Synthetic Data with Digital Humans

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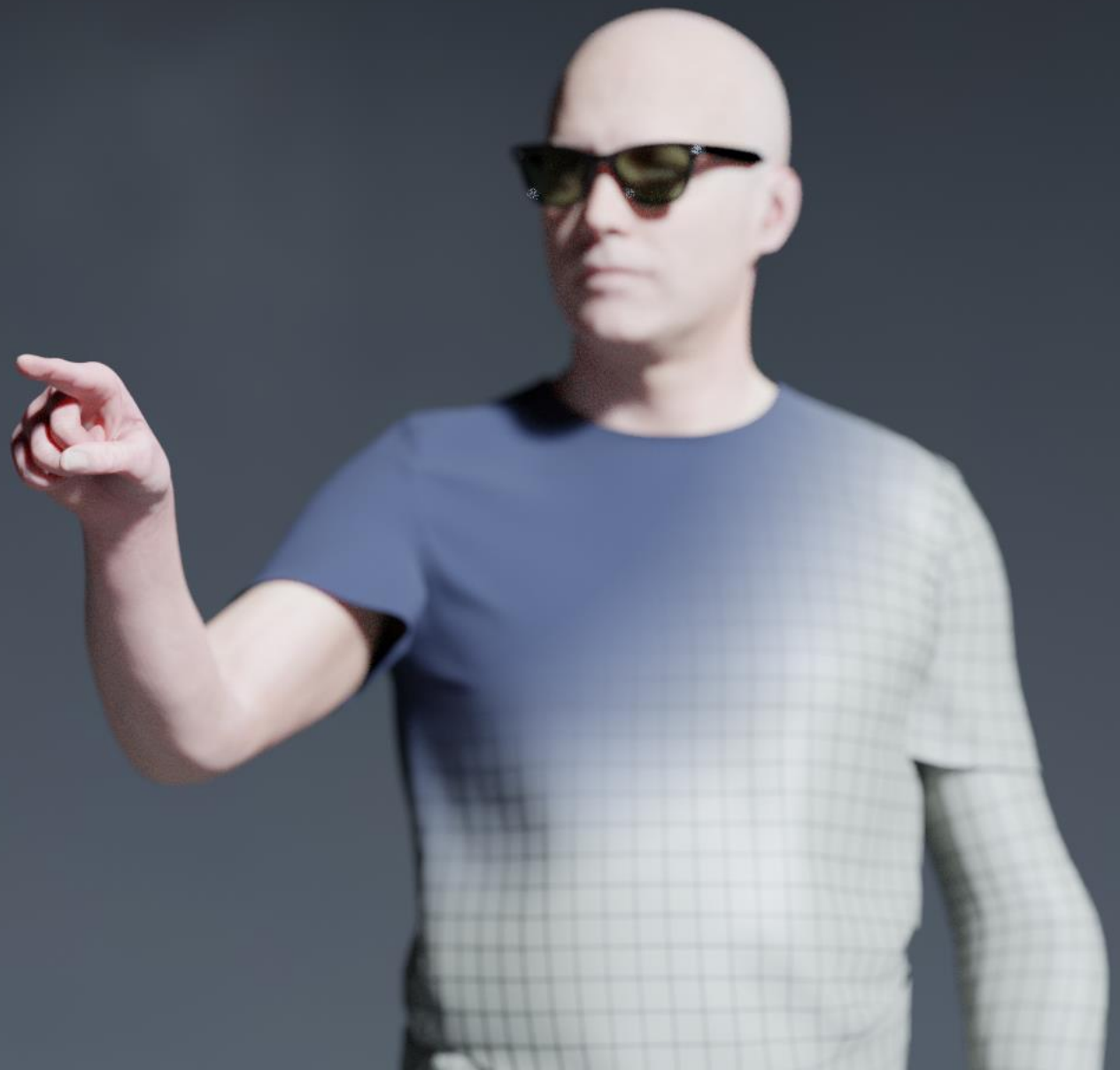


Microsoft


Trained with
synthetic data only
Timeline : Frames 3204 -- 3303
LowRes : AB Map
LowRes-Class : Segment WinMap
ROI 1 : AB Map
ROI 1 : Segment WinMap
ROI 2 : AB Map
ROI 2 : Segment WinMap
3D : AB Point Cloud

Synthetic training data

Synthetic training data are labelled images made using computer graphics.

