

CAPTURING DYNAMIC TEXTURED SURFACES OF MOVING TARGETS

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ABSTRACT

We present an end-to-end system for reconstructing complete watertight and textured models of moving subjects such as clothed humans and animals, using only three or four handheld sensors. The heart of our framework is a new pair-wise registration algorithm that minimizes, using a particle swarm strategy, an alignment error metric based on mutual visibility and occlusion. We show that this algorithm reliably registers partial scans with as little as 15% overlap without requiring any initial correspondences, and outperforms alternative global registration algorithms. This registration algorithm allows us to reconstruct moving subjects from free-viewpoint video produced by consumer-grade sensors, without extensive sensor calibration, constrained capture volume, expensive arrays of cameras, or templates of the subject geometry.

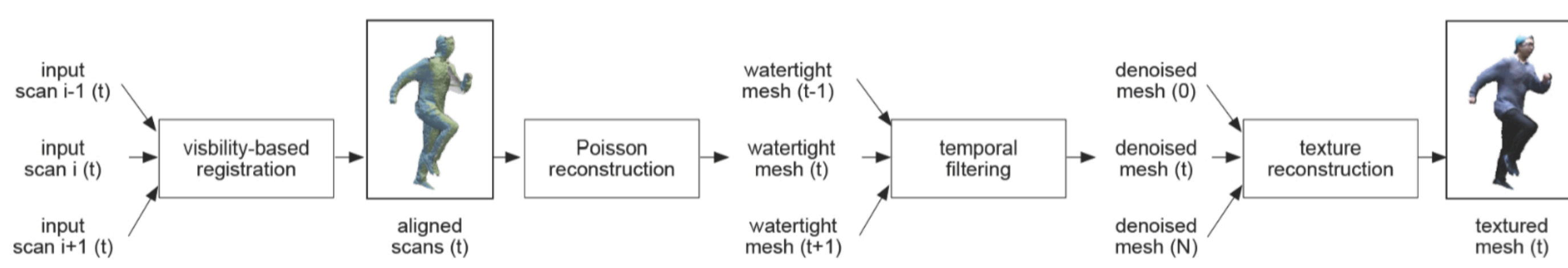
HAND-HELD CAPTURE



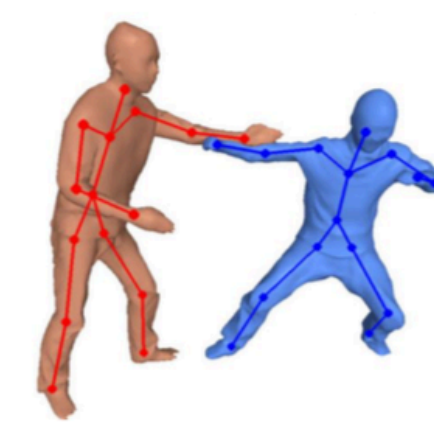
Kinect One (V2)

