High-Resolution 3D Shape Matching with Global Optimality and Geometric Consistency

Supplementary Material

In the supplementary, we provide more information about our method. In particular, in Section 8, we show additional qualitative results of our method on shapes with 5,000 and 10,000 triangles. Further, in Section 9 we provide details on geodesic errors as well as on Dirichlet energies. Finally, in Section 10, we provide detailed results on the runtime of our two stages.

8. Additional Qualitative Results

In Fig. 13 and in Fig. 14, we show additional qualitative results of our method on high-resolution shapes.

9. Additional Quantitative Results

In Tables 3 and 4, we provide detailed results on geodesic errors and on Dirichlet energies respectively.

Method	FAUST	SMAL	DT4D Intra	DT4D Inter
ULRSSM [CRB23]	0.031	0.048	0.033	0.041
SmoothShells [ELC20]	0.379	0.376	0.373	0.420
DiscrOpt [RMWO21]	0.110	0.268	0.075	0.170
SpiderMatch [RB24]	0.029	**0.044**	0.027	0.041
GeCo [RB25]	**0.027**	**0.044**	**0.024**	**0.039**
Ours	0.033	0.046	0.030	0.043

Table 3: *Comparison of **mean geodesic errors** (↓) of competing methods on various datasets. While our method does not perform best, we argue that it nevertheless yields the best trade-off between runtime, matching performance and smoothness, cf. also with Fig. 8.*

Dataset	FAUST	SMAL	DT4D Intra	DT4D Inter
ULRSSM [CRB23]	2.1	2.6	3.4	2.6
SmoothShells [ELC20]	1.9	2.8	1.6	2.3
DiscrOpt [RMWO21]	8.9	13.6	7.5	10.7
SpiderMatch [RB24]	1.7	1.8	1.7	2.1
GeCo [RB25]	**0.46**	**0.53**	**0.48**	0.62
Ours	0.52	0.54	0.51	**0.60**

Table 4: *Comparison of **mean Dirichlet energies** (↓) of competing methods on various datasets. Geometric consistent methods (SpiderMatch [RB24], GeCo [RB25], and ours) yield best results and consequently smoothest matchings. GeCo [RB25] and ours perform best and have similar performance.*

10. Runtime Analysis

In Table 5, we provide detailed numbers of median runtimes of the individual stages of our two-stage approach.

Dataset	(PATCH-MATCH)	(SURF-MATCH)	Both Stages
FAUST	128.94	25.58	161.10
SMAL	124.20	21.18	148.42
DT4D Intra	116.14	26.83	139.51
DT4D Inter	139.81	23.19	171.14
Combined	126.57	24.39	154.76

Table 5: ***Runtime analysis of the two stages** of our method on all datasets for shape resolution of 1,000 triangles. We show the median runtime in seconds of each stage. Combined is the median over all datasets.*

Figure 13: ***Additional qualitative results*** *of our method on shapes with a resolution of 5,000 triangles. Also for these shapes we can see richer geometric details enabled through higher shape resolution, especially when compared to Fig. 9.*

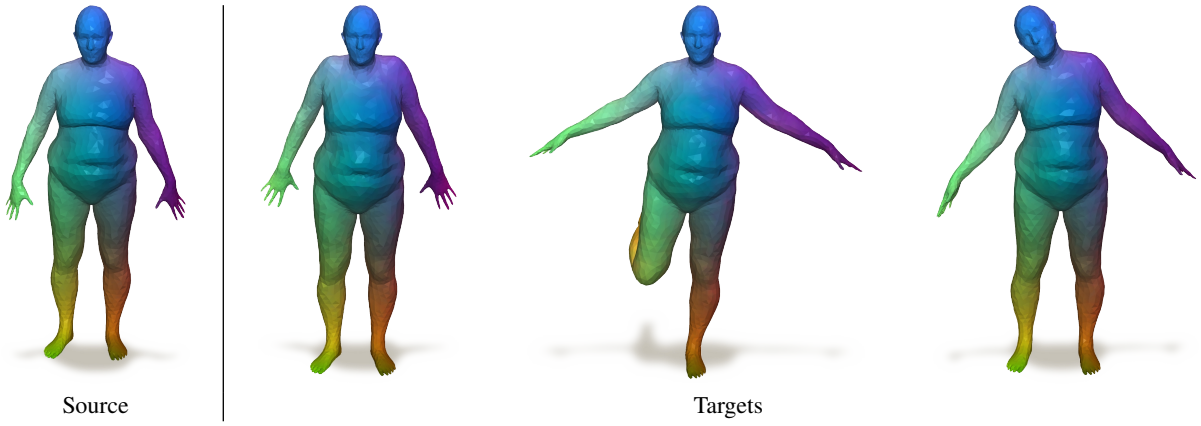

Figure 14: ***Qualitative results*** *on shapes with 10,000 triangles from our runtime experiments. We can see that our method produces accurate and smooth matching results these pairs. Furthermore, at this shape resolution, more geometric details are visible (see e.g. hands or faces).*