Semi-supervised Synthesis of High-Resolution Editable Textures for 3D Humans
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Contributions
• Given a semantic segmentation map as input, our method generates UV texture maps for clothed 3D humans
• Our textures have high resolution, high fidelity, large diversity and allow independent layout and style editing
• Styles of each region can be controlled individually

Methodology
• Encoder encodes and pools image features region-wise to create style matrix
• VAE learns per-class style distributions; random sampling from these distributions control the output styles of regions
• Generator converts input segmentation map to texture map guided by the style matrix; noise helps learn high-frequency details
• Pretrained super-resolution network scales up the output to 1024 x 1024 resolution

Application
• Lift 2D human images to UV texture and segmentation maps
• GarmentCUT removes artifacts and baked lighting; brings domain closer to 3D scans

Evaluation of Randomly Synthesized Textures
• Qualitative comparison with SOTA non-exemplar based and exemplar-based methods; also shown in 3D render form

Training Data Generation
• Lift 2D human images to UV texture and segmentation maps

User interface
• Given a semantic segmentation map as input, our method generates UV texture maps for clothed 3D humans
• Our textures have high resolution, high fidelity, large diversity and allow independent layout and style editing
• Styles of each region can be controlled individually

REFERENCES:
(1) Densepose: Dense human pose estimation in the wild, R. A. Güler et al., CVPR 2018
(2) SEAN: Image synthesis with semantic region-adaptive normalization, P. Zhu et al., CVPR 2020
(3) A style-based generator architecture for generative adversarial networks, T. Karras et al., CVPR 2019
(4) High-resolution image synthesis and semantic manipulation with conditional GANs, T. Wang et al., CVPR 2018
(5) Semantic image synthesis with spatially adaptive normalization, T. Park et al., CVPR 2019