DermSynth3D: Synthesis of in-the-wild Annotated Dermatology Images

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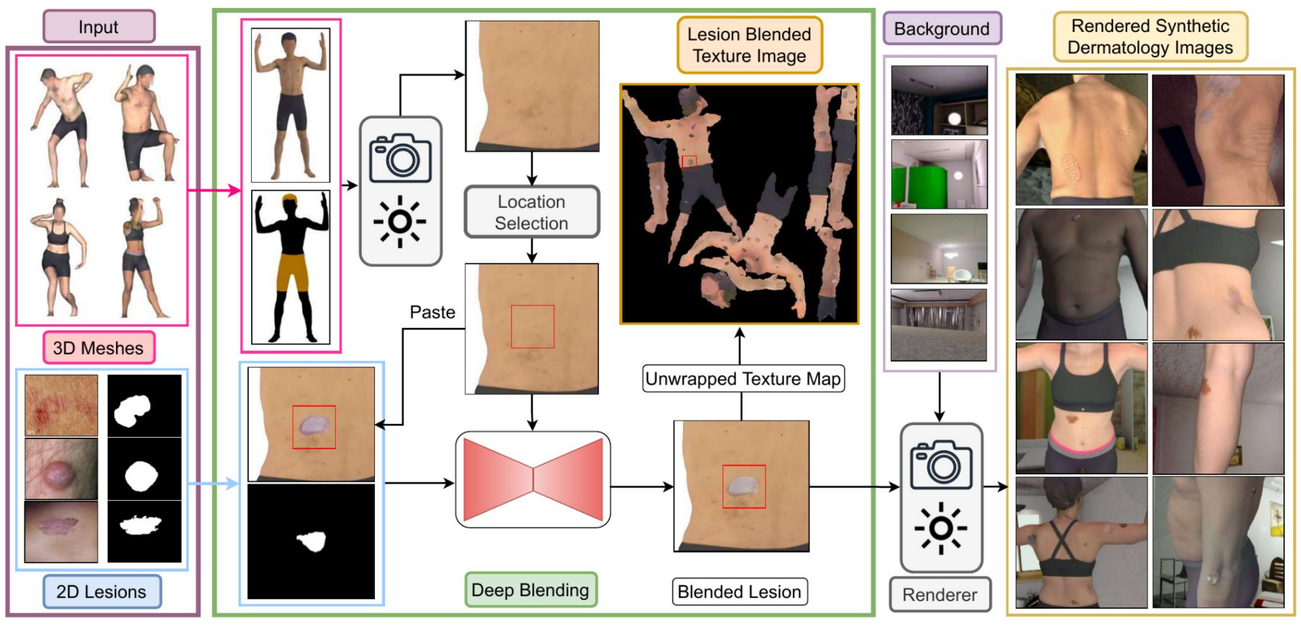
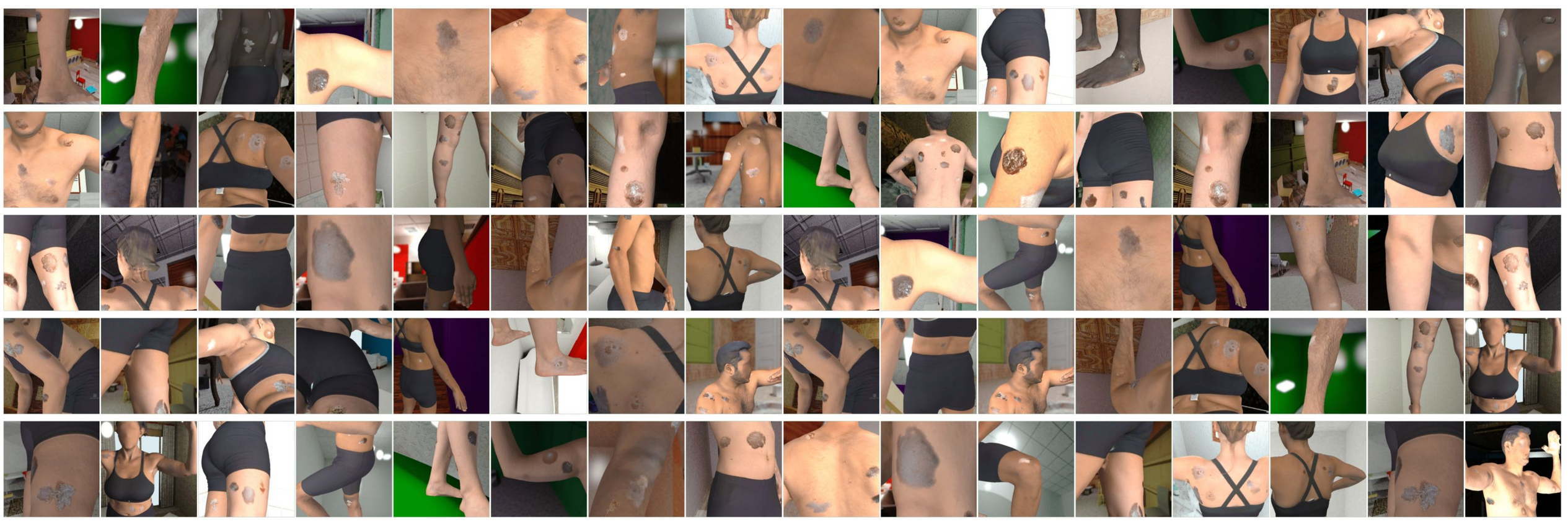
Highlights