Structure Sensor

SYSTEM OVERVIEW



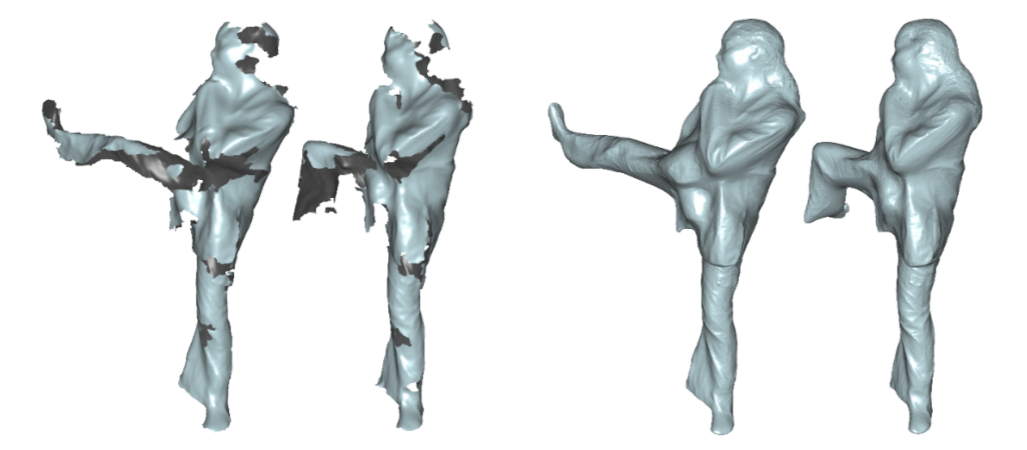
PRIOR WORK



template-based

