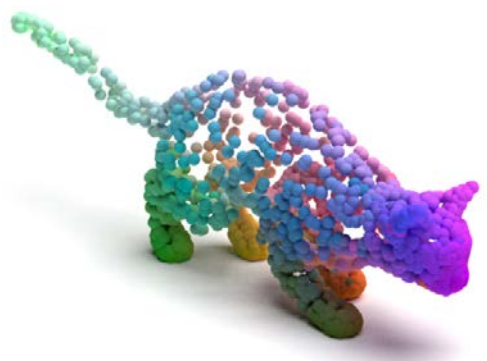
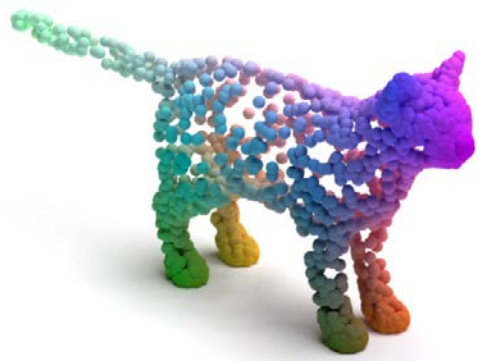


DPC: Unsupervised Deep Point Correspondence via Cross and Self Construction

Itai Lang*, Dvir Ginzburg*, Shai Avidan, Dan Raviv



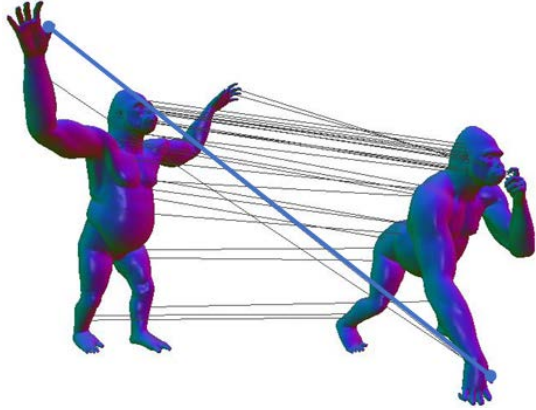
