Light-Field Intrinsic Dataset (Supplementary Material)

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1 Overview

In the supplementary material document we provide more details about our dataset and also show various examples, comparing intrinsic decomposition and specularity extraction algorithms. In Sec. 2 we provide details about camera parameters and scene configuration for light-field rendering. In Sec. 3, we provide similar details for real world light-field capturing. At the end of Sec. 3, we show the 3D models which were used to create the real world scene. In Sec. 4, we show more examples comparing the intrinsic decomposition algorithms for single image (Bell *et al*.,[3]), video (Meka *et al*.,[5]) and light field (Alperovich *et al*.,[1] and Garces *et al*.,[4]) using our ground-truth data. We also show examples comparing the specularity extraction algorithms for light-fields, [1] and [2], by Alperovich *et al*.,. Finally in Sec. 5, we add to the error analysis table introduced in the main paper, by providing details about the error in extraction of *shading* layer .

*indicates equal contribution

2 Light-Field Rendering

In this section we describe the camera parameters and scene configuration for dense and sparse synthetic light-fields.

2.0.1 Camera Parameters

Scene Number	Scene Name	Focal-Length	Sensor Width	Baseline (dense / sparse)
1	Small Room	60 mm	32 mm	1.5 mm / 3 cm
2	Chess Set	30 mm	32 mm	9 mm / 40 cm
3	Guitar and Football	36 mm	32 mm	15 mm / 11 cm
4	Living Room	45 mm	32 mm	2 mm / 4 cm
5	BMW Motorbike	41.68 mm	32 mm	10 mm / 12 cm
6	Wood-Metal	35 mm	32 mm	2 mm / 10 cm
7	Old Man Face	120 mm	32 mm	2 mm / 10 cm
8	Minimal Interior	51 mm	32 mm	3 mm / 8.5 cm

Table 1: Camera parameters and baseline data for synthetic light-fields. Baseline is same in x and y directions.

2.0.2 Scene Description

In this section we show enlarged image of the center view of each synthetic light-field. For all synthetic light fields, view resolution for dense and sparse version was 35×35 and 11×11 respectively. Along with each image, we provide the source of *blend* file which is used for light field rendering.

Scene 1: Small Room

Figure 1: Center view of dense light-field. **Source:** https://www.blendswap.com/blends/view/86236

Scene 2: Chess Set

Figure 2: Center view of dense light-field. **Source:** https://www.blendswap.com/blends/view/86207

Scene 3: Guitar and Football

Figure 3: Center view of dense light-field. **Source:** (Guitar)https://www.blendswap.com/blends/view/88782, (Football)http://www.blendswap.com/blends/view/57234

Scene 4: Living Room

Figure 4: Center view of dense light-field. **Source:** https://www.blendswap.com/blends/view/72641

Scene 5: BMW Motorbike

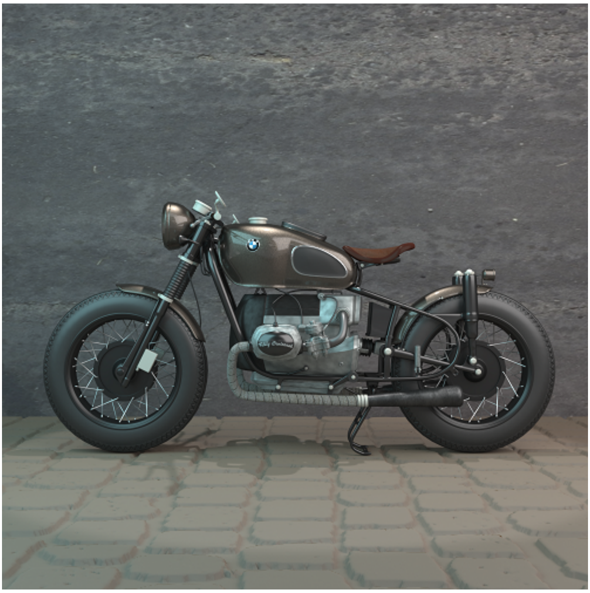

Figure 5: Center view of dense light-field. **Source:** (Bike)http://www.blendswap.com/blends/view/76744, (Cobble Stone)https://www.blendswap.com/blends/view/66984

Scene 6: Wood and Metal

Figure 6: Center view of dense light-field. **Source:** http://www.blendswap.com/blends/view/76744

Scene 7: Old Man Face

Figure 7: Center view of dense light-field. **Source:** http://www.3dscanstore.com/index.php?route=information/information&information_id=16

Scene 8: Minimal Interior

Figure 8: Center view of dense light-field. **Source:** https://www.blendswap.com/blends/view/68530

3 Real World Light-Field Capturing

In this section we describe the camera parameters and scene configuration for real-world capturing of light-field intrinsic layers.

