

Chupa: Carving 3D Clothed Humans from Skinned Shape Priors using 2D Diffusion Probabilistic Models



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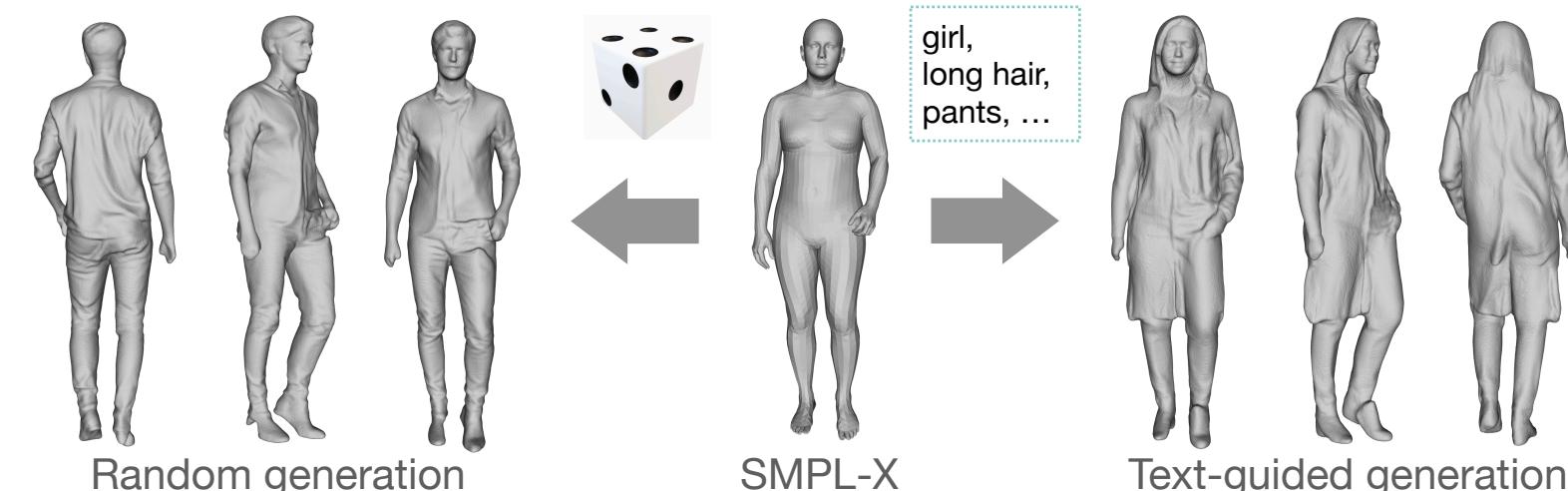


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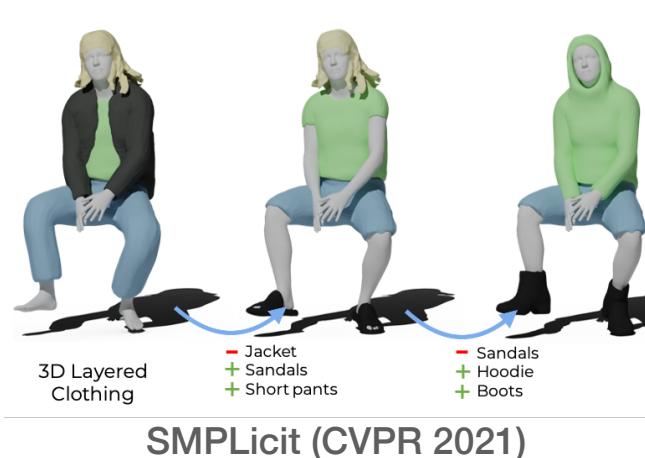
²Naver Webtoon AI