*Equal contribution



Target shape

Source shape

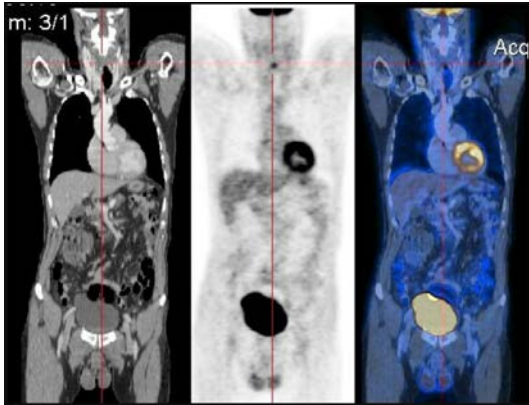
Dense Correspondence Applications



Character Animation



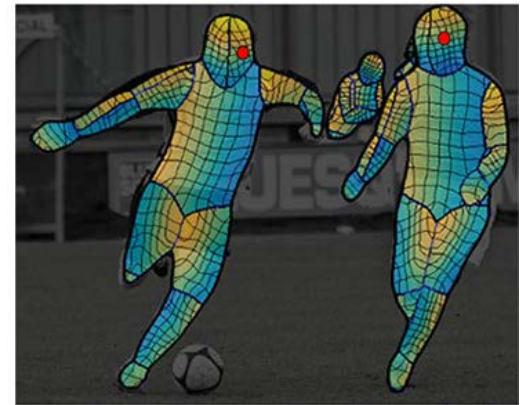
Virtual Try-on



Medical Alignment

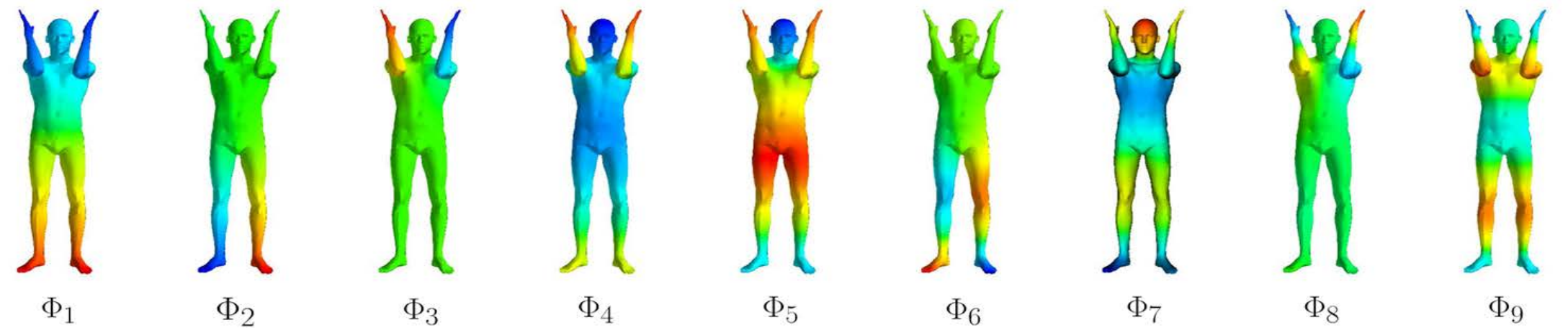