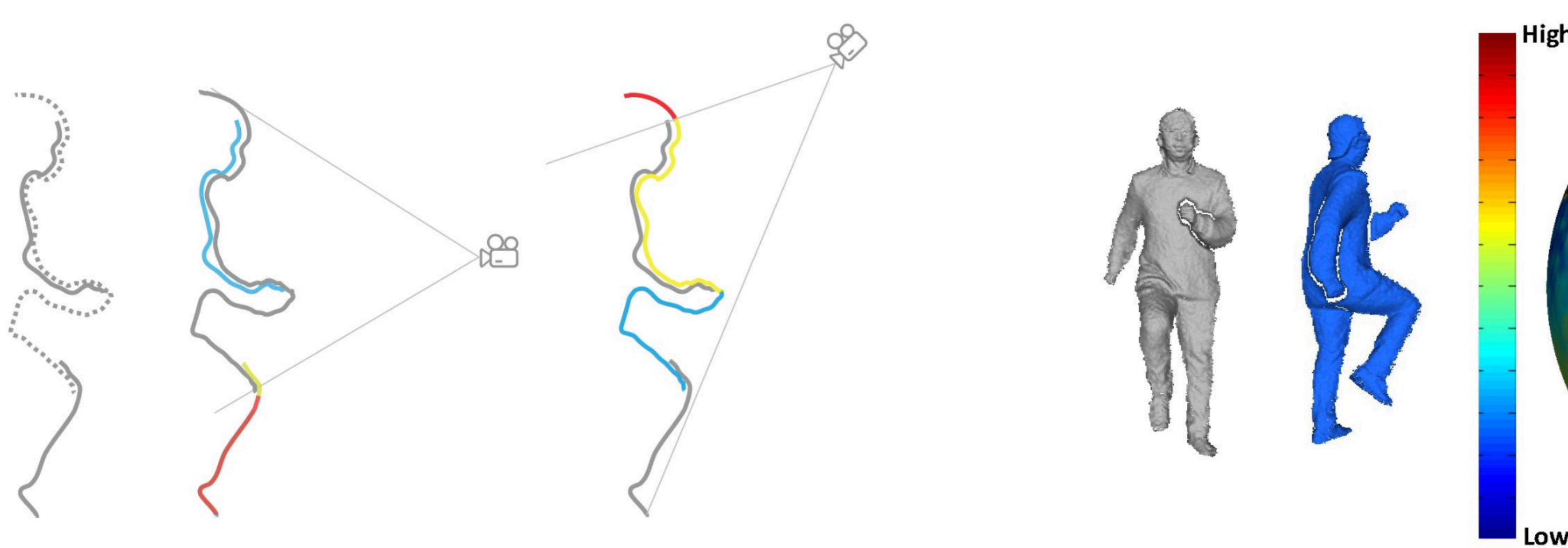


costly capture setup



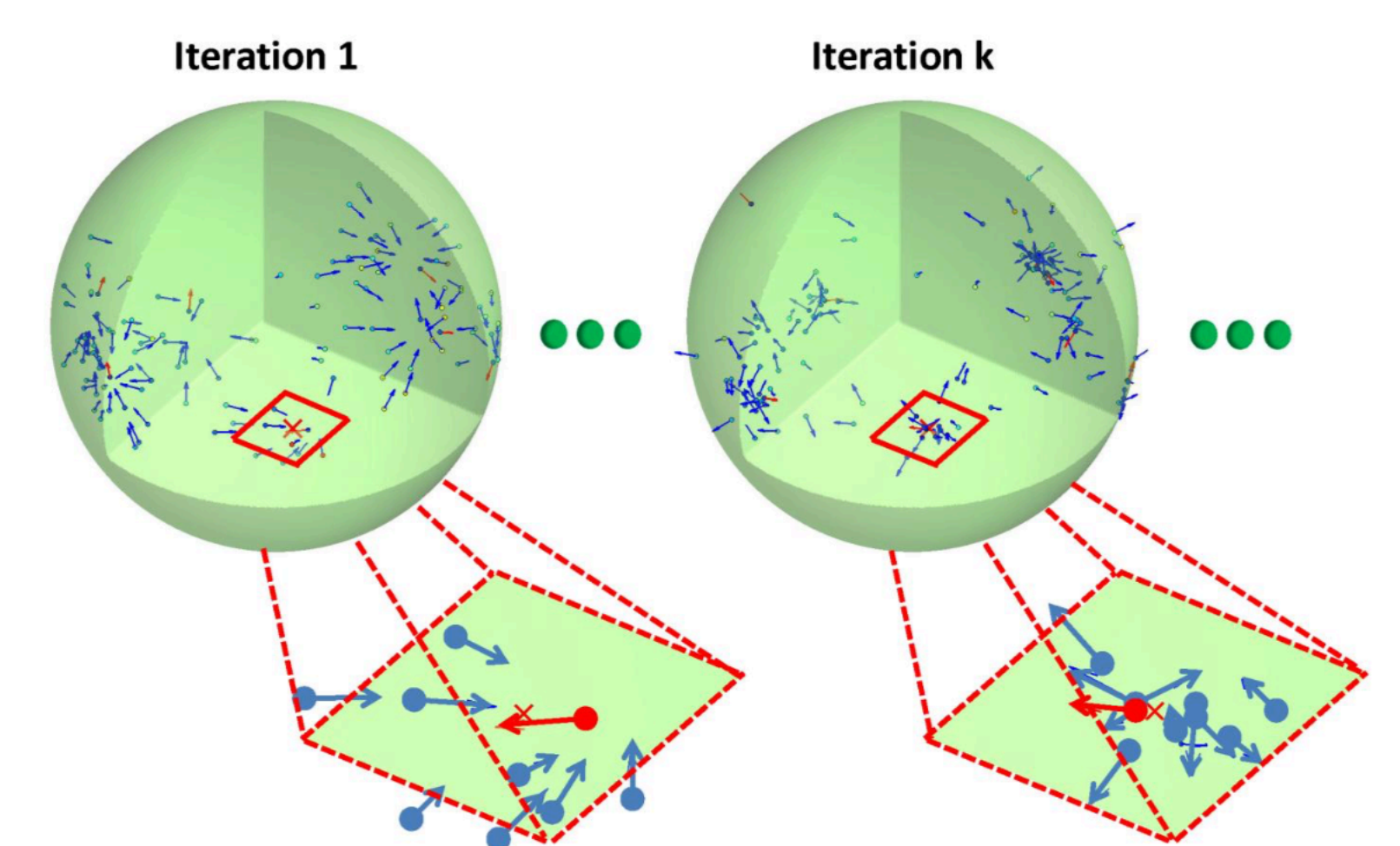