1. Goal

Generate a high-fidelity 3D human mesh from SMPL-X and text prompts



2. Previous Work

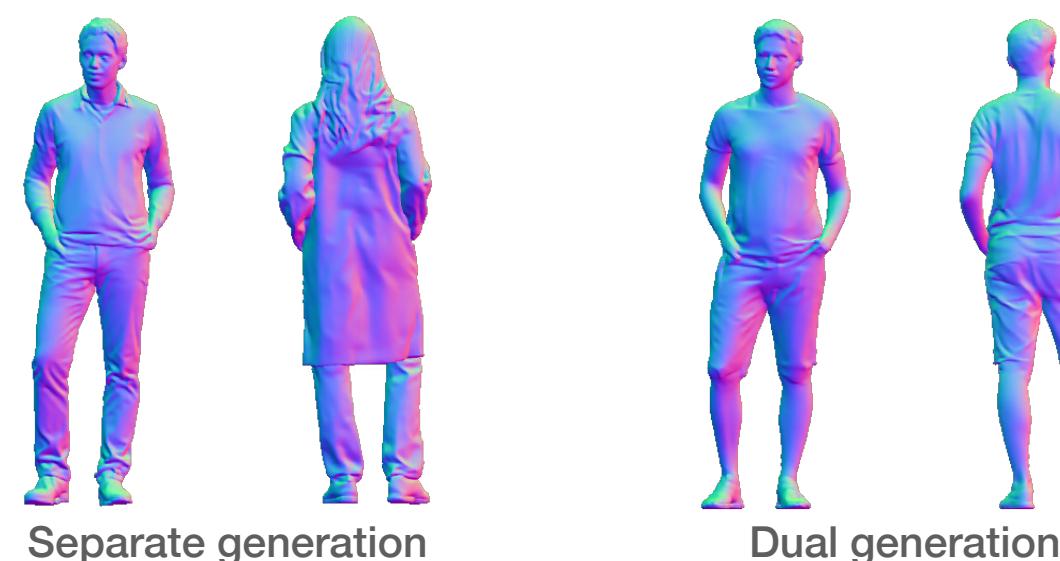


- SMPL++ approach
- Rely on templates for body & clothing

Limited diversity

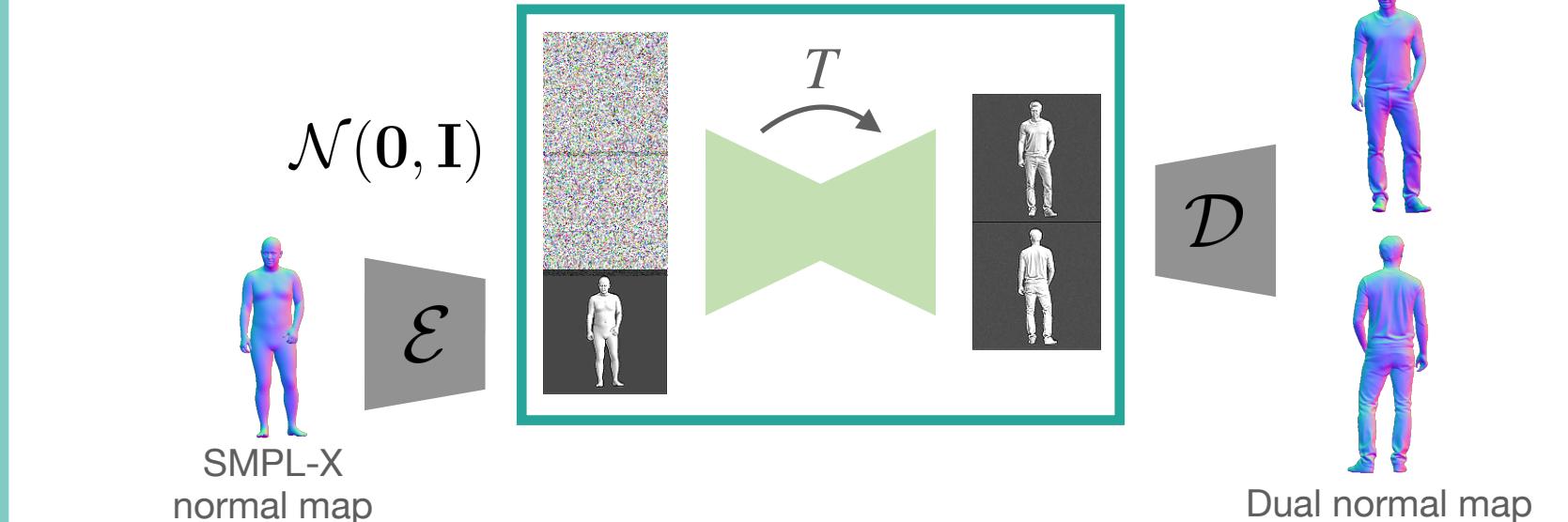
3. Key Insights

- Decompose 3D generation into **2D normal map generation + 3D reconstruction**
- **Generating front and back at once** gives holistic geometric details of human