Action Recognition

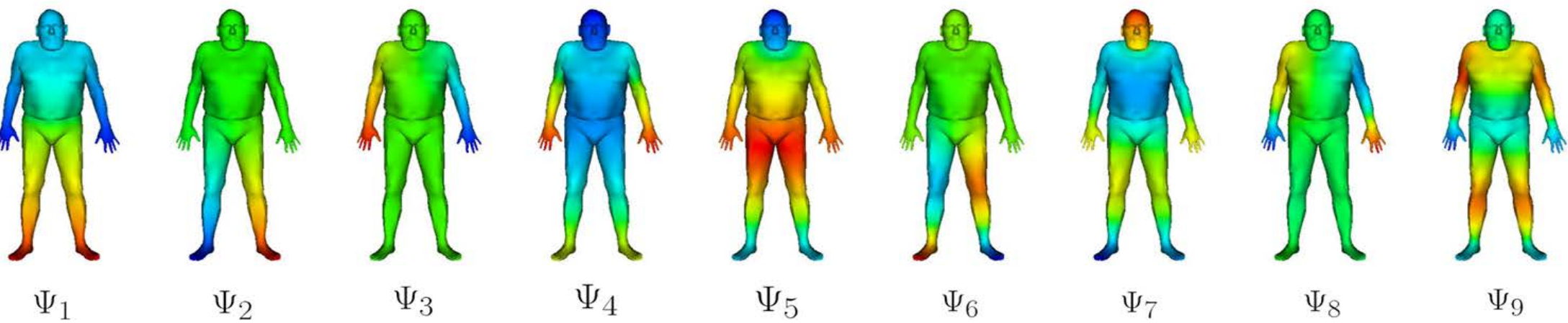


Spectral Approach

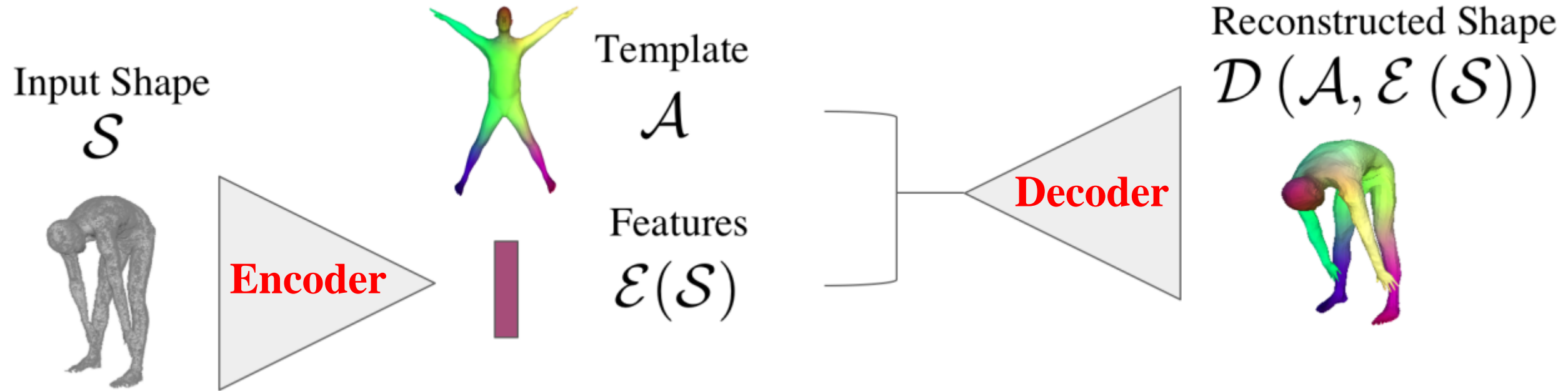
Source
Shape



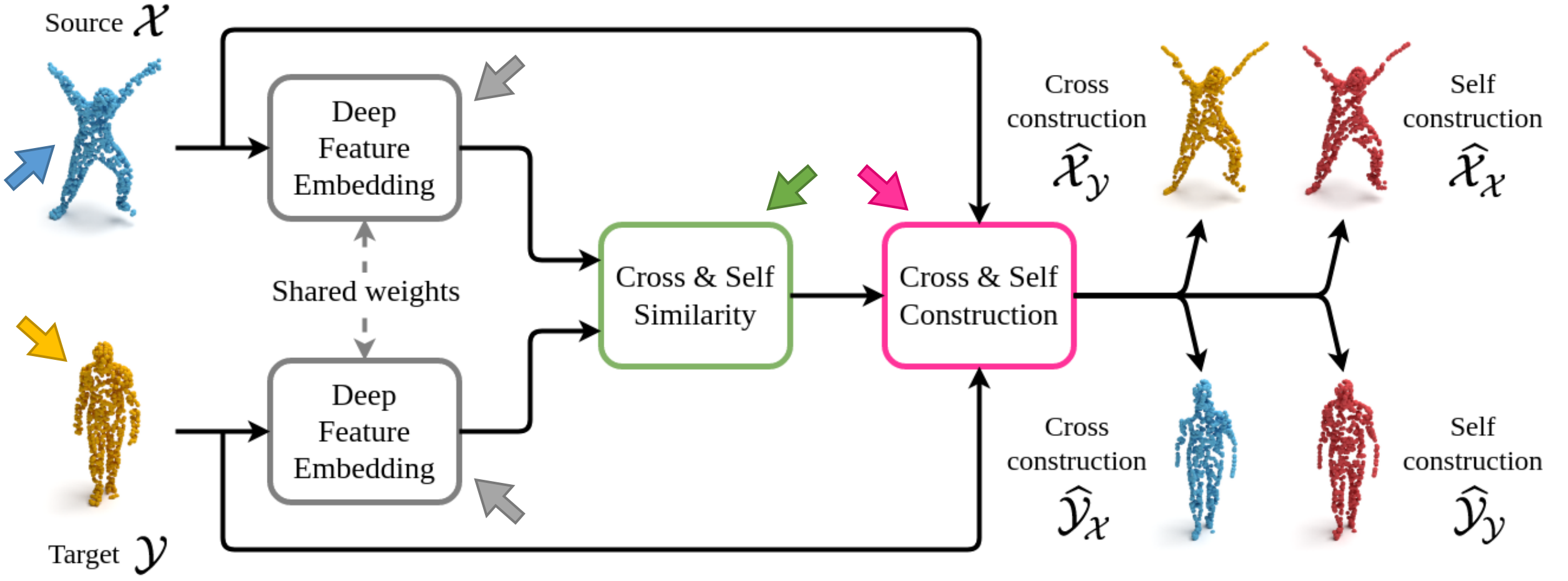
Target
Shape



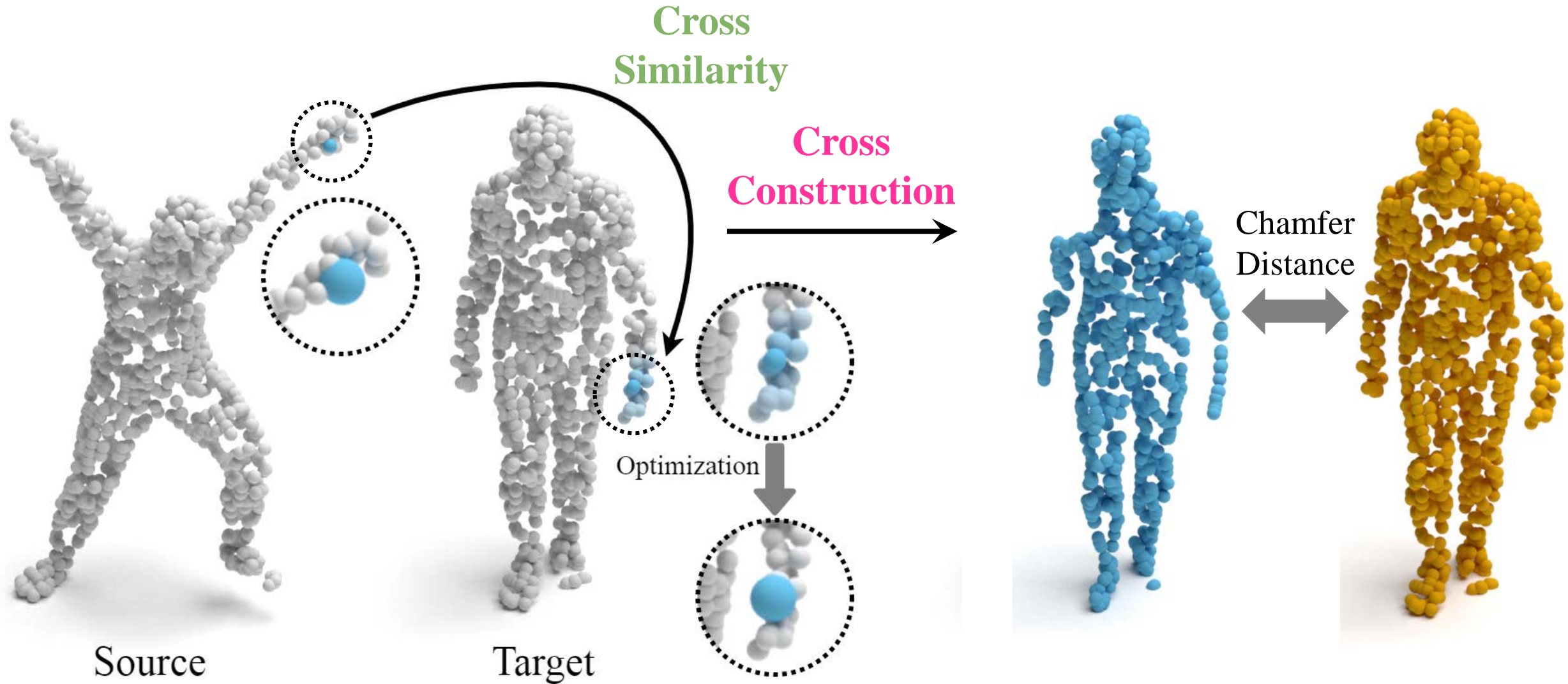
