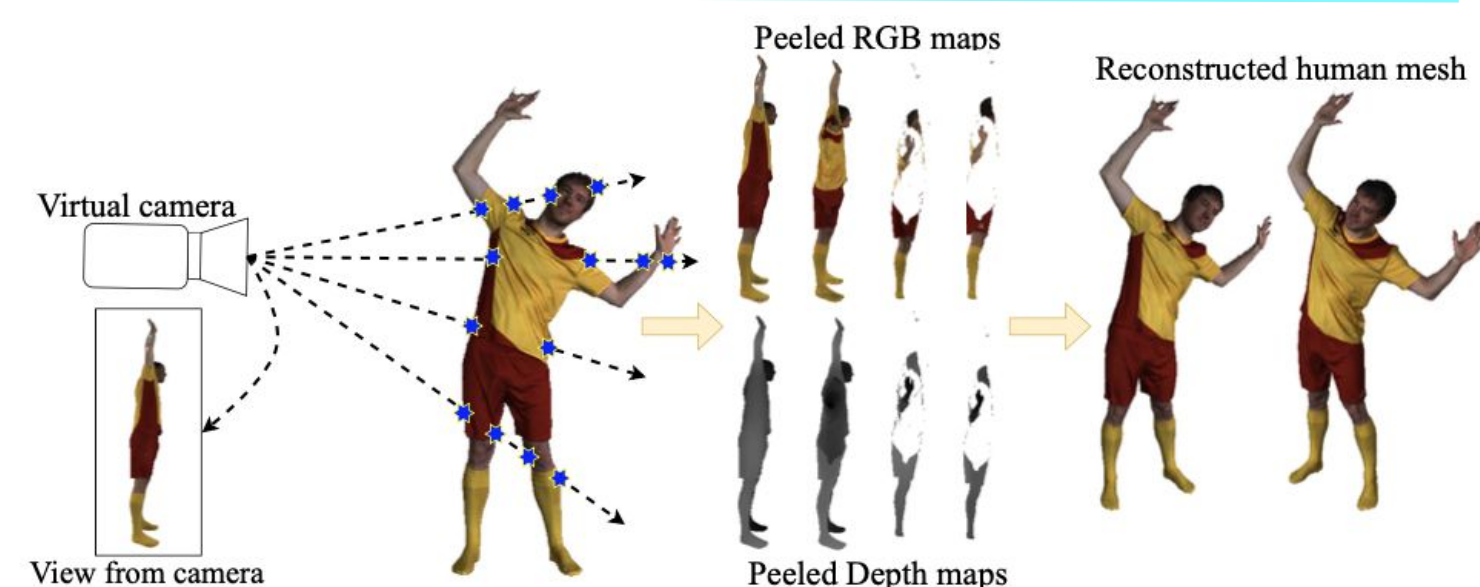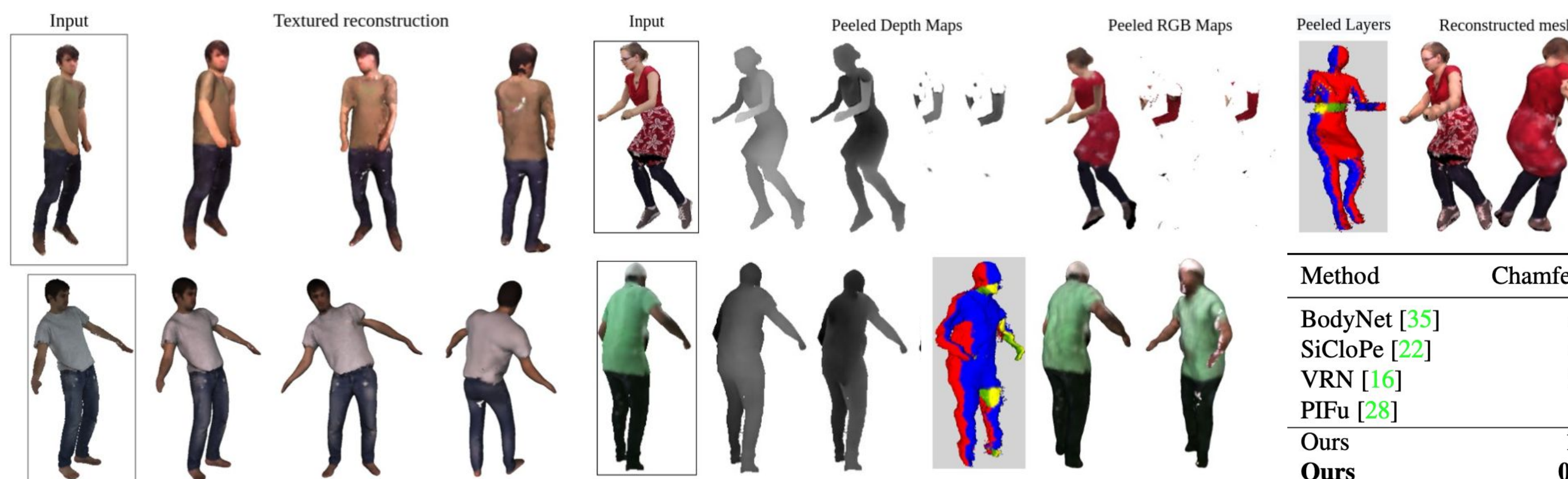# PeeledHuman: Robust Shape Representation for Textured 3D Human Body Reconstruction

