

A Multi-Hypothesis Approach to Color Constancy

Daniel Hernandez-Juarez, Sarah Parisot, Benjamin Busam,
Ales Leonardis, Gregory Slabaugh, Steven McDonagh



CVPR 2020
SEATTLE, WASHINGTON

The Color Constancy problem



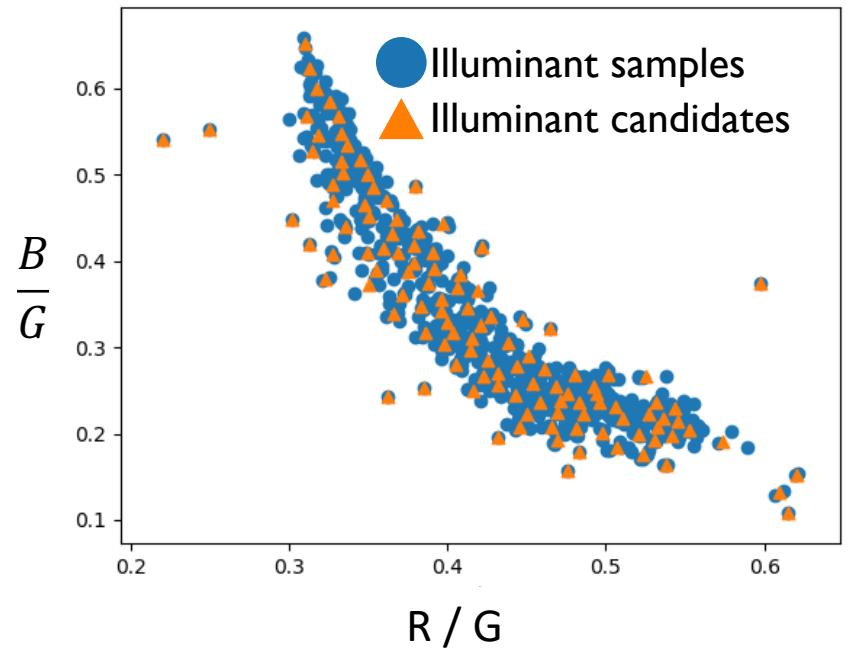
$$input = illuminant \times output$$

Learn to infer the *illuminant*, given the input image

Method

A Multi-Hypothesis Approach to Color Constancy

1. Illuminant candidate selection

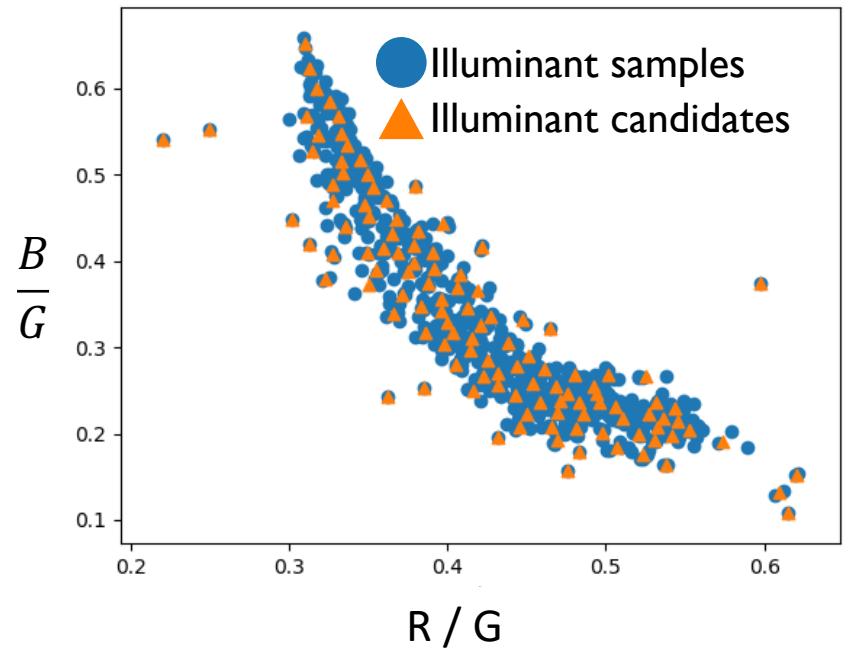


Determine n **representative** illuminants (e.g. K -means clustering)

$$\ell_i \in \mathbb{R}^3 \quad i \in \{1, \dots, n\}$$

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1. Illuminant candidate selection

