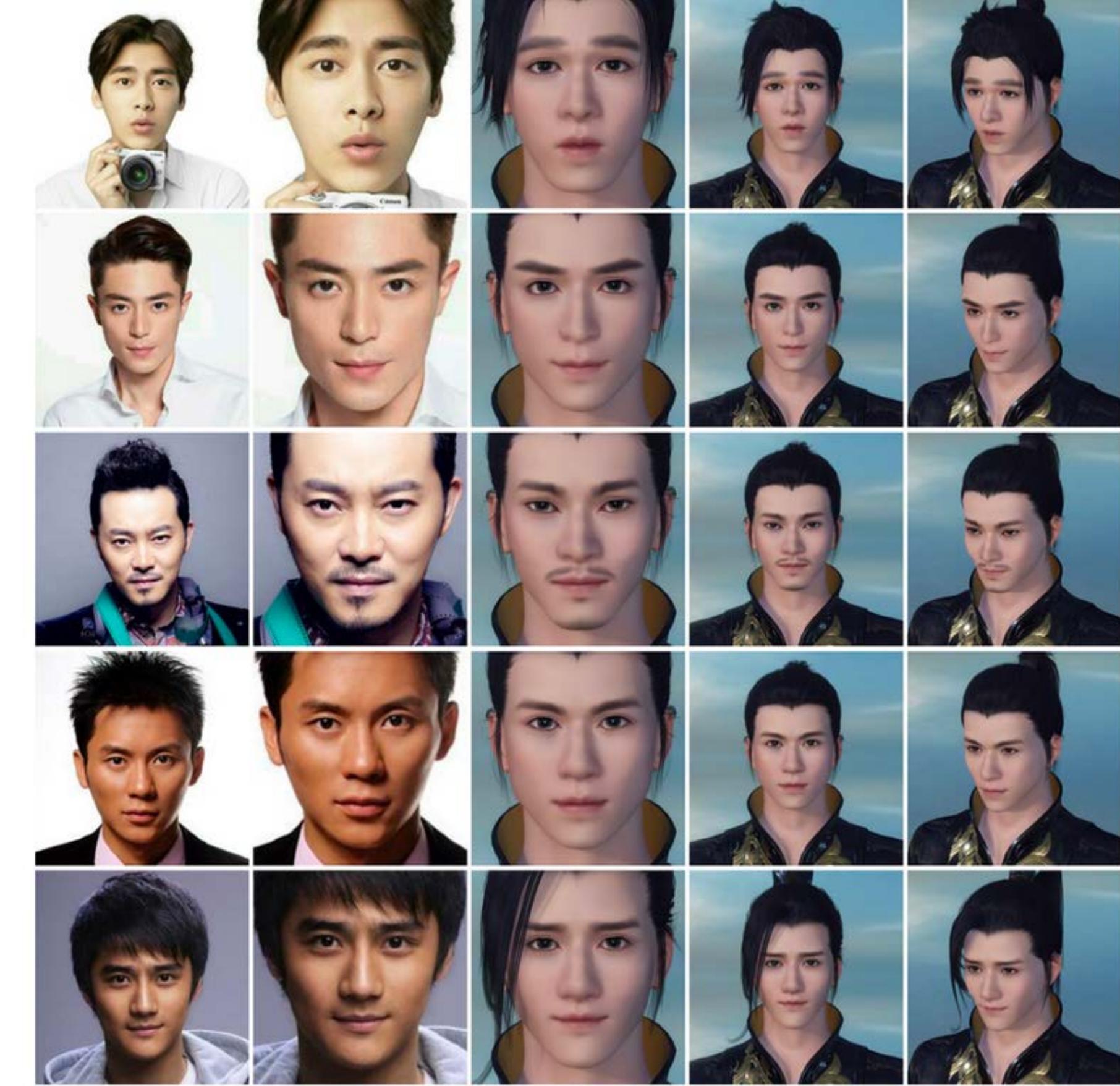
II. Integrating a Neural Transfer Style Pipeline

- Few studies exists but a growing number
- Generate innovative and really new images, models, shapes , colors ...
- Massive applications to video games, graphics, cinema, comics, instagrams filters, FX, fashion, arts ...
- Some well known business used them for 2D like Zalandoo, FaceApps, Gradient