ABSTRACT

We introduce PeeledHuman - a novel shape representation of the human body that is robust to self-occlusions. PeeledHuman encodes the human body as a set of Peeled Depth and RGB maps in 2D, obtained by performing ray-tracing on the 3D body model and extending each ray beyond its first intersection. This formulation allows us to handle self-occlusions efficiently compared to other representations.

Virtual camera / View from camera / Peeled RGB maps / Peeled Depth maps / Reconstructed human mesh

RESULTS

Input / Textured reconstruction / Input / Peeled Depth Maps / Peeled RGB Maps / Peeled Layers / Reconstructed mesh

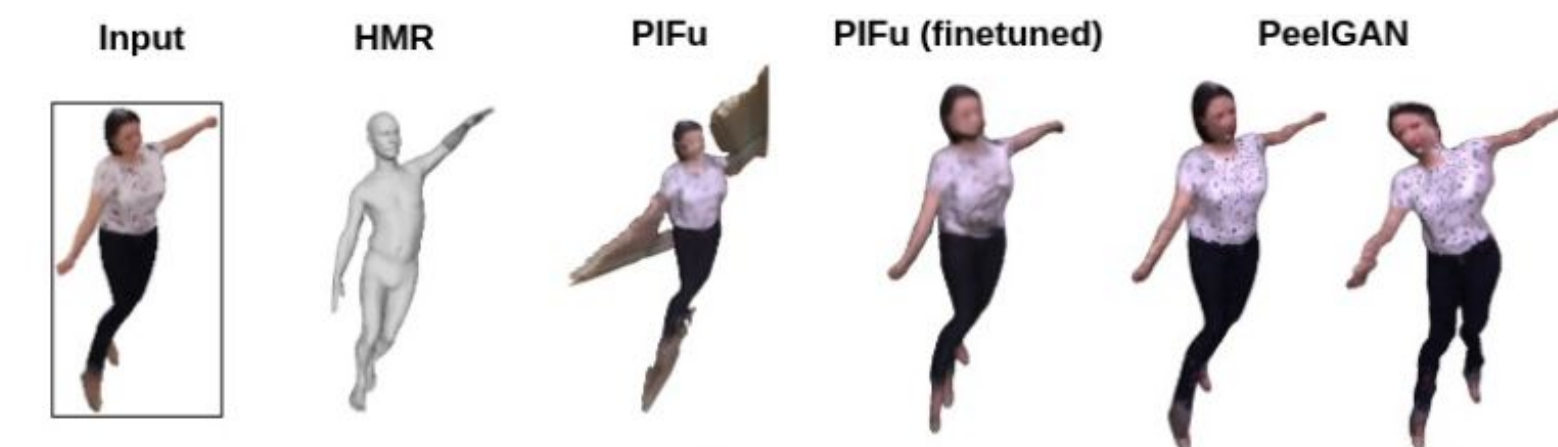| Method	Chamfer Distance ↓	Image Resolution
BodyNet [35]	4.52	256
SiCloPe [22]	4.02	256
VRN [16]	2.48	256
PIFu [28]	1.14	512
Ours	1.283	256
Ours	**0.9254**	**512**