dynamic shape completion

VISIBILITY-BASED REGISTRATION



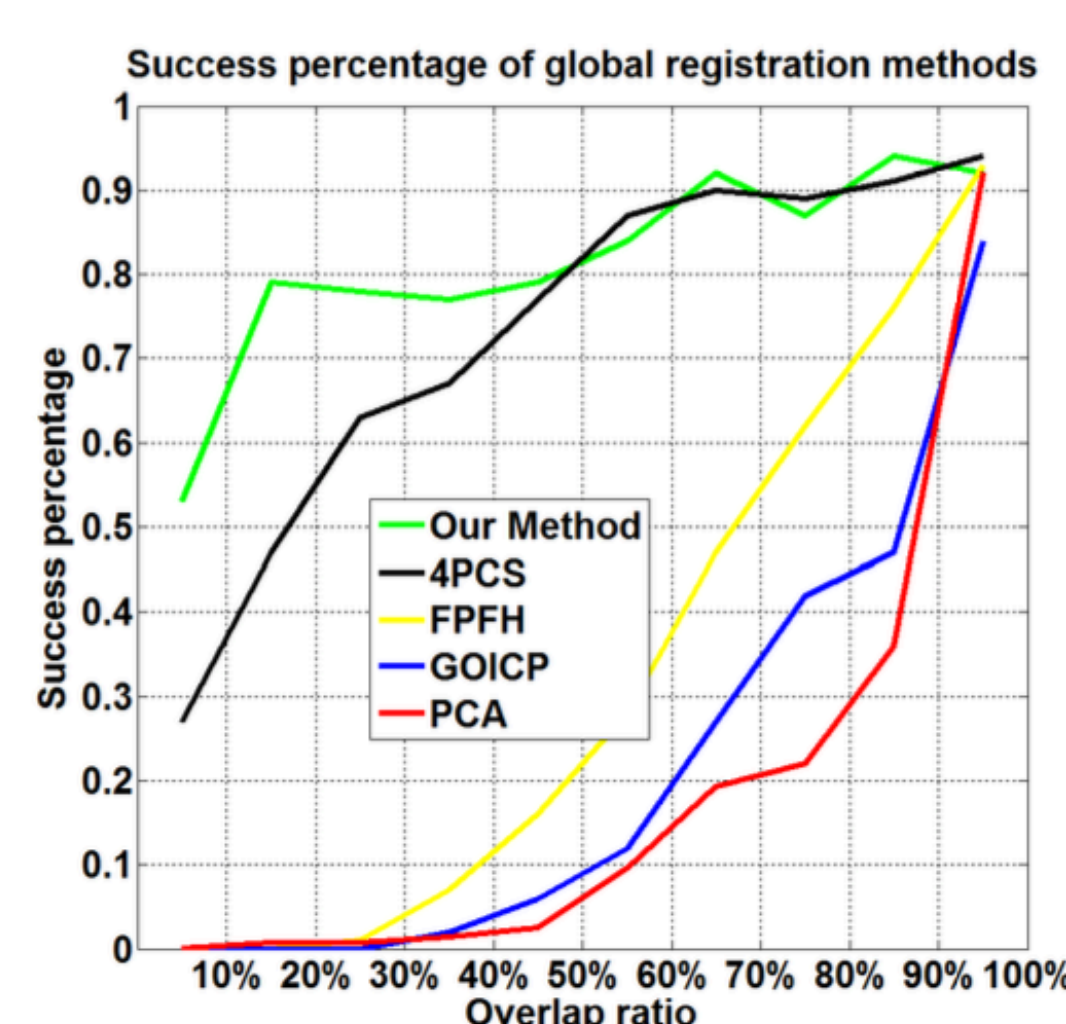