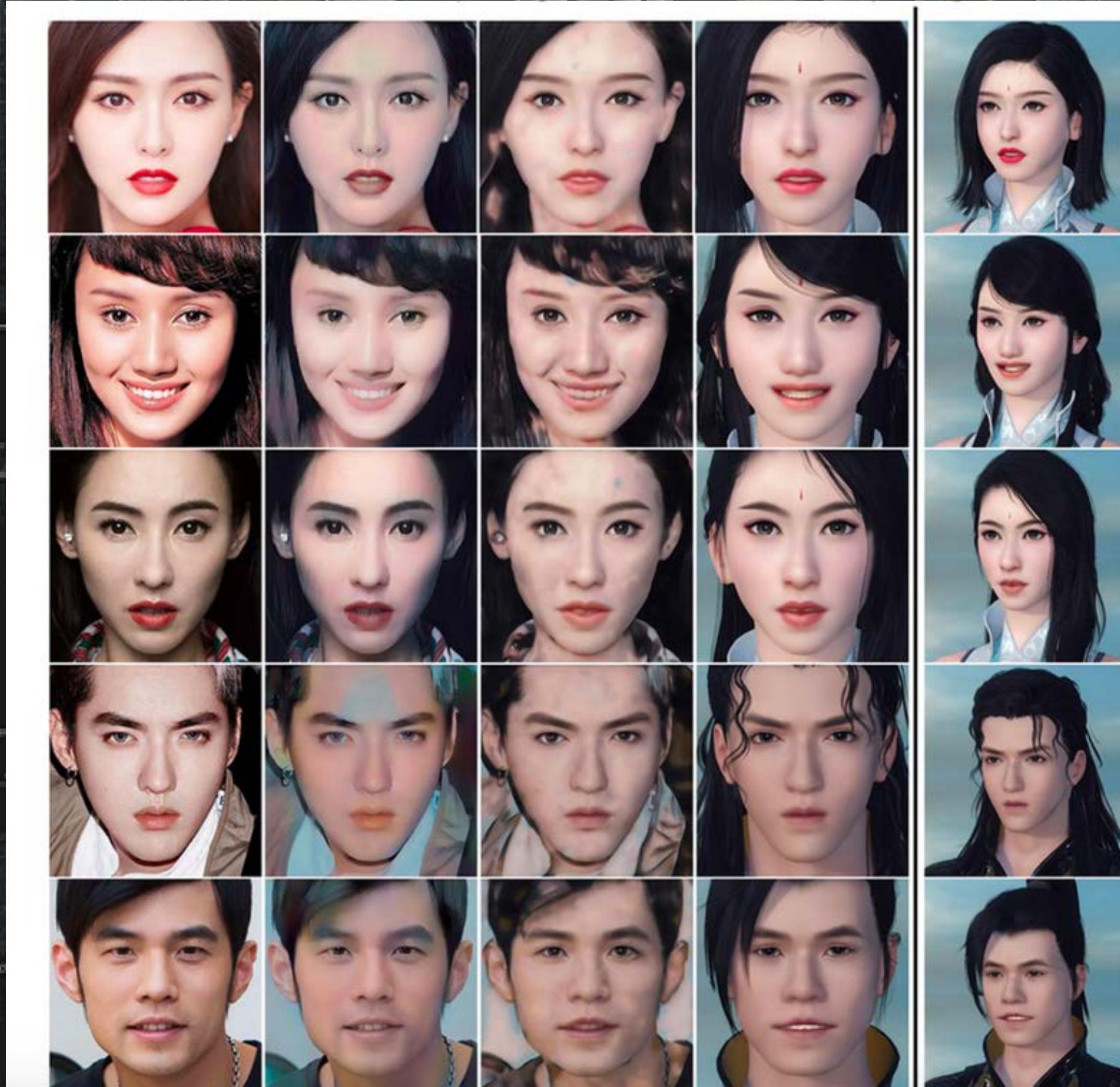
II. Integrating a Neural Transfer Style Pipeline

- **Few studies exists but a growing number**
- **Generate innovative and really new images, models, shapes , colors ...**
- **Massive applications to video games, graphics, cinema, comics, instagrams filters, FX, fashion, arts ...**
- **Some well known business used them for 2D like Zalandoo, FaceApps, Gradient**