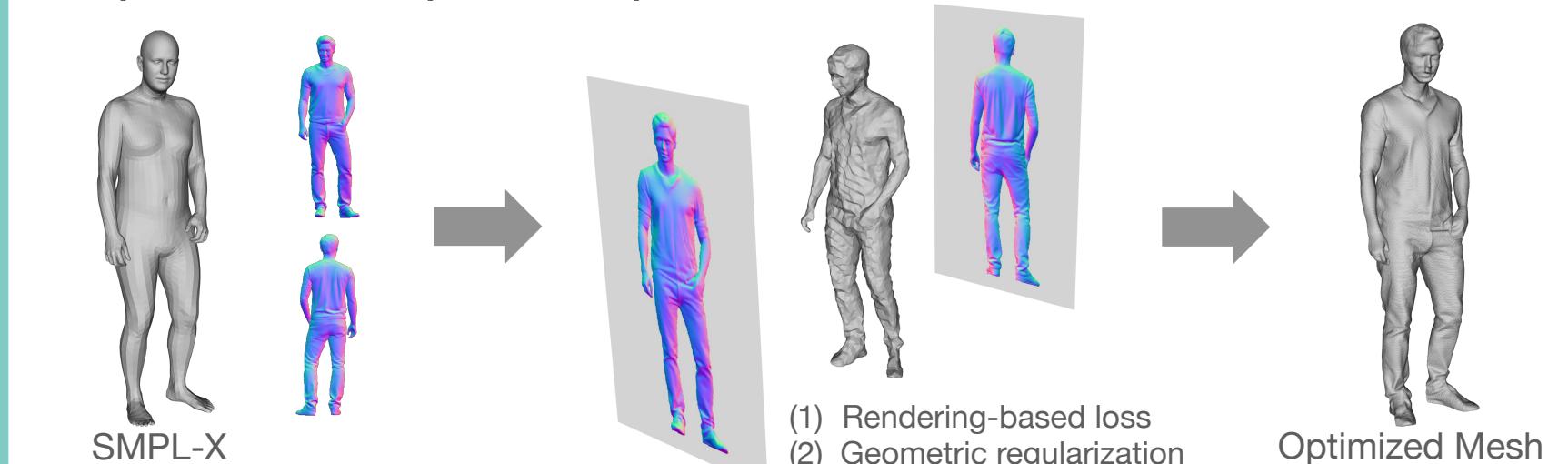


4. Method

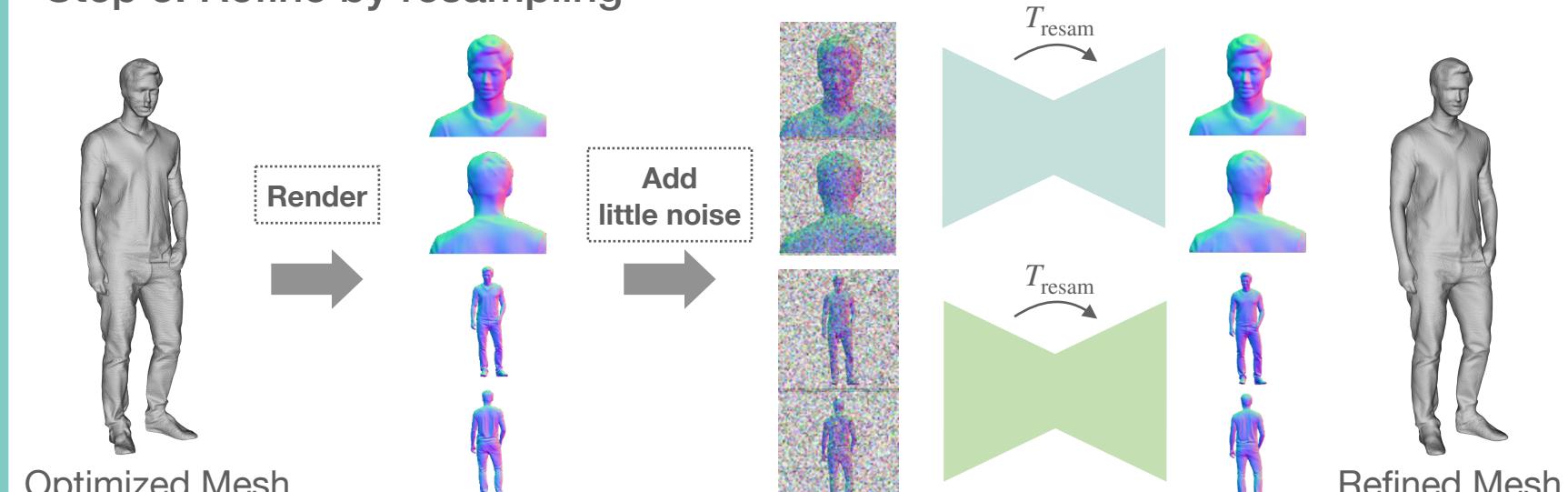
Step 1. Dual normal map generation via diffusion



