Object Image Relighting through Patch Match Warping and Color Transfer

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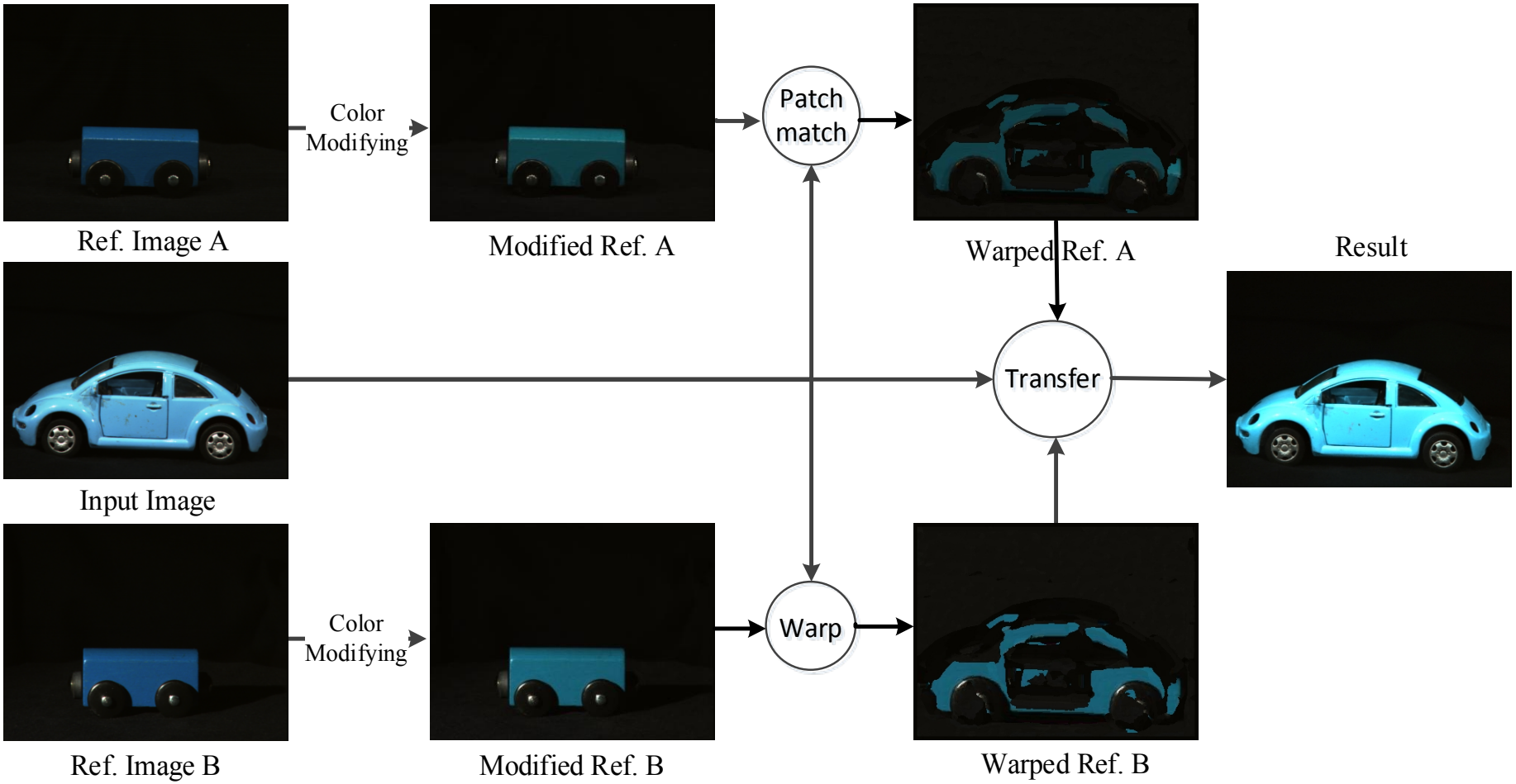
Outline