- **Synthesis** of skin lesion images by **rendering 2D views** of a **3D scene**.
- Skin lesion **blending on 3D human textured meshes** at **optimized body locations** with controlled lighting, choice of background, and optimal camera viewpoint.
- 2D images with **dense annotations** for skin, lesion and body-part segmentation.
- **Synthetic data with annotations** can be used to train DL models for **downstream dermatological tasks**.
- **Open-source** modular code and datasets.

Overview

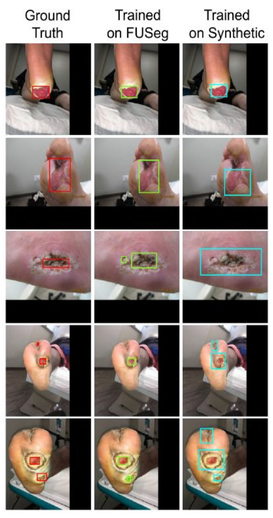


Sample Synthetic Images

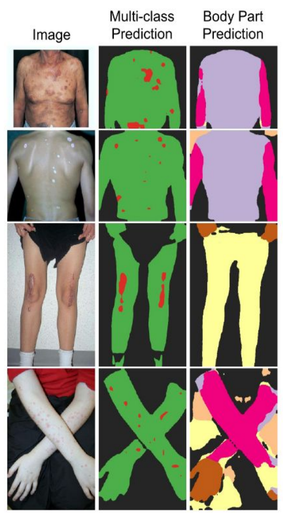


Dense Annotations

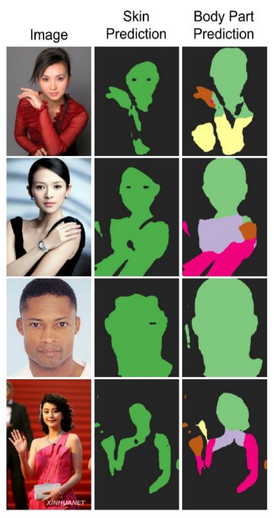
Qualitative Results: Downstream Tasks