3.0.1 Camera Parameters:

Scene Name	Focal-length	Baseline (dense and sparse)	Camera Desc.	F-Stop
Real 3D Scene 1	28 mm	1.3 mm (only dense)	EOS 5D Mark II	f/22.6
Real 3D Scene 2 and 3	50 mm	1.3 mm (only dense)	EOS 5D Mark II	f/22.6
Real 4D Scene 1 and 2	50 mm	4.5 mm and 1 cm	EOS 6D	f/19.9
Real 4D Scene 3	50 mm	4.5 mm and 1 cm	Sony Alpha 7R II	f/22

Table 2: Camera parameters and baseline data for real-world light-fields. Scene depth in all the cases is between 1 to 2 m.

3.0.2 Scene Description

In this section we show the enlarged center view of captured 3D and 4D light fields. For all the 3D light-fields, the capturing is dense with a view resolution of 151×1. We capture the sparse 4D light-fields for two different types of view resolution, *small* and *large*. The *small* view resolution for all the *4D Scenes* is 11×11. The *large* view resolution for "*4D Scene 1*" and "*4D Scene 2*" is 43×21. In case of "*4D Scene 3*" the large view resolution is 23×17.

3D Scene 1: Real-world dense 3D light-field.

Figure 9: Center view of the dense 3D light-field.

3D Scene 2: Real-world dense 3D light-field.

Figure 10: Center view of the dense 3D light-field.

3D Scene 3: Real-world dense 3D light-field.

Figure 11: Center view of the dense 3D light-field.

4D Scene 1: Real-world sparse 4D light-field.

Figure 12: Center view of the 4D light-field.

4D Scene 2: Real-world sparse 4D light-field.

Figure 13: Center view of the 4D light-field.

4D Scene 3: Real-world sparse 4D light-field.

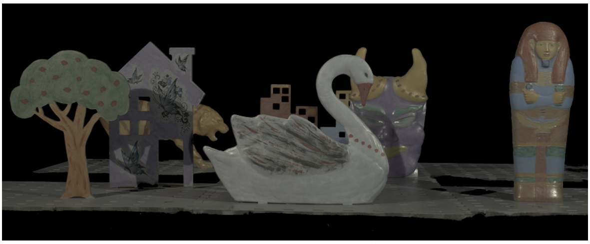

Figure 14: Center view of the 4D light-field.

3D Models Here we show the 3D models which were used to create our real-world scenes.

Figure 15: 3D Models used to create real-world scenes. Sources: (Devil)https://www.thingiverse.com/thing:27297, (Swan)https://www.thingiverse.com/thing:731686, (Tiger)https://www.thingiverse.com/thing:1763141, (Egyptian)https://www.myminifactory.com/object/3d-print-pahamnetjer-at-the-british-museum-london-4774

4 Intrinsic Decomposition and Specularity Extraction Comparison

In this section we show more comparisons for intrinsic decomposition and light-field specularity extraction algorithms using our ground-truth data.