Introduction



Outline

Color Modifying

- Color Modifying
- Patch Match Warping
- The Local and Global Transfer

Color Modifying

(a) Ref. A

(d) Ref. B

(e) Input Image

(b) Modified Ref. A

(c) Modified Ref. B

Color Modifying

Patch Match Warping

(a) Modified Ref. A

(d) Modified Ref. B

(e) Input Image

(b) Warped Ref. A

(c) Warped Ref. B

Patch Match Warping

$$\sum_{i=-r}^{r}\sum_{j=-r}^{r}\left\|I(x_p+i,y_p+j)+A(x_p+i,y_p+j)\right\|^2$$

The Local and Global Transfer

- the energy function models the transformation from B to A

$$\sum_k \left\| P_k(\tilde{B}) - T_k(\tilde{A}) \right\|^2$$

- convert the input image I to the output relit result R

$$\sum_k \left\| P_k(R) - T_k(I) \right\|^2$$

- whole energy function of our local and global transfer model

$$R = \arg\min_{R,\{T_k\}} \sum_k \left\| P_k(\tilde{B}) - T_k(\tilde{A}) \right\|^2 + a \sum_k \left\| P_k(\tilde{B}) - T_k(\tilde{A}) \right\|^2$$

$$+ b \sum_k \left\| T_k - G \right\|^2$$

The Local and Global Transfer

(a) Input Image I

(d) Relit Result R

(e) Ground Truth

(b) Warped Ref. A: $\tilde{A}$

(c) Warped Ref. B: $\tilde{B}$

Illumination Transfer

Outline

1. Introduction
2. Object Image Relighting
3. The Experimental Results
4. Conclusion and Discussion

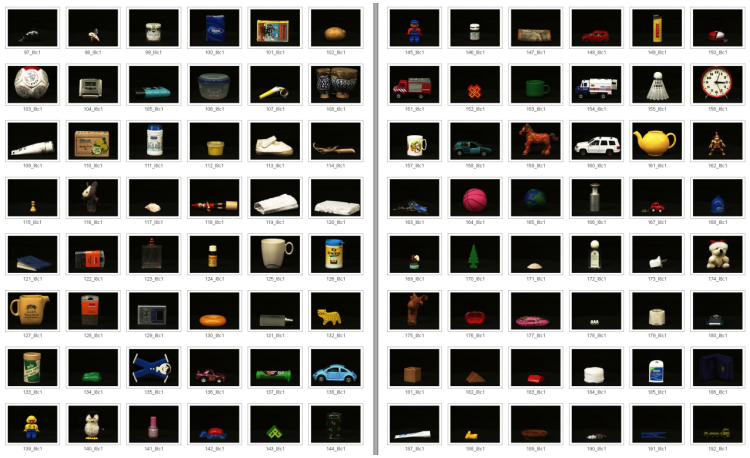
The Experimental Results

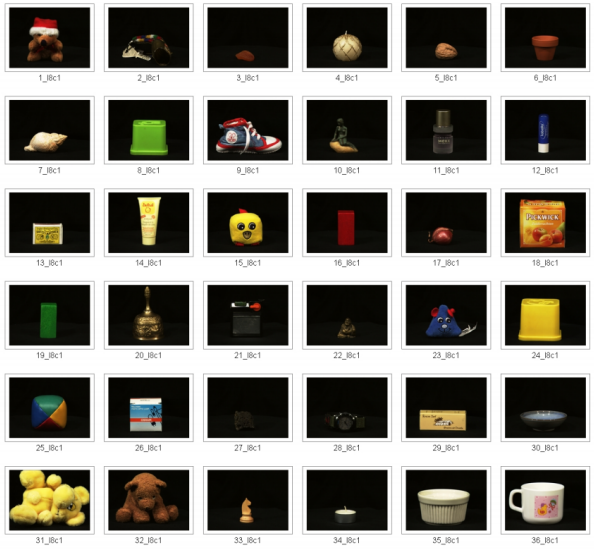
We test our method in the ALOI dataset.