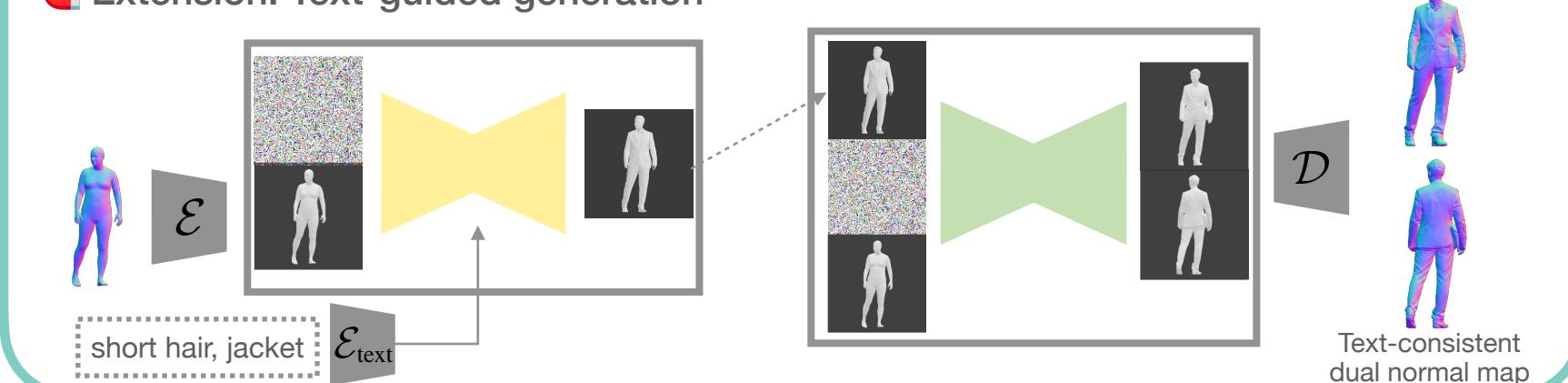
Step 2. Normal map-based optimization



Step 3. Refine by resampling



Extension: Text-guided generation



5. Results

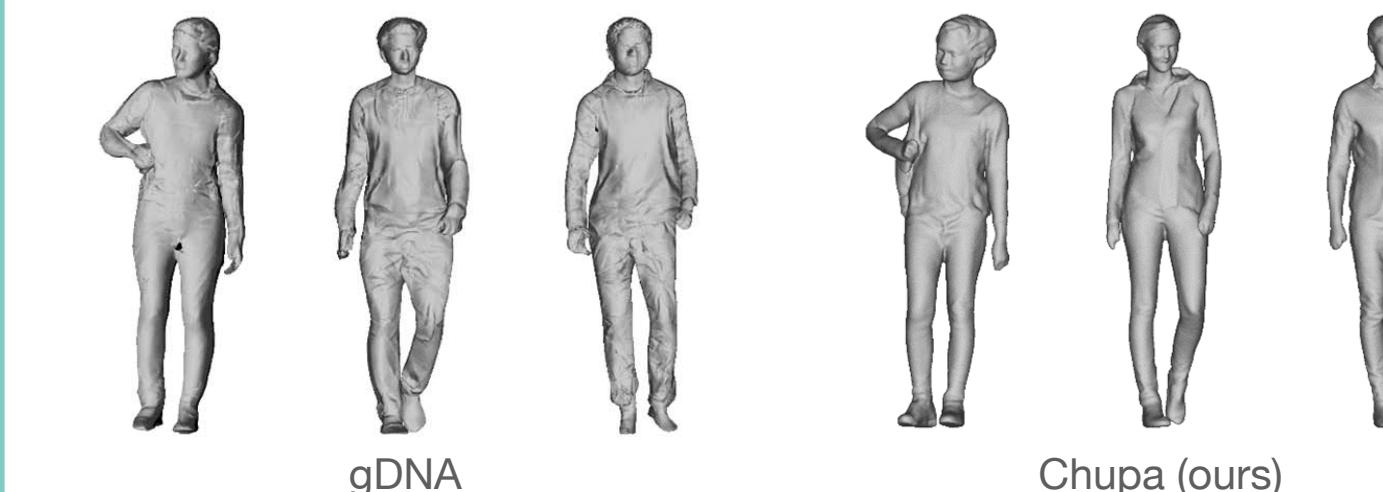
• Quantitative results

Method	FID _{normal}	FID _{shade}
gDNA _{coarse} [1]	53.74	68.14
gDNA _{fine} [1]	36.43	45.57