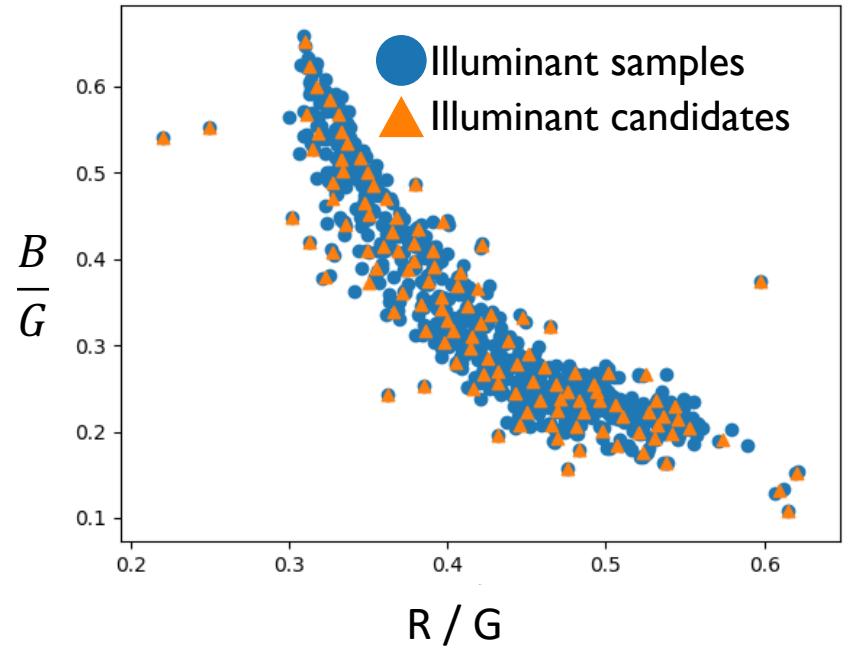


2. Correct image with n candidates



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1. Illuminant candidate selection

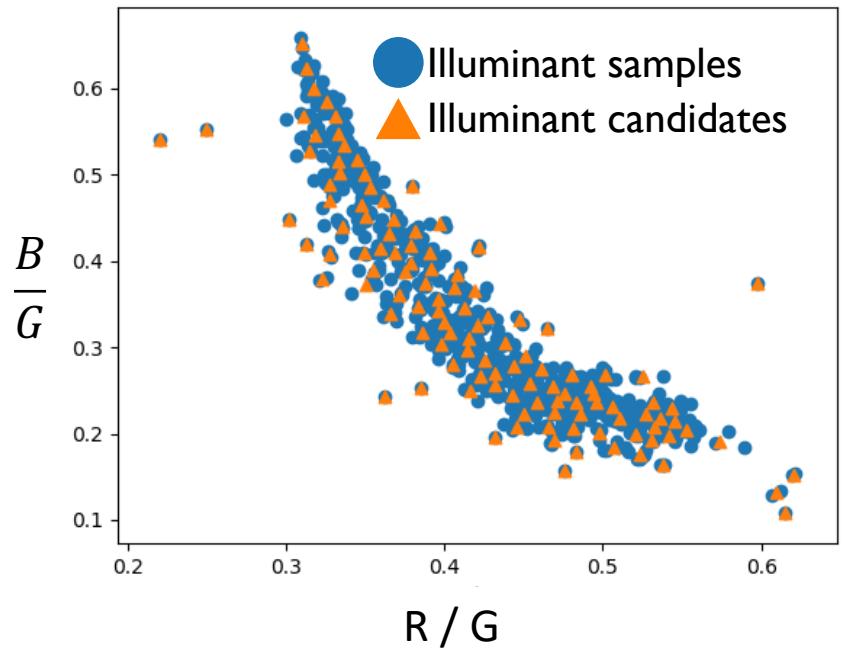


2. Correct image with n candidates

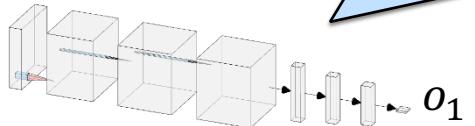


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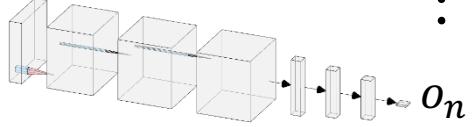
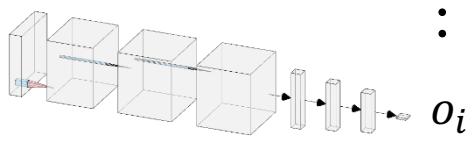
1. Illuminant candidate selection



2. Correct image with n candidates