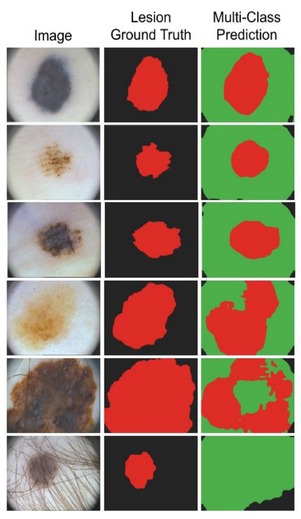
Foot ulcer detection



Multi-class skin segmentation and **body part prediction**

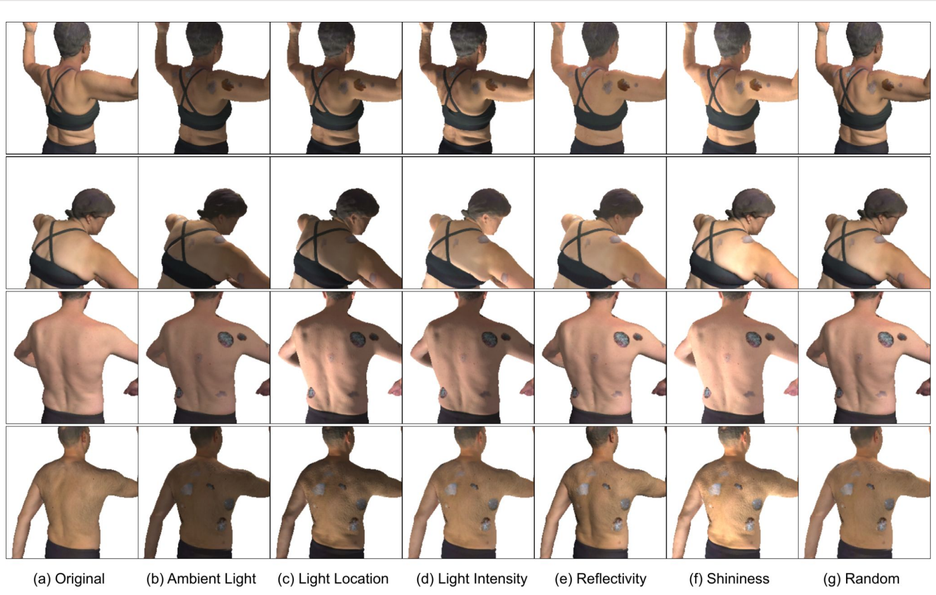


Skin segmentation and **body part prediction**

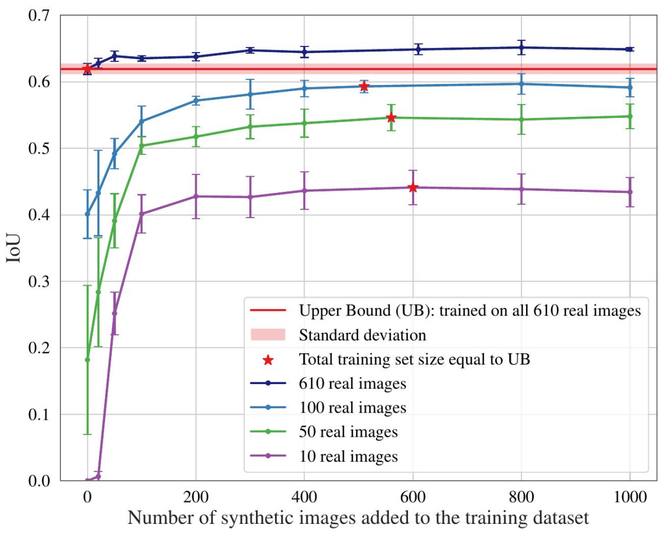


Multi-class skin lesion segmentation

Lighting Variation

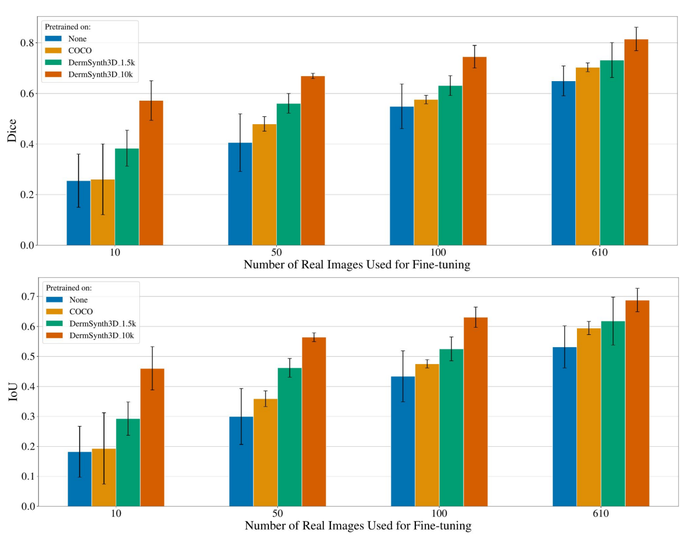


Quantitative Results



Foot Ulcer Detection

'100 synthetic + only 10 real images' yields same IoU as '100 real images'.



Foot Ulcer Segmentation

Pretraining on only 1,500 images outperforms COCO-pretraining.

Acknowledgements

Skin lesion images: **Fitzpatrick17k**

3D meshes of humans: **3DBodyTex.v1**

Background scenes: **SceneNet-RGBD**