II. Integrating a Neural Transfer Style Pipeline

- **Few studies exists but a growing number**
- **Generate innovative and really new images, models, shapes , colors ...**
- **Massive applications to video games, graphics, cinema, comics, instagrams filters, FX, fashion, arts ...**
- **Some well known business used them for 2D like Zalandoo, FaceApps, Gradient**



II. Integrating a Neural Transfer Style Pipeline

- **Few studies exists but a growing number**
- **Generate innovative and really new images, models, shapes , colors ...**
- **Massive applications to video games, graphics, cinema, comics, instagrams filters, FX, fashion, arts ...**
- **Some well known business used them for 2D like Zalandoo, FaceApps, Gradient**



**But those models are far
too heavy and long to train
what to do ?**



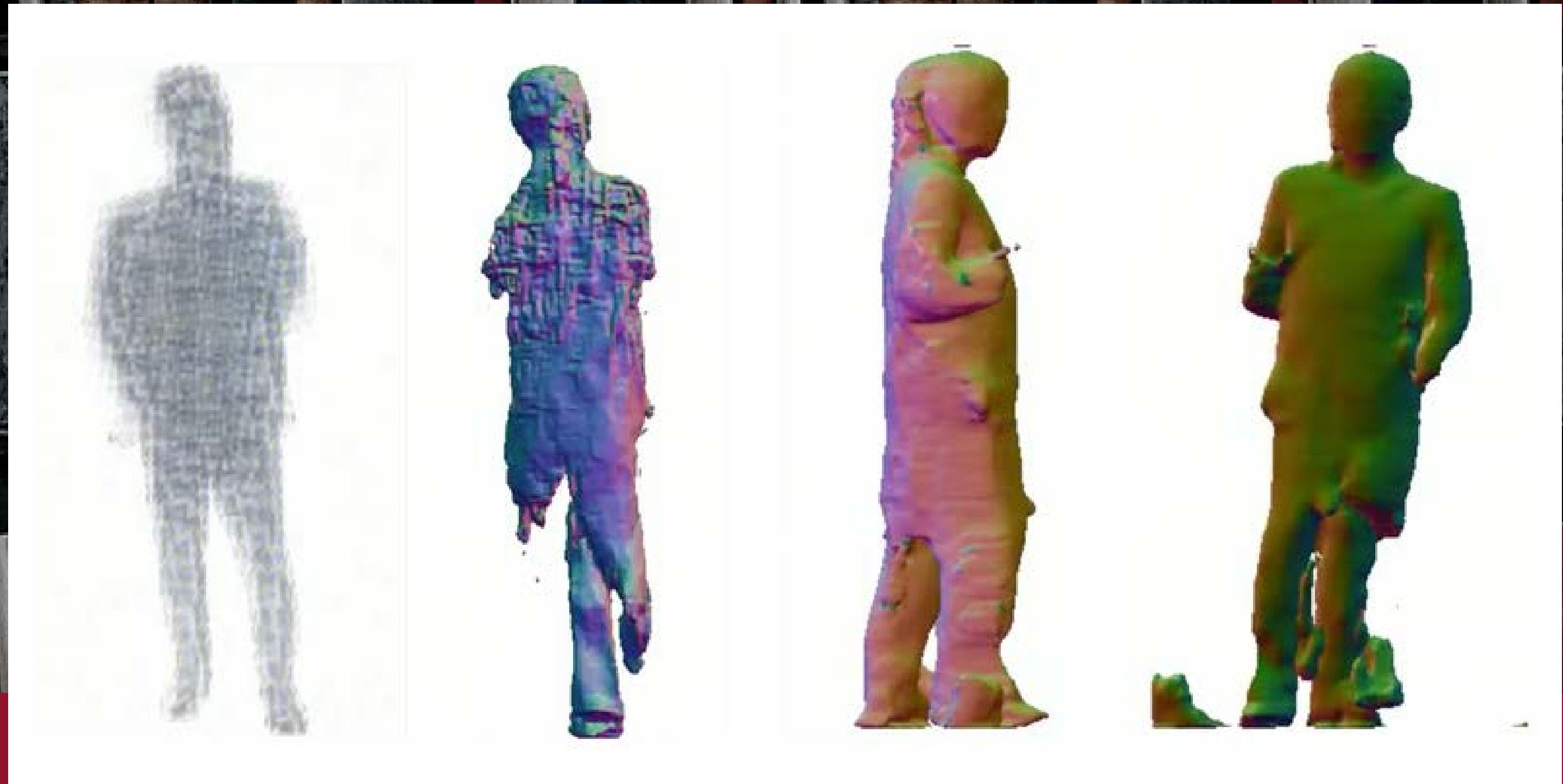