METHOD

Given a monocular RGB image, a set of Peeled maps are predicted in an end-to-end generative adversarial fashion using our novel framework - PeelGAN. PeelGAN is trained using a 3D Chamfer loss and other 2D losses to generate multiple depth values per-pixel and a corresponding RGB field per-vertex in a dual-branch setup.
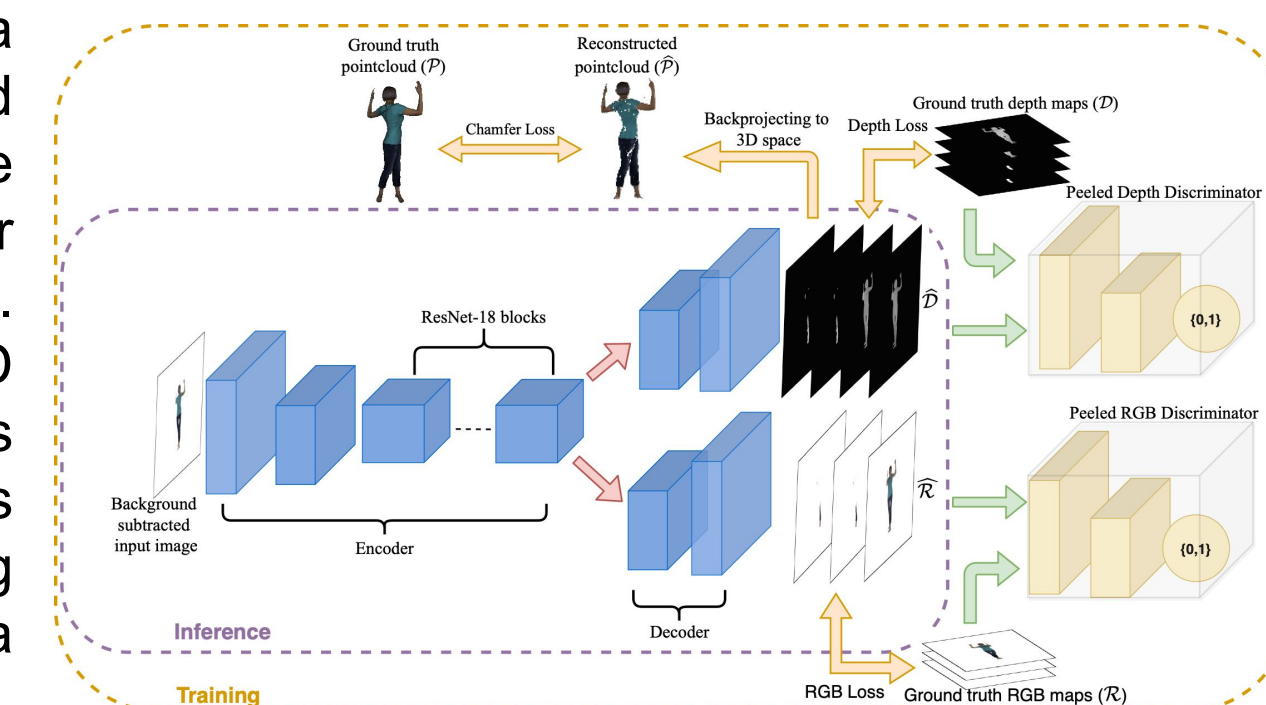
In our simple non-parametric solution, the generated Peeled Depth maps are back-projected to 3D space to obtain a complete textured 3D shape. The corresponding RGB maps provide vertex-level texture details.

COMPARISONS

Input / HMR / PIFu / PIFu (finetuned) / PeelGAN

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