Why use synthetic data?

- Clean labels without annotation noise or error
- Generate labels impossible to annotate by hand
- Easy to control variation in dataset

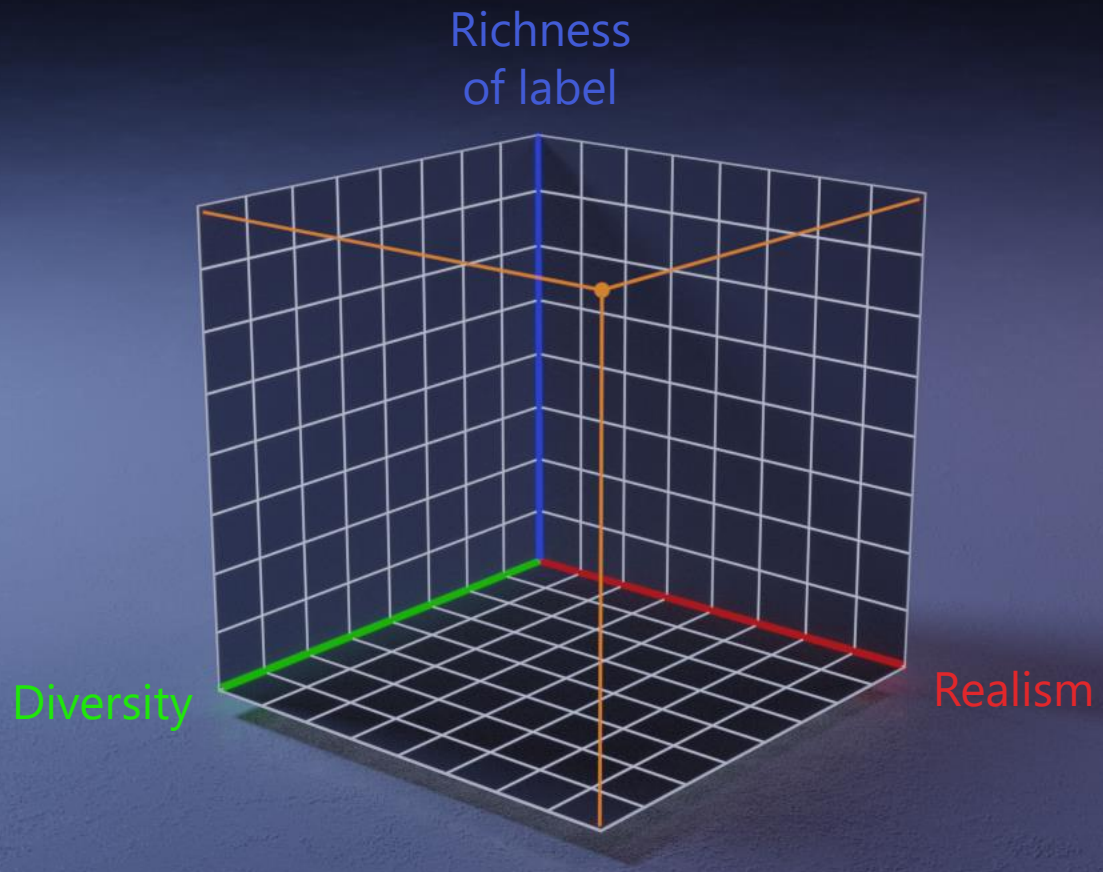
Synthetic Training Data for Hand Tracking