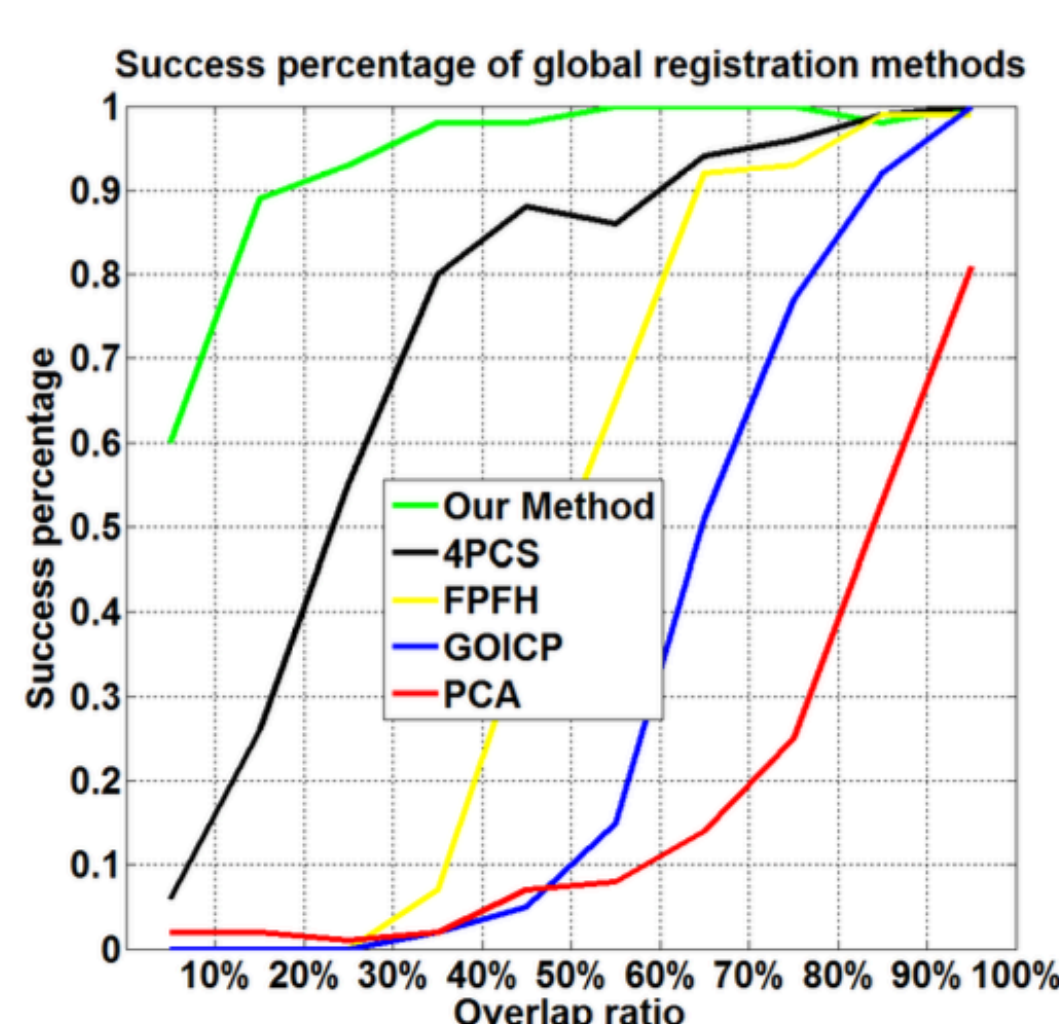
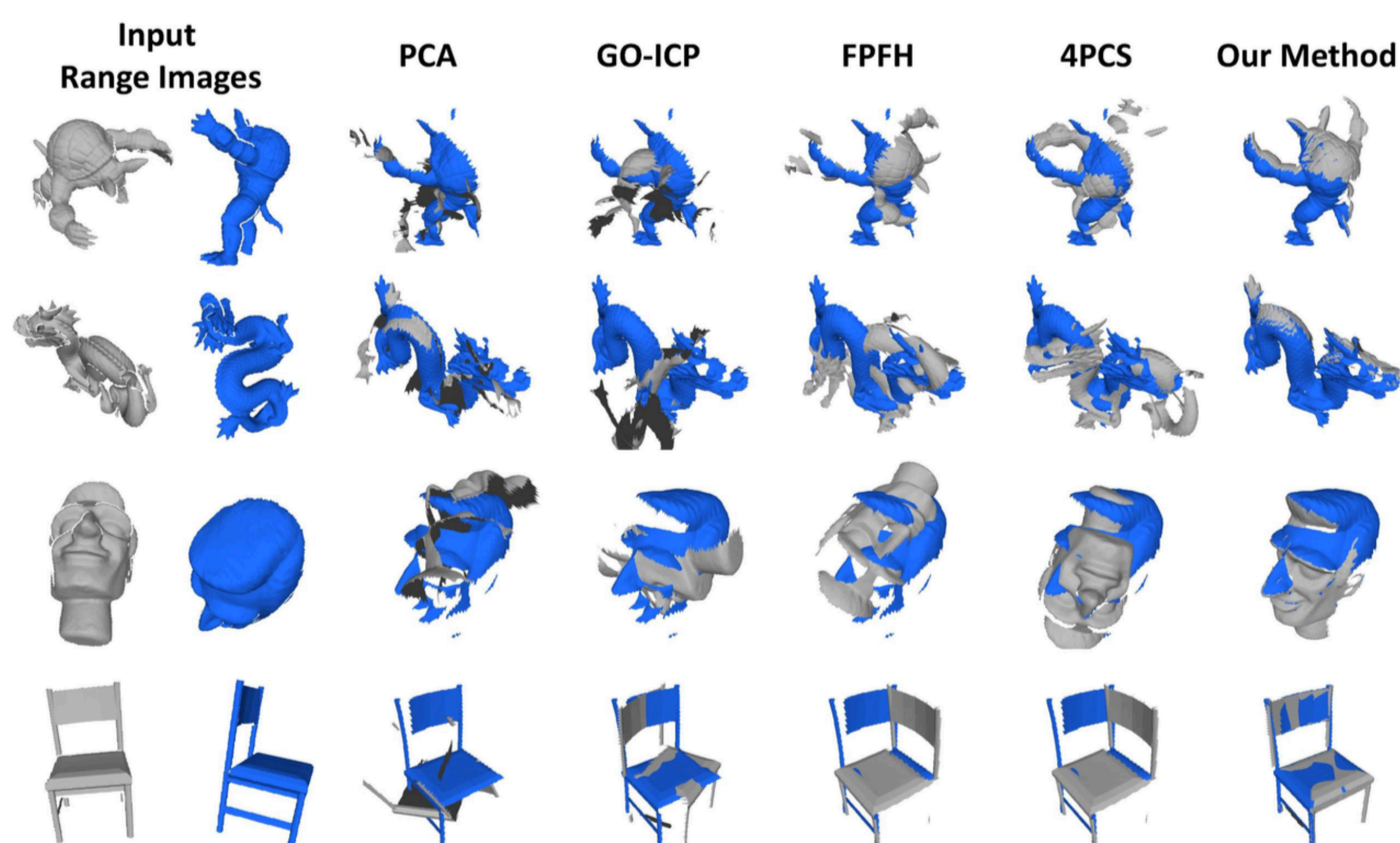
visibility error metric (VEM)