Ours	21.90	36.58

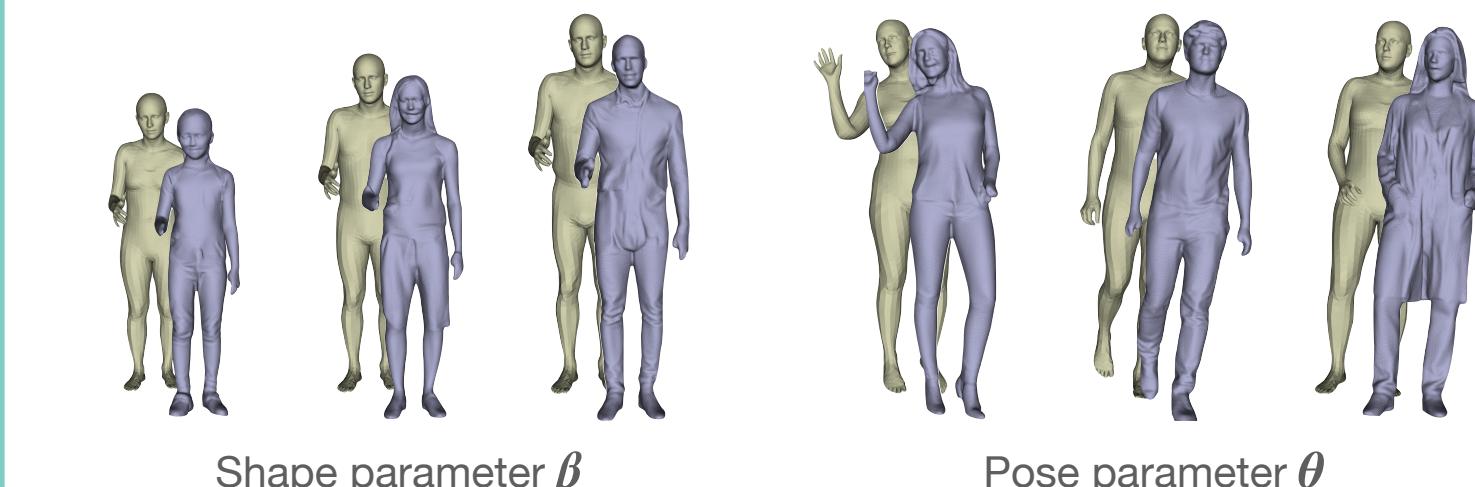
• Ablation study

dual.	L_{sides}	refine _{body}	refine _{face}	FID _{normal}
✓				30.55
✓	✓			26.31
✓	✓	✓		25.50
✓	✓	✓	✓	22.61
✓	✓	✓	✓	21.90

• Qualitative comparison with gDNA



• Control SMPL-X parameters



• Text-guided generation

