Stereoscopic Flash and No-Flash Photography for Shape and Albedo Recovery Supplementary Material

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1. Shape and albedo recovery on real-world data

Figure 1 shows more qualitative results of shape and albedo recovery on real-world data. Our approach recovers high-frequency details in the shape and recovers albedo correctly without mistaking shading variation for albedo variation.

2. Lighting estimation on synthetic data

To verify that the global lighting vector is reliably estimated from the coarse normal map, Fig. 2 displays the lighting estimation results of three objects under three environmental maps and their absolute difference error maps. A diffuse sphere is relighted by the estimated lighting vector and we treat the sphere rendered under the same environmental map as ground truth. We call the mean absolute error between the two spheres relighting error.

We compute the global lighting vector from three different normal maps: the ground truth, the coarse normal map, and our refined normal map. Note that the relighting error is not zero even if the ground truth normal map is used because the image formation model based on second-order spherical harmonics is an approximation. While the coarse normal map only contains low-frequency shape information, the estimated lighting vector is very close to that computed from the ground truth surface normal.

On the other hand, although the estimated normal map recovers high-frequency details, it only reduces the relighting error by a marginal amount. This result verifies that the global lighting vector computed from the coarse normal map is reliable, and implies that there is no need for iteratively optimizing the normal map and estimating the lighting vector.

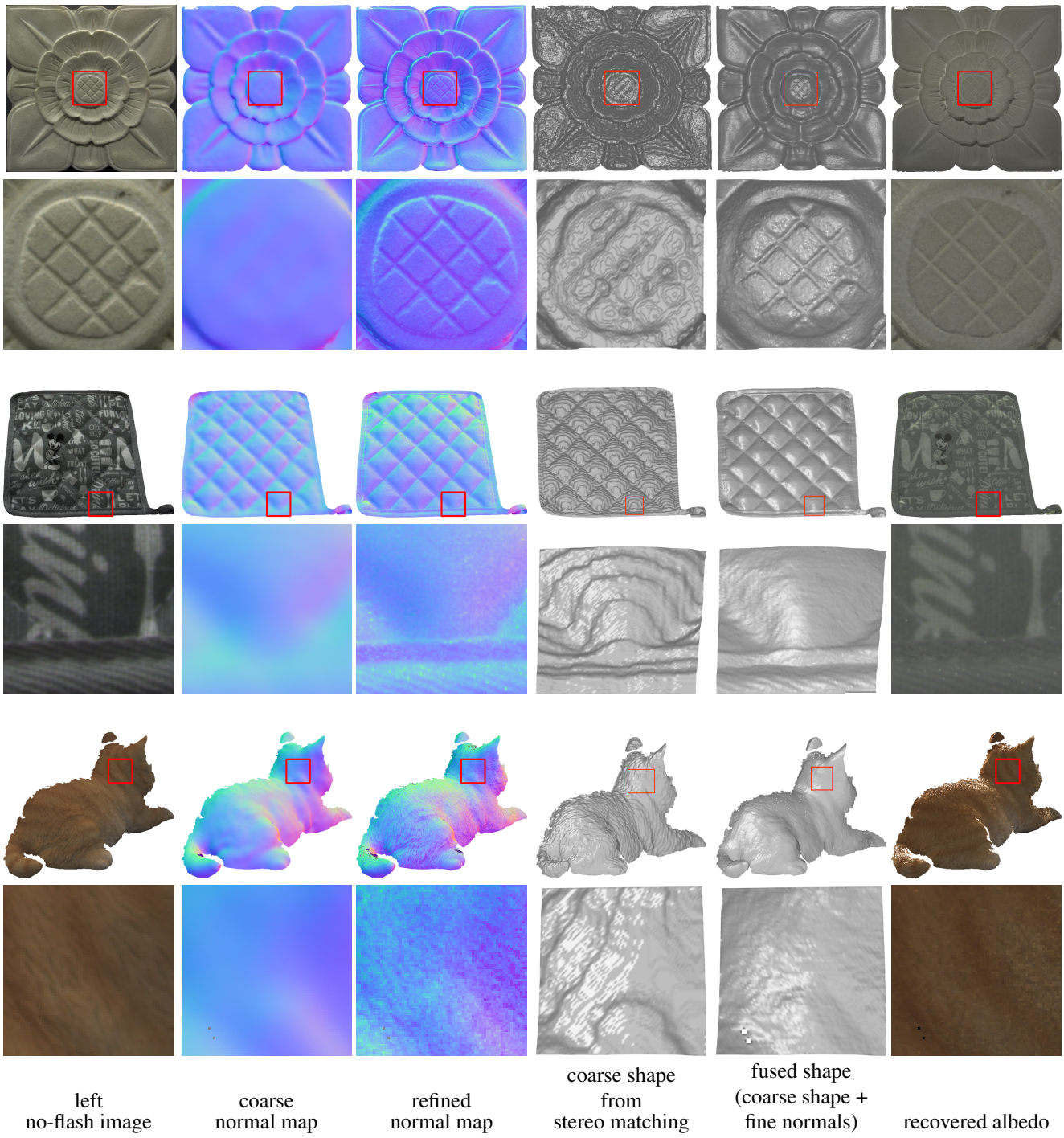

Figure 1. Shape and albedo recovery on real-world data. Even rows display close-up.