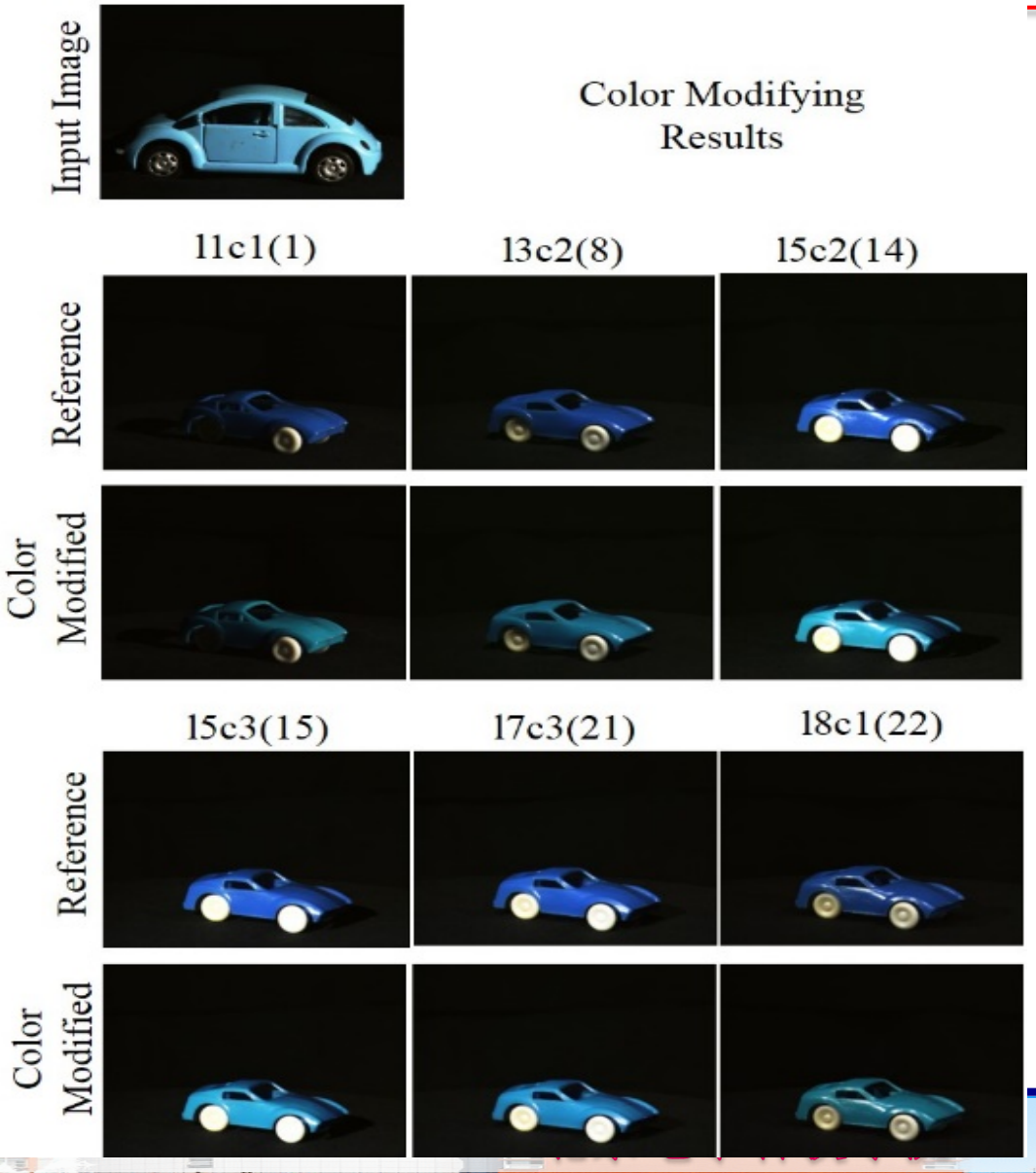
We acquire convincing relit results on multiple objects.