Visible Light - RGB

Depth Camera

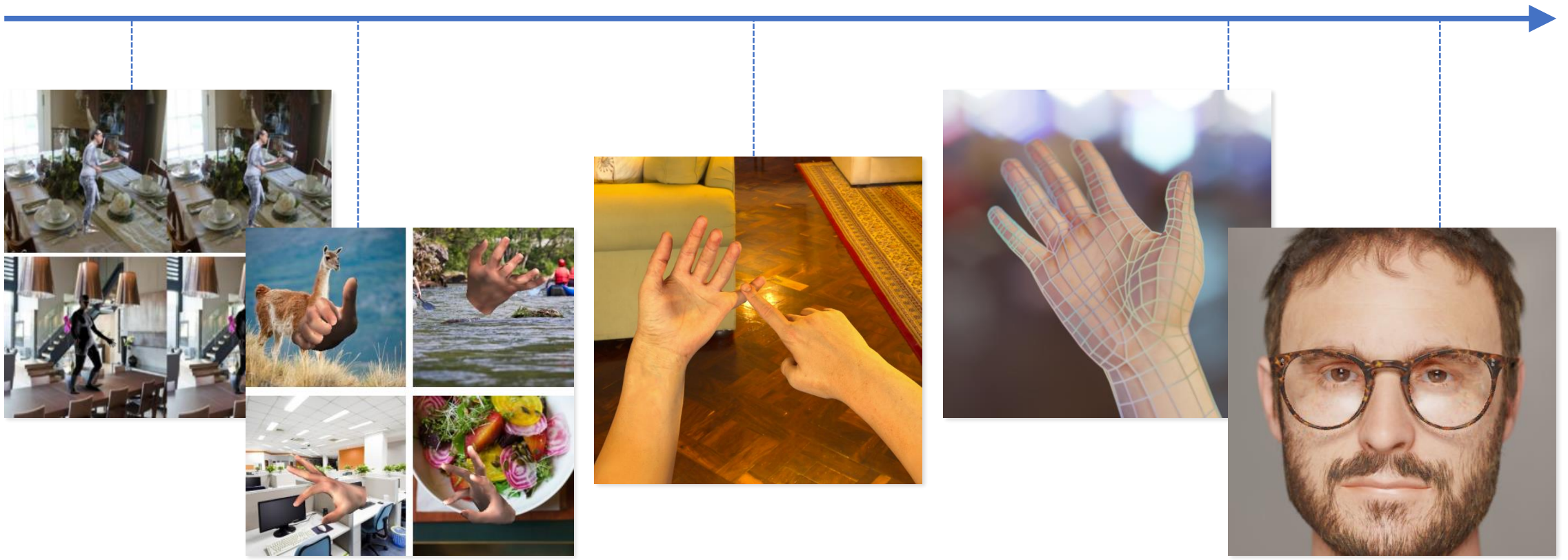
Ground Truth for Machine Learning

What makes good synthetic data



Realism

Why do we care? We want to avoid domain mismatch.