Spatial Approach



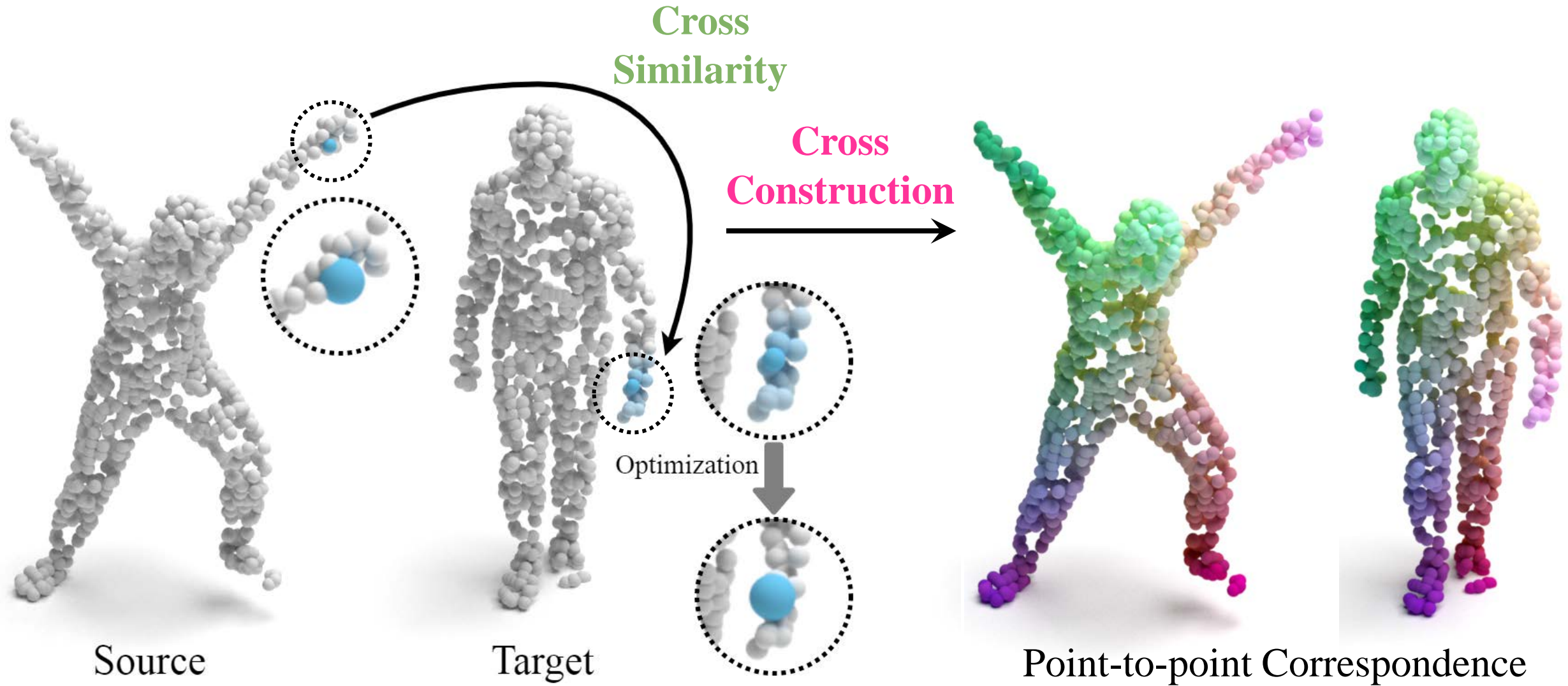
DPC



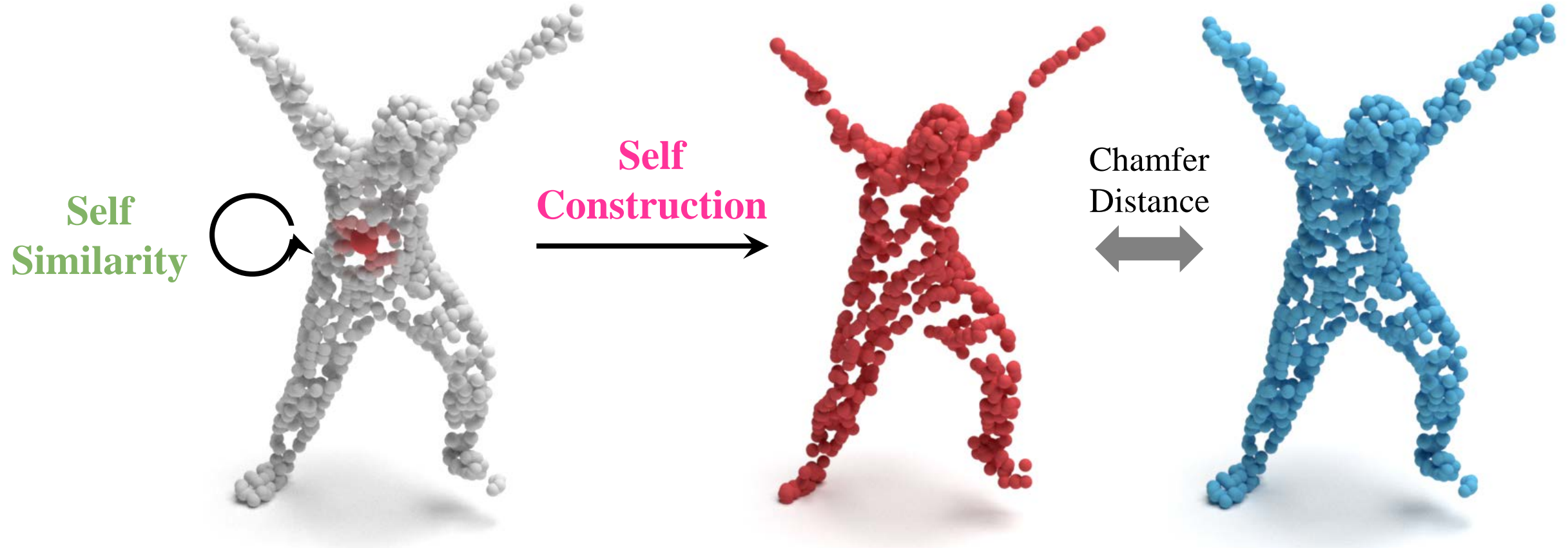
Cross Similarity and Construction



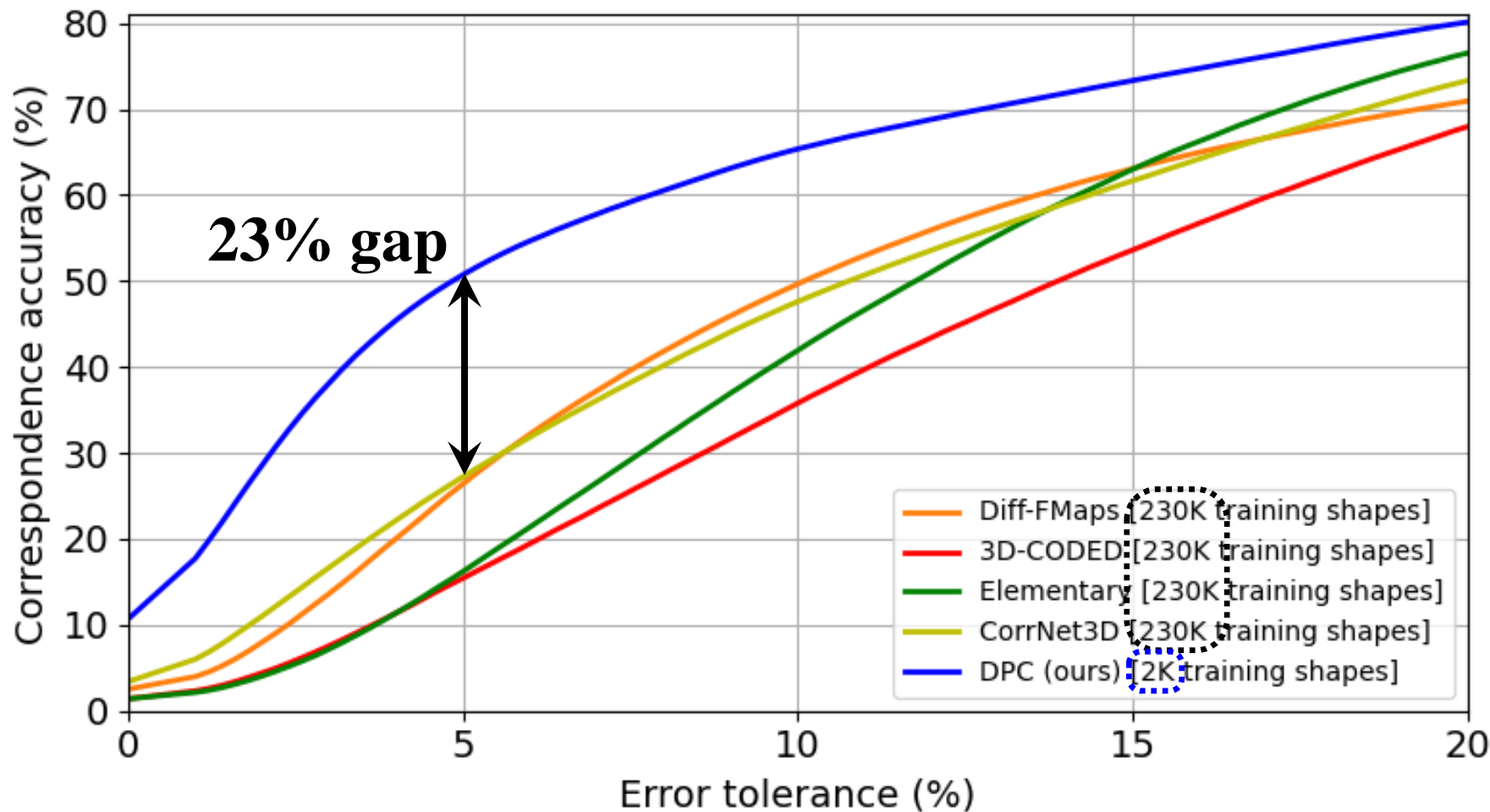
Cross Similarity and Construction



Self Similarity and Construction



Results for Human Shapes



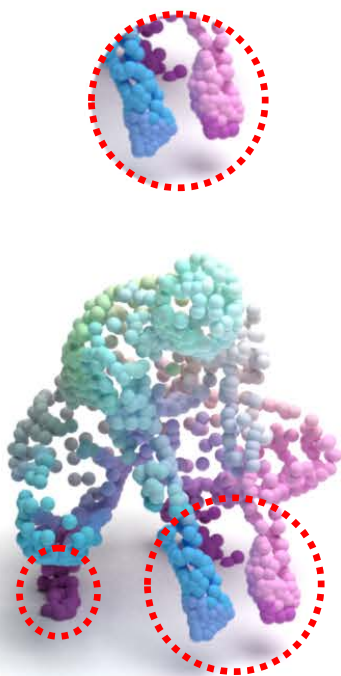
SURREAL, Groueix, *et al.*, 2018; SHREC'19, Melzi *et al.*, 2019

Marin, *et al.*, 2020, 3D-CODED, Groueix, *et al.*, 2018; Elementary, Deprelle *et al.*, 2019; CorrNet3D, Zeng *et al.*, 2021