- **Color Modifying Results**
- **Relighting with and without color modifying**
- **One Input, Multiple Reference Objects**
- **One Input, Multiple Reference Illumination**

Color Modifying Results

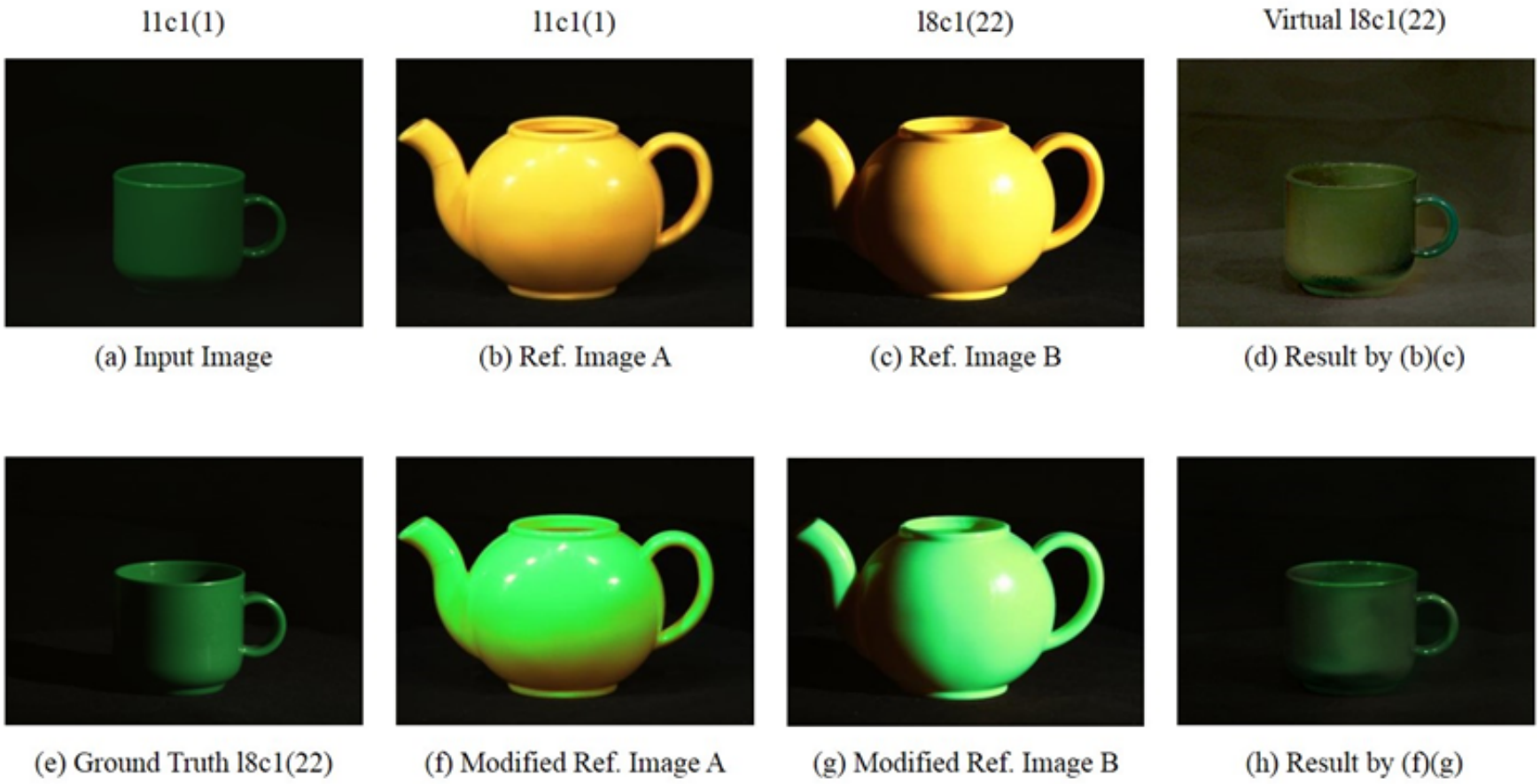






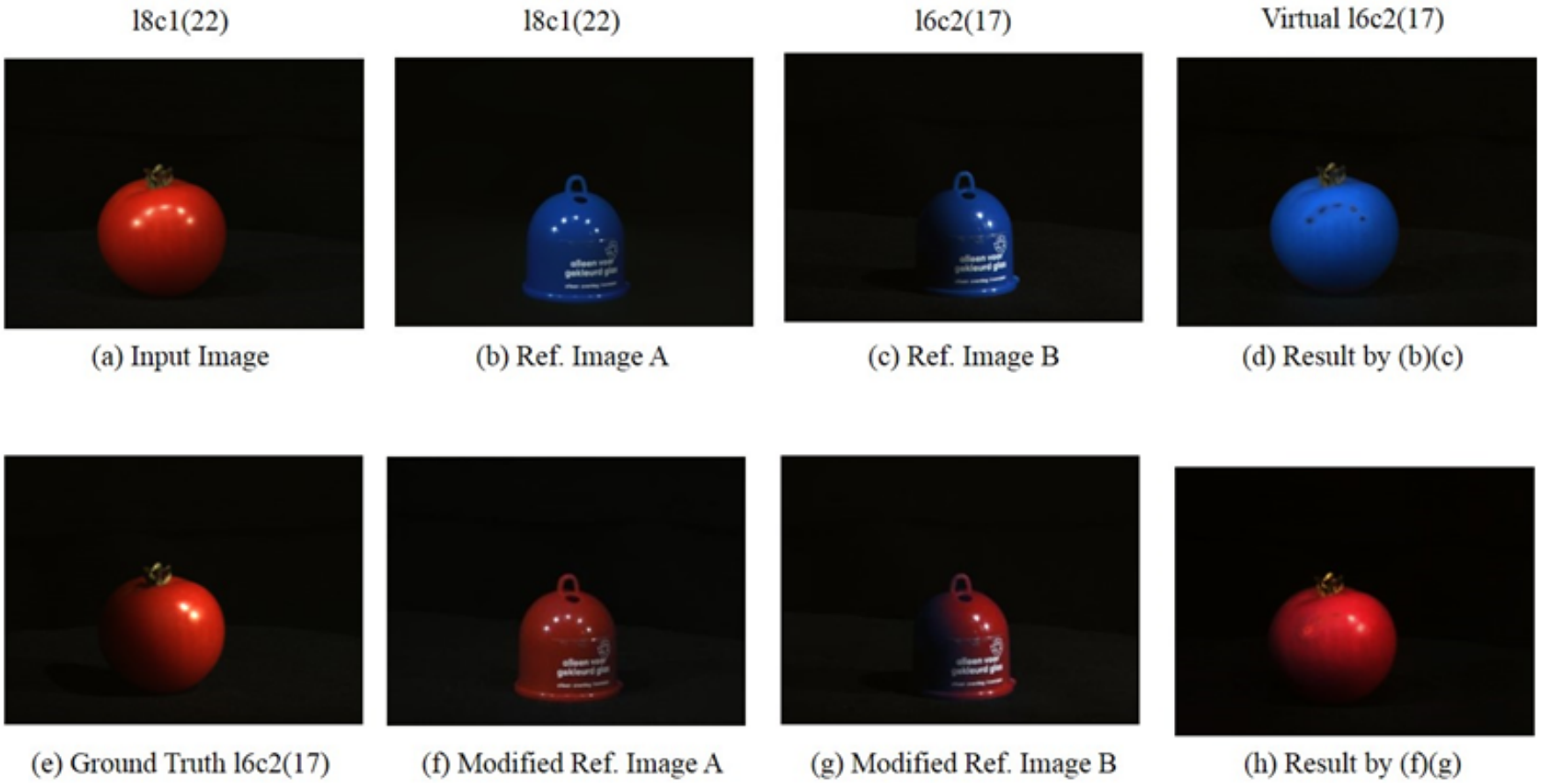
Relighting with and without color modifying