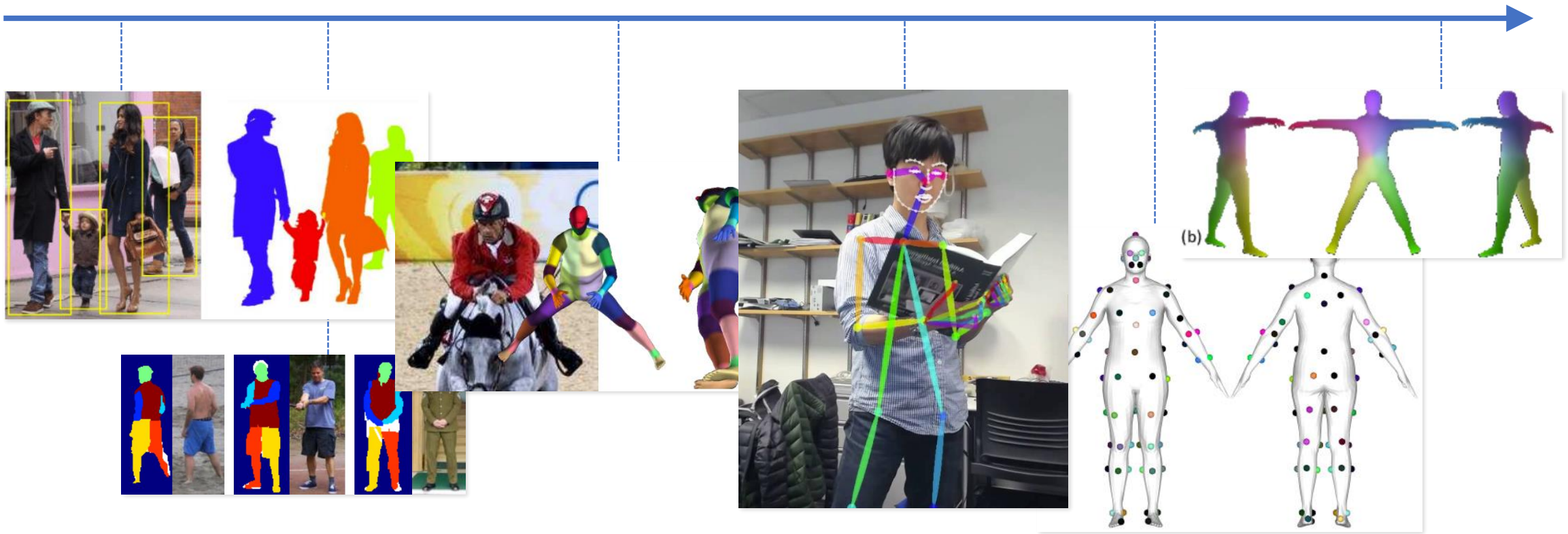


Diversity


Mark Zuckerberg
Follow · January 25, 2016 near Palo Alto ·
First day back after paternity leave. What should I wear? — feeling undecided.