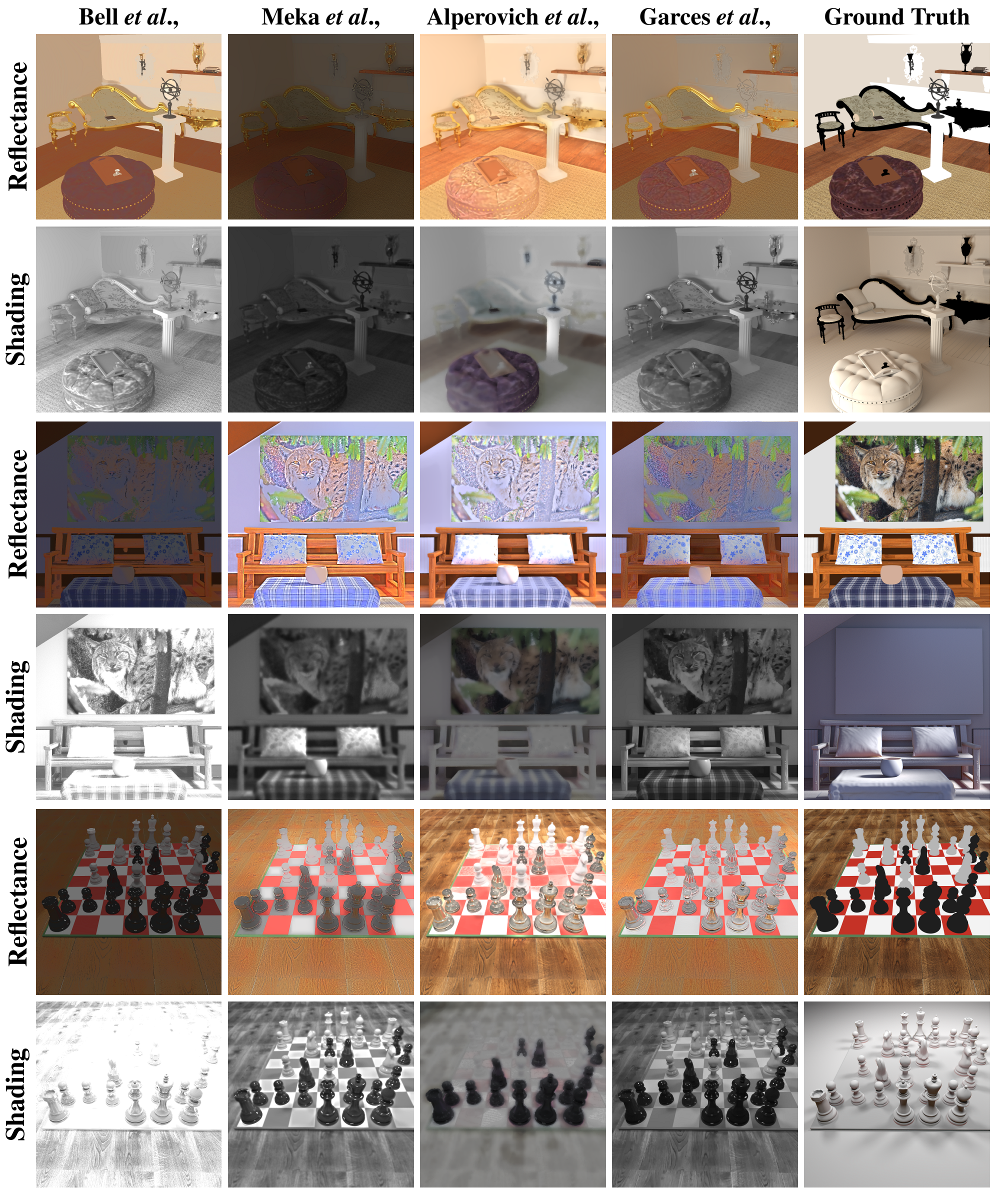

Figure 16: A comparison of intrinsic decomposition methods for single image (Bell *et al.*,[3]), video (Meka *et al.*,[5]) and light field (Alperovich *et al.*,[1] and Garces *et al.*,[4]) using synthetic ground-truth data.