Original Inputs with Transfer Style

Solution : 2D images, human silhouette and one Texture



Original Inputs with Transfer Style

Solution : 2D images, human silhouette and one Texture



Original Inputs with Transfer Style

Solution : 2D images, human silhouette and one Texture



Original Inputs with Transfer Style

Solution : 2D images, human silhouette and one Texture



Original Inputs with Transfer Style

Solution : 2D images, human silhouette and one Texture

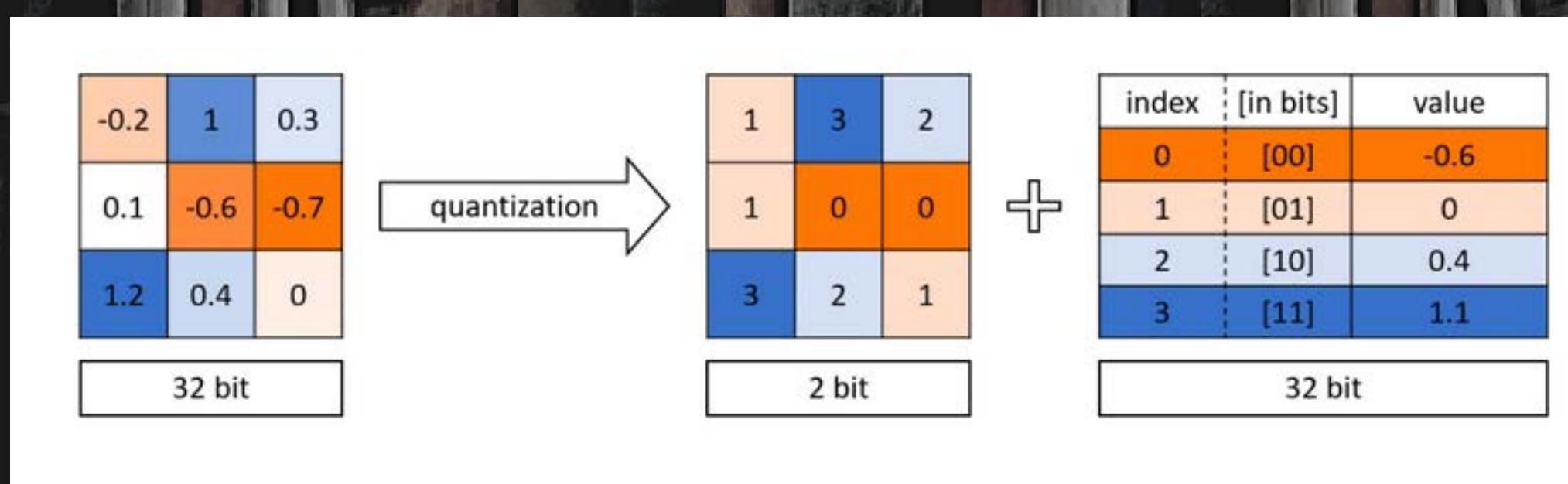
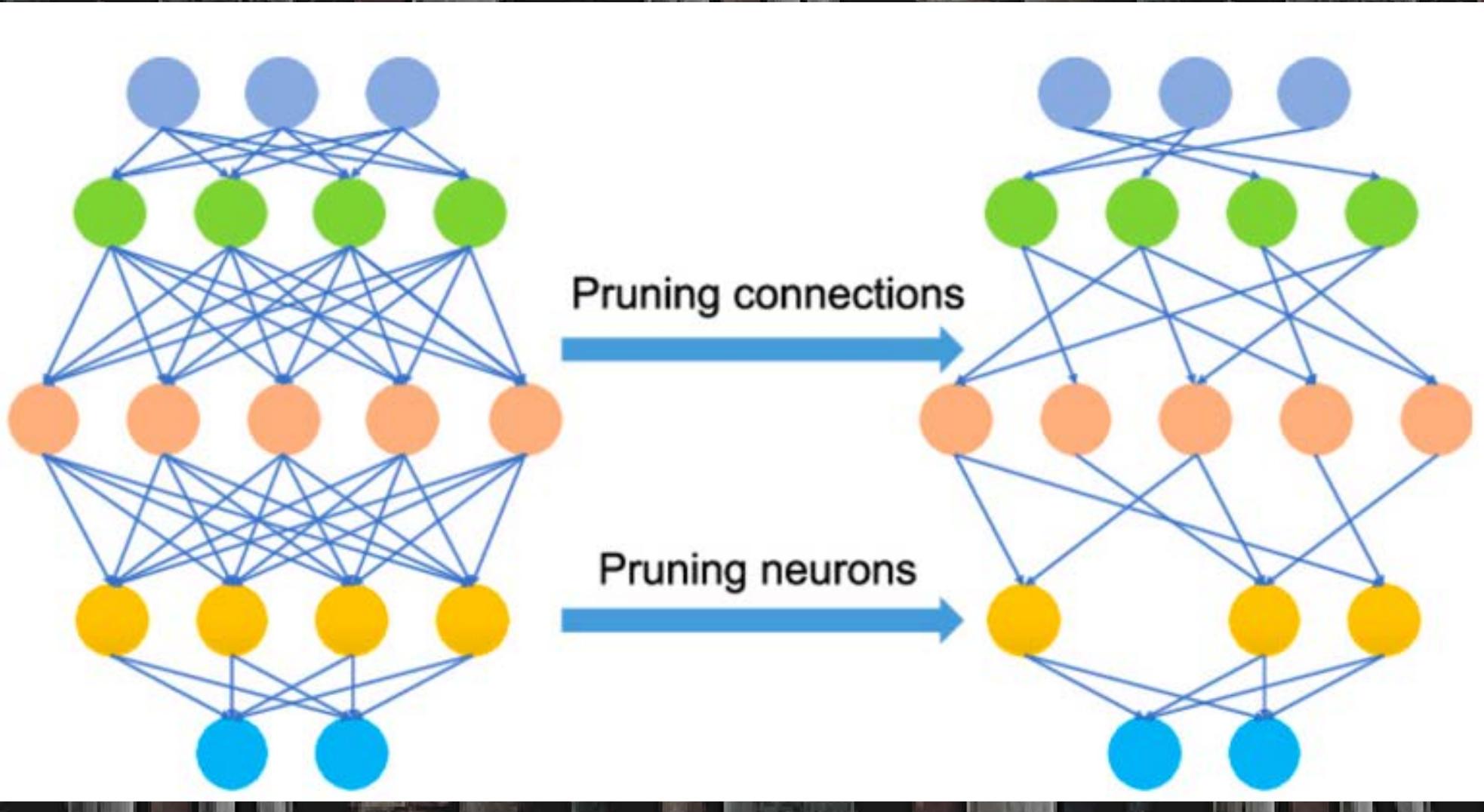


Original Inputs with Transfer Style

Solution : 2D images, human silhouette and one Texture



A way Towards Faster Inferences : Methods



A way Towards Faster Inferences : Methods

- 1,4 GO for the networks
- GPU memory overload
- Take 8 minutes inferences with marching cubes reconstruction on Intel5 with MacBookPro
- Roughly 8 seconds inference time, too long for real-time, mobile app.



TensorFlow Lite



3D Reconstruction of Humans with Images
Fast inference, light model





NN Neural Network Intelligence

3D Reconstruction of Humans with Images
Fast inference, light model



3D Reconstruction of Humans with Images

Conclusion :

- Very high quality image needed
- Profile picture type and full body
- Preferably with good textures
- Overall, transfer learning works and well



Future Works

- Create a 3D dataset of Heroic Fantasy Creatures
- Testing 3D reconstruction with Spiking neural Nets and events-based camera
- Color rendering and multi-pose rendering





CLÉMENT SIEGRIST
clement.siegrist@etu.u-paris.fr

Bag of Tricks for an Expedited PiFuHD usage : Testing Robustness, new Applications and a Path Towards Faster Inference



3D Reconstruction of Humans with Images