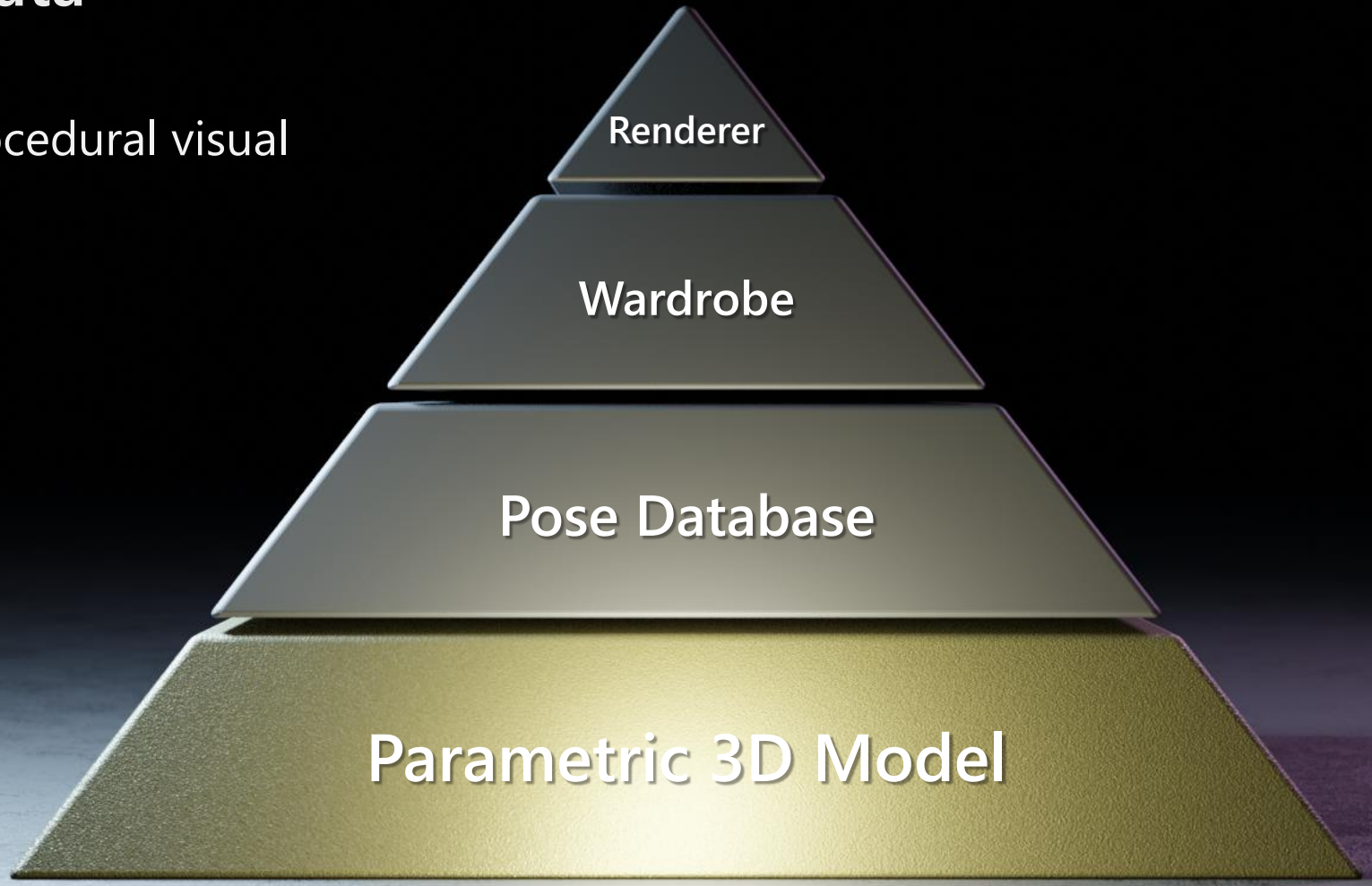
Richness of label

With Synthetics, we can make labels which are impossible to label by hand.

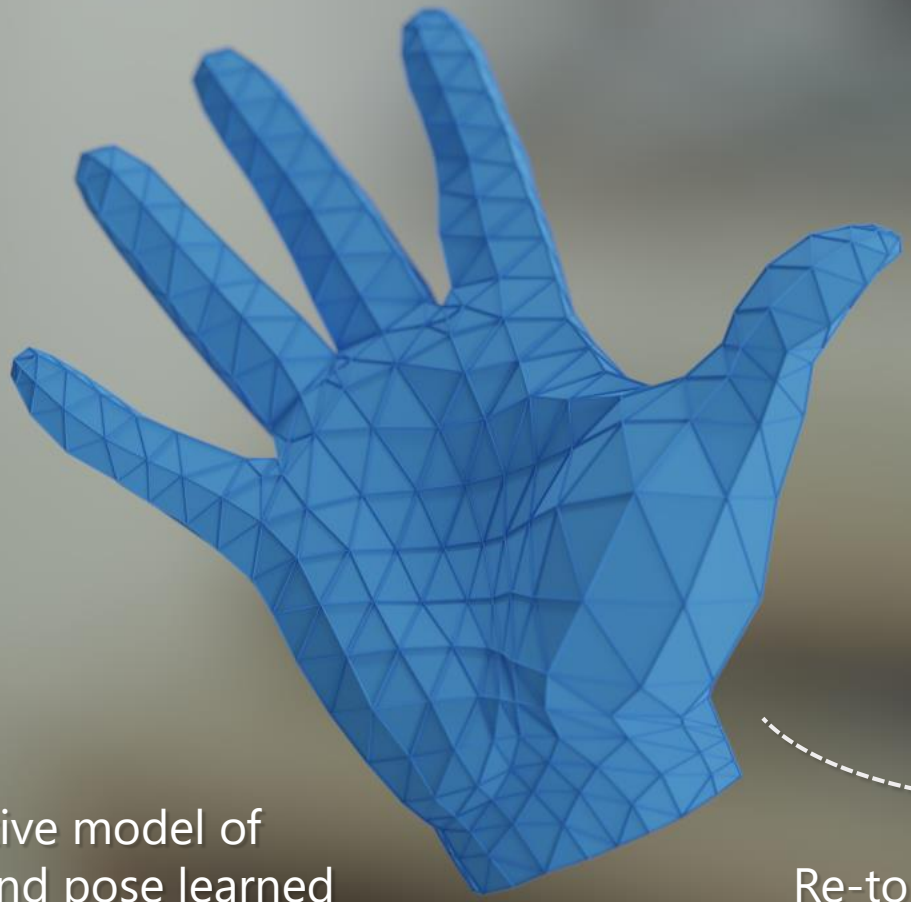


How to make good synthetic data

Synthetics is procedural visual effects at scale.



Parametric 3D hand model



Generative model of shape and pose learned from 3D scans

Re-topologize and apply realistic textures

Sample hand appearance from texture library

Mocap pose database

24 camera capture studio

148,000 hand poses

97 hand shapes

Mocap pose database

Hand shapes and poses recovered with cloud-powered offline fitter.