Experiment 1



Relighting with and without color modifying

Experiment 2



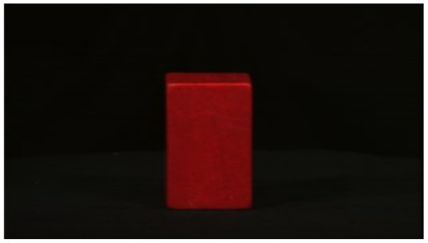
One Input, Multiple Reference Objects

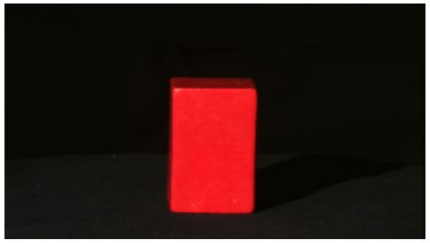

(a) Input Image


(b) Relit Result by (m)(n)


(c) Relit Result by (o)(p)

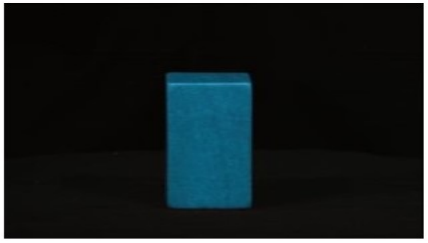

(d) Ground Truth

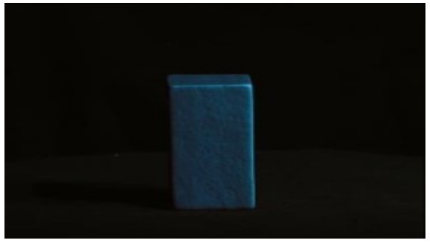

(e) Ref. Image A

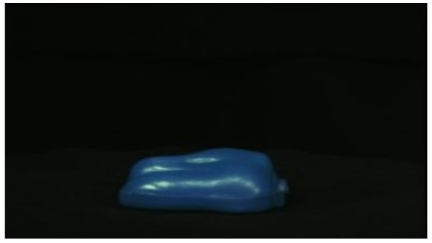

(f) Ref. Image B


(g) Ref. Image A


(h) Ref. Image B

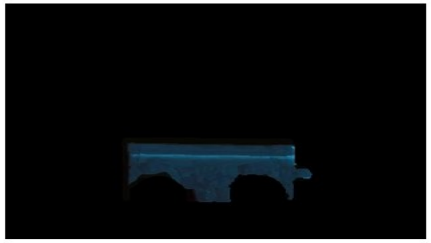

(i) Modified Ref. A


(j) Modified Ref. B


(k) Modified Ref. A


(l) Modified Ref. B

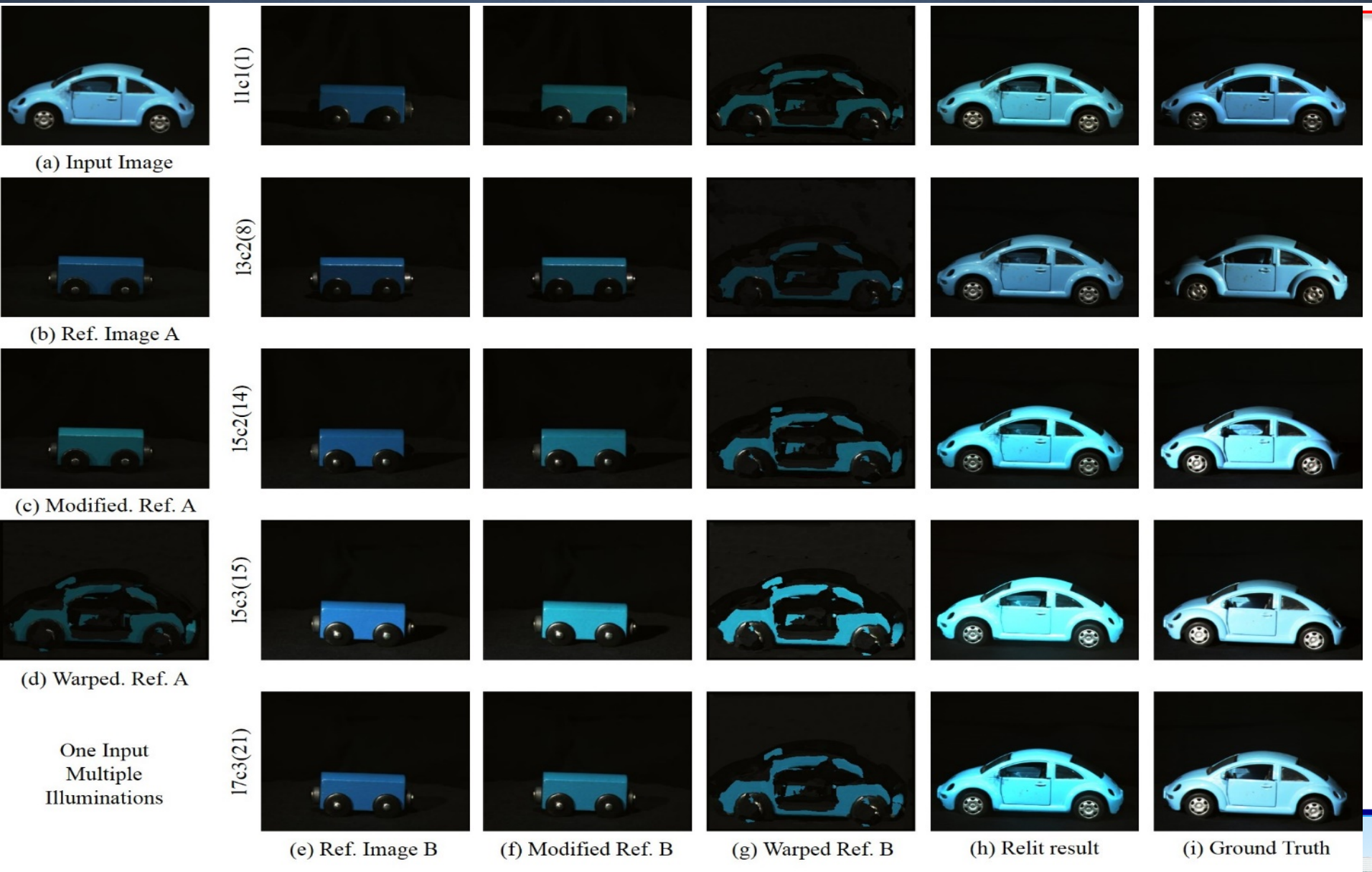

(m) Warped Ref. A


(n) Warped Ref. B


(o) Warped Ref. A


(p) Warped Ref. B

One Input, Multiple Reference Illumination



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Conclusion and Discussion

- **Only an image pair of another reference object taken under different illumination conditions is needed. Our method contains color modifying, patch match warping and illumination transfer.**
- **In the future work, we will first add this feature into our framework to automatically find appropriate object for the input object relighting. Then we will optimize all the steps in our framework together instead of optimizing them independently in current version.**

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Thanks !

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