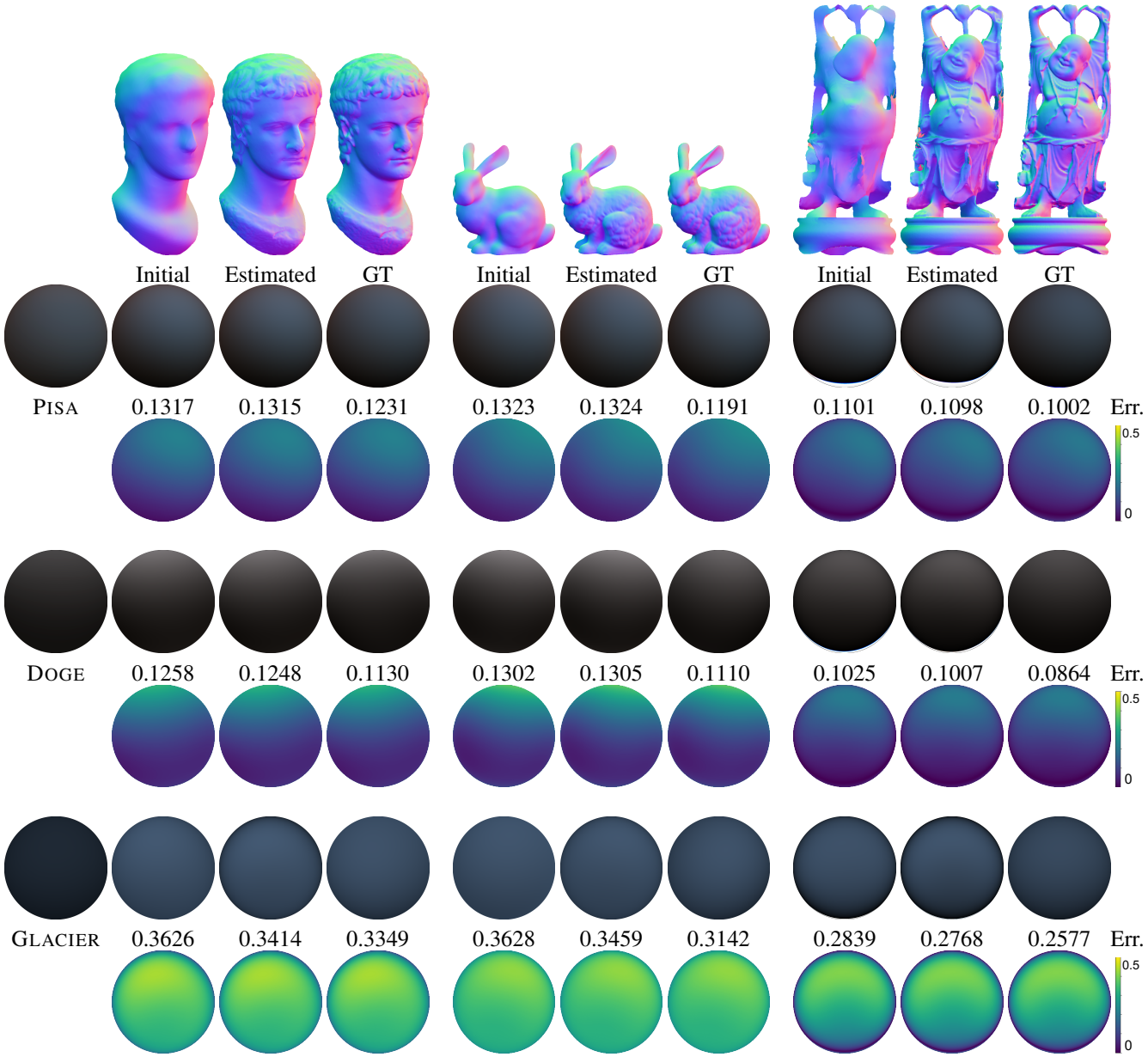

Figure 2. Relighting results on a diffuse sphere and their error maps. The first column displays the diffuse sphere rendered under an environmental map. The rest of the columns show the relighting results along with the absolute difference error map. The global lighting vector used for relighting is computed from the corresponding normal map displayed in the first row.