Digital Wardrobe

Visible light

Depth camera (IR)

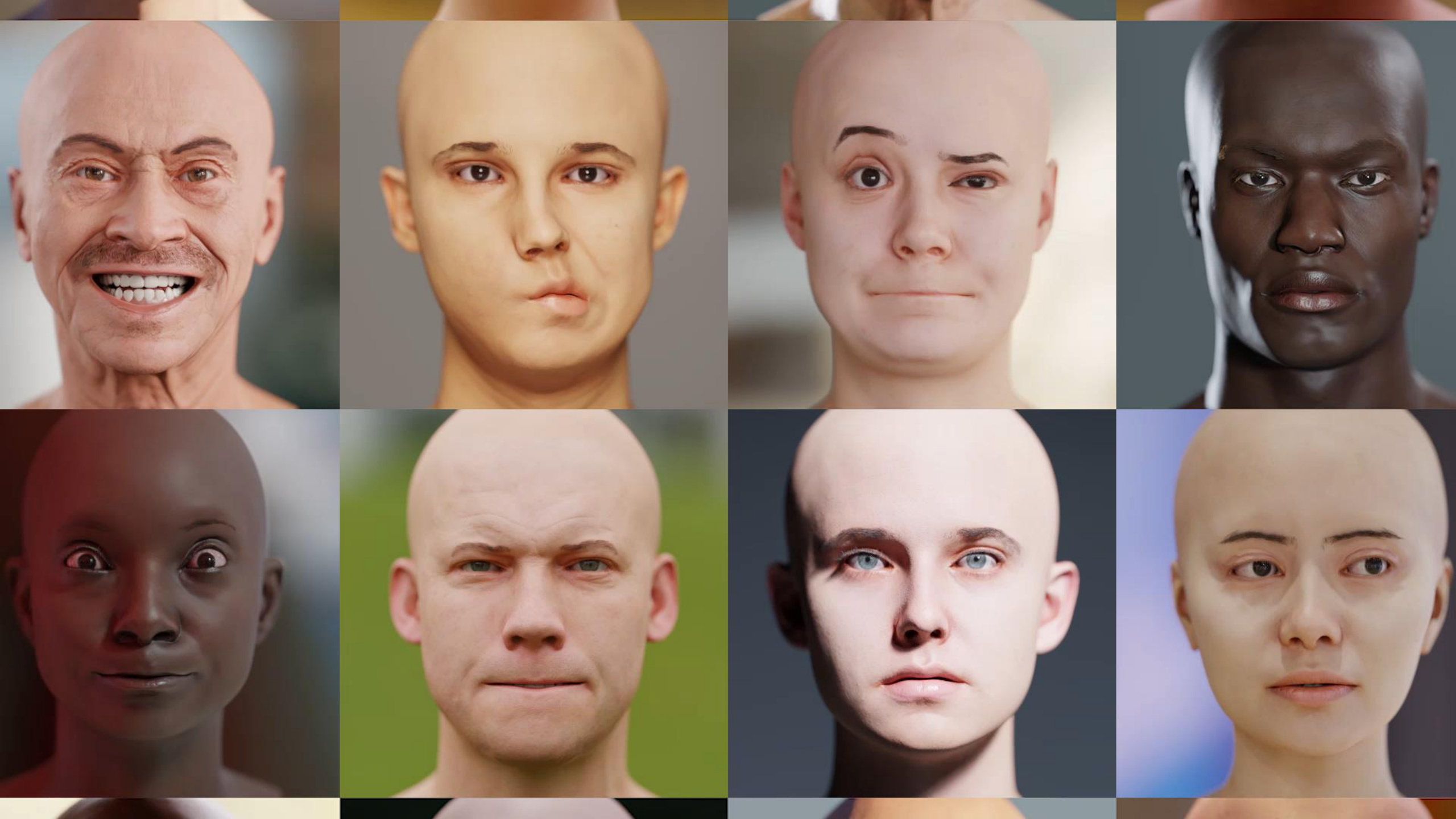
Synthetic labels

Synthetic > Real

With synthetics, you can solve tasks you never thought possible with real data.

- Per-pixel dense correspondence estimation.
- Regressing 453 keypoints simultaneously.

Experimental results; not representative of any product experience



Synthetic Digital Humans

Parametric human body model

Sample shape from statistical model
Sample pose from motion capture data

Body with sampled shape and pose

Apply realistic skin textures
Attach and simulate clothing

Photorealistic human with rich labels for machine learning

Simulated egocentric view

Synthetics is Visual Effects

Synthetic > Real