VEM in rotational space

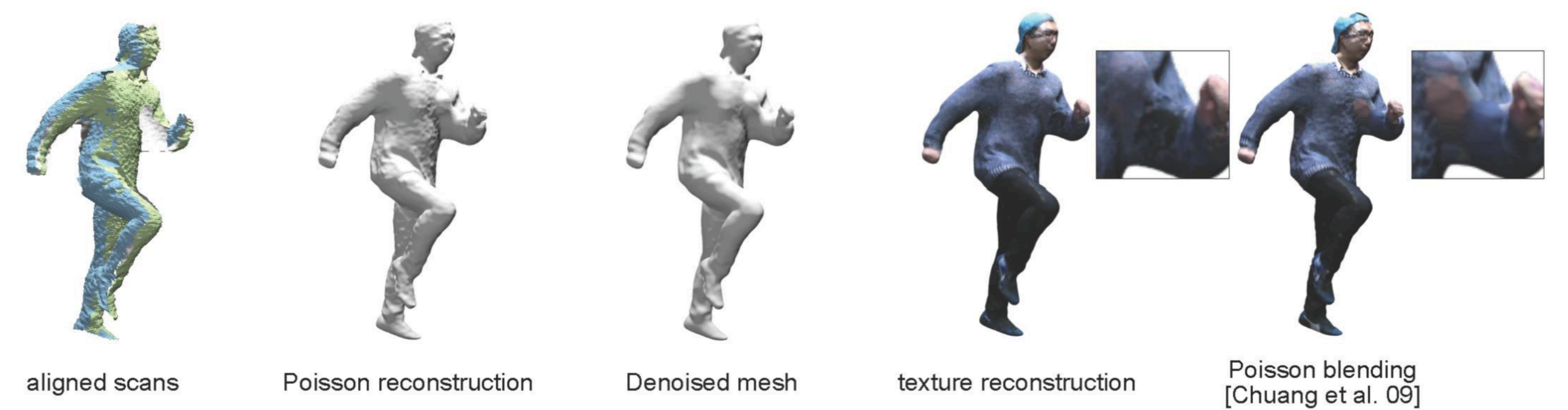


particle swarm & gradient descent optimization

REGISTRATION EVALUATION



SHAPE & TEXTURE RECONSTRUCTION



CAPTURE RESULTS