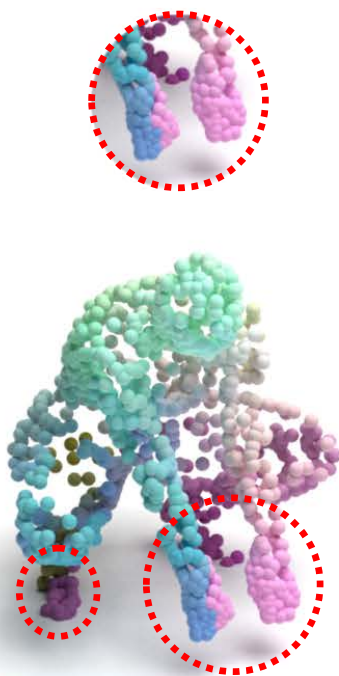
Visual Comparison for SHREC'19



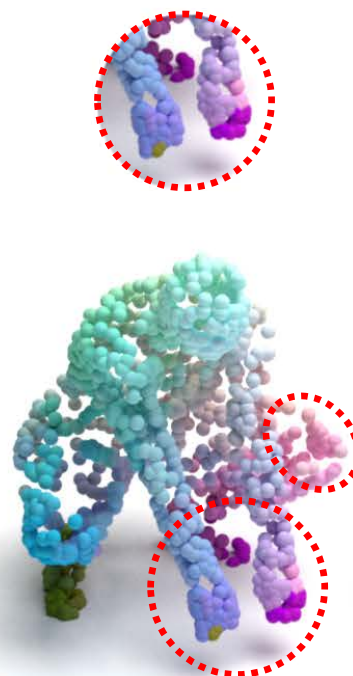
Reference target



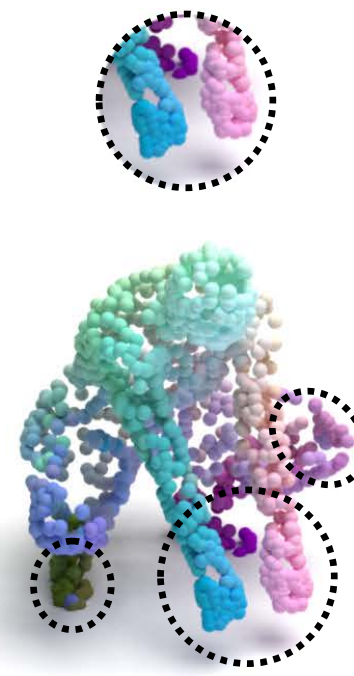
3D-CODED



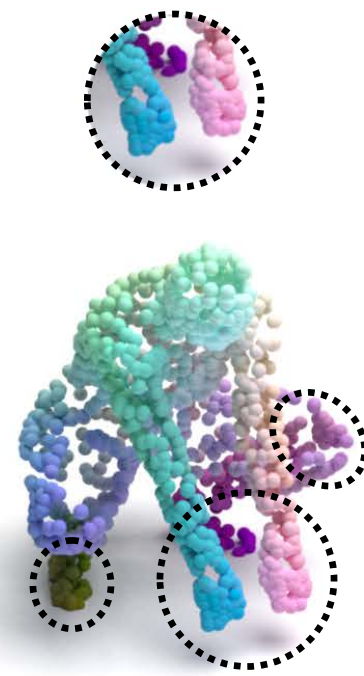
Elementary



CorrNet3D



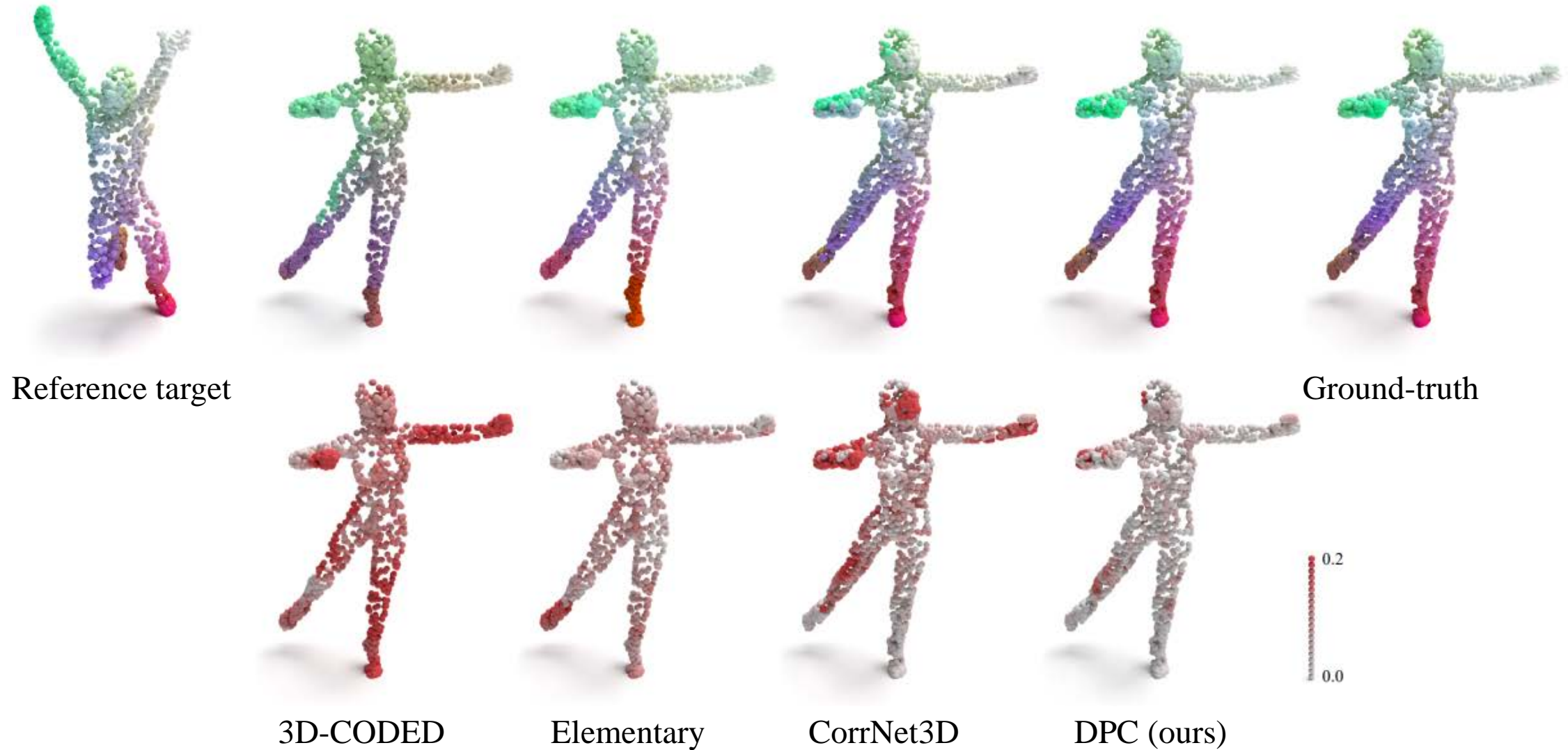
DPC (ours)



Ground-truth

SURREAL, Groueix, *et al.*, 2018; SHREC'19, Melzi *et al.*, 2019
3D-CODED, Groueix, *et al.*, 2018; Elementary, Deprelle *et al.*, 2019; CorrNet3D, Zeng *et al.*, 2021

Error Visualization



3D-CODED, Groueix, *et al.*, 2018; Elementary, Deprelle *et al.*, 2019; CorrNet3D, Zeng *et al.*, 2021

