SUPR: A Sparse Unified Part-Based Human Body Model
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Problem Statement

- Existing models only relate the body deformations to the body pose.
- We propose a network architecture for modelling the feet deformation due to ground contact.

Foot Deformation Network

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- We propose a network architecture for modelling the feet deformation due to ground contact.

Foot Evaluation

- We capture a male subject performing rocking motion, effectively changing the center of mass from the heel to the toes shown in (a).
- The SUPR-Foot network predicts significant deformations around the heel region compared to the rest of the foot.
- However, when the subject leans forward the center of mass is above the toes, consequently the soft tissue at the heel is less compressed. The SUPR-Foot predicted deformations shift from the heel towards the front of the foot.

Experiments

- Federated Training Dataset: 1.2 Million Registrations.
- We train an expressive body (SUPR) model on a federated dataset of 1,2 million hand, head and body registrations. Then separate the model into body parts. This is possible because of the sparse pose blend shape formulation based on STAR [3].

Key Ideas

• Body parts are trained on scans that do not capture the head and hand full range of motion.
• Full body scans captures the head and hand full range of motion relative to the body.
• We train an expressive body (SUPR) model on a federated dataset of 1.2 million hand, head and body registrations. Then separate the model into body parts. This is possible because of the sparse pose blend shape formulation based on STAR [3].
• Surprisingly the separated body parts are influenced by more joints than commonly used models.

Supplementary Information

1. Li, Tianye, et al. "Learning a model of facial shape and expression from 4D scans."
4. Xu et al.: "Generative 3d human shape and articulated pose models."
5. Saint et al. "3dbodytex: Textured 3d body dataset."