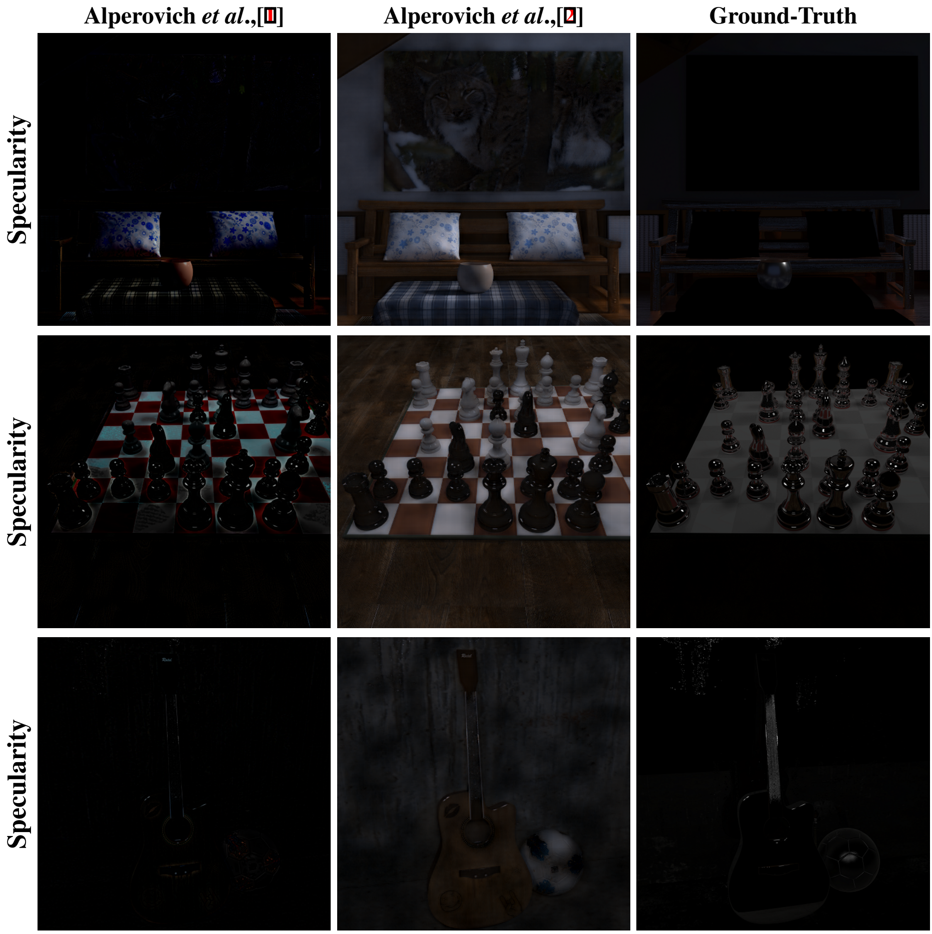

Figure 17: A comparison of specularity extraction methods for light fields using synthetic ground-truth data.

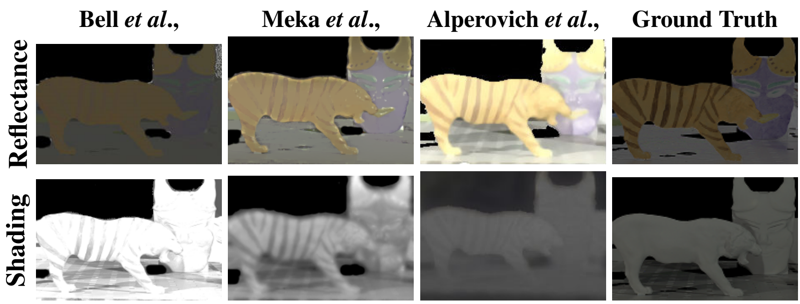

Figure 18: A comparison of intrinsic decomposition methods for single image (Bell *et al.*,[3]), video (Meka *et al.*,[5]) and light field (Alperovich *et al.*,[1]) using real-world ground-truth data.

Figure 19: A comparison of specularity extraction methods for light fields using real-world ground-truth data.

5 Error Analysis

Scene Type/Num	Single Image (Bell *et al.*,)		Video (Meka *et al.*,)		Light-Field (Alperovich *et al.*,)	
	μ	σ	μ	σ	μ	σ
Syn./ 2	$2.80e-01$	$3.25e-04$	$3.19e-01$	$2.33e-08$	$1.87e-01$	$1.34e-05$
Syn./ 3	$3.17e-01$	$3.15e-04$	$1.05e-01$	$5.95e-08$	$3.43e-02$	$2.28e-08$
Real 3D/ 2	$1.21e-01$	$2.36e-01$	$6.74e-02$	$1.09e-06$	NA	NA
Real 3D/ 3	$1.05e-01$	$1.09e-05$	$6.29e-02$	$3.73e-07$	NA	NA
Real 4D/ 2	$6.76e-02$	$2.08e-07$	$2.23e-02$	$3.76e-07$	$4.22e-01$	$7.35e-06$
Real 4D/ 3	$7.08e-02$	$1.75e-07$	$2.25e-02$	$5.83e-07$	$4.19e-01$	$8.08e-06$

Table 3: The average (μ) and variance (σ) of error in *shading* extraction, for a set of sub-aperture images for *real* and *synthetic* data..

References

[1] A. Alperovich, O. Johannsen, M. Strecke, and B. Goldluecke. Shadow and specularity priors for intrinsic light field decomposition. In *Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR)*, 2017.

[2] A. Alperovich, O. Johannsen, M. Strecke, and B. Goldluecke. Light field intrinsics with a deep encoder-decoder network. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.

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[5] Abhimitra Meka, Michael Zollhöfer, Christian Richardt, and Christian Theobalt. Live intrinsic video. *ACM Trans. on Graphics (Proceedings SIGGRAPH)*, 35(4), 2016.