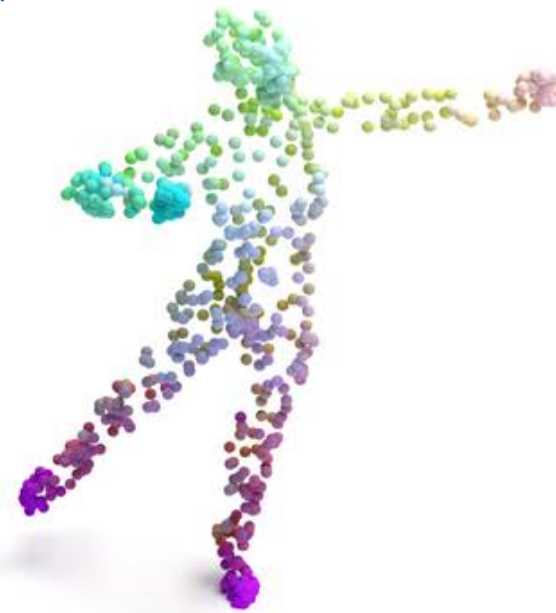
Resolution Robustness



Target 1024



Source 1024



Source 512



Source 4096

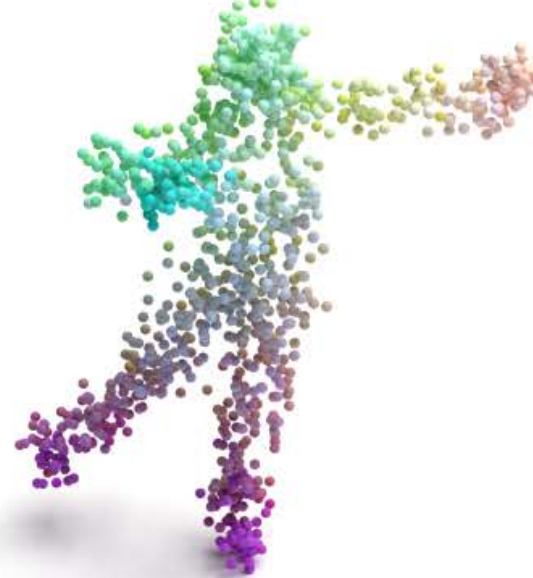
Noise Resilience



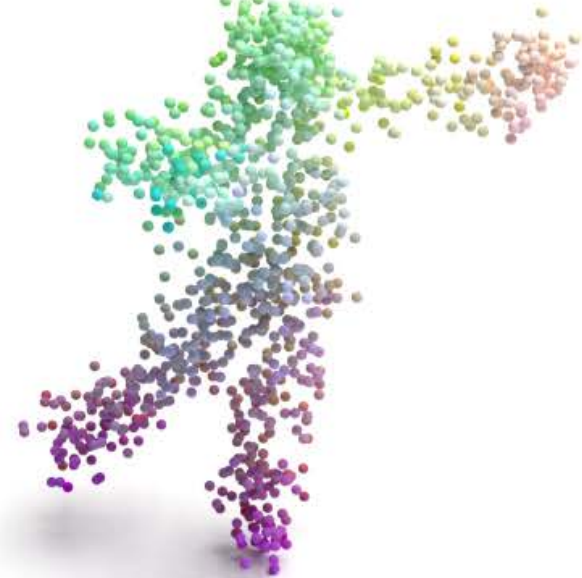
Target $\sigma = 2[cm]$



Source $\sigma = 1[cm]$



Source $\sigma = 2[cm]$



Source $\sigma = 4[cm]$

Visual Comparison for TOSCA



Reference target



3D-CODED



Elementary



CorrNet3D



DPC (ours)



Ground-truth

SMAL, Zuffi, *et al.*, 2017; TOSCA, Bronstein *et al.*, 2008
3D-CODED, Groueix, *et al.*, 2018; Elementary, Deprelle *et al.*, 2019; CorrNet3D, Zeng *et al.*, 2021

Processing Time Analysis

	Method	Pre-process	Inference	Total [ms]
Spectral	SURFMNet	1593	163	1756
	GeoFMNet	1997	215	2212
Spatial	Diff-FMaps	0	121.7	121.7
	3D-CODED	0	32.1	32.1
	Elementary	0	35.3	35.3
	CorrNet3D	0	175.4	175.4
	DPC (ours)	38 shape pairs per-second		26.3

SURFMNet, Roufousse *et al.*, 2019; GeoFMNet, Donati *et al.*, 2020; Diff-Fmaps, Marin *et al.*, 2020; 3D-CODED, Groueix, *et al.*, 2018; Elementary, Deprelle *et al.*, 2019; CorrNet3D, Zeng *et al.*, 2021

Summary

- A new method for dense shape correspondence
Directly on point clouds, unsupervised, real-time
- Assignment by construction
Rather than regression by a decoder
- Surpasses existing methods by a large margin
For both human and animal shapes
- Paper and code are available
<https://github.com/dvirginz/DPC>



Reference shape

Our result

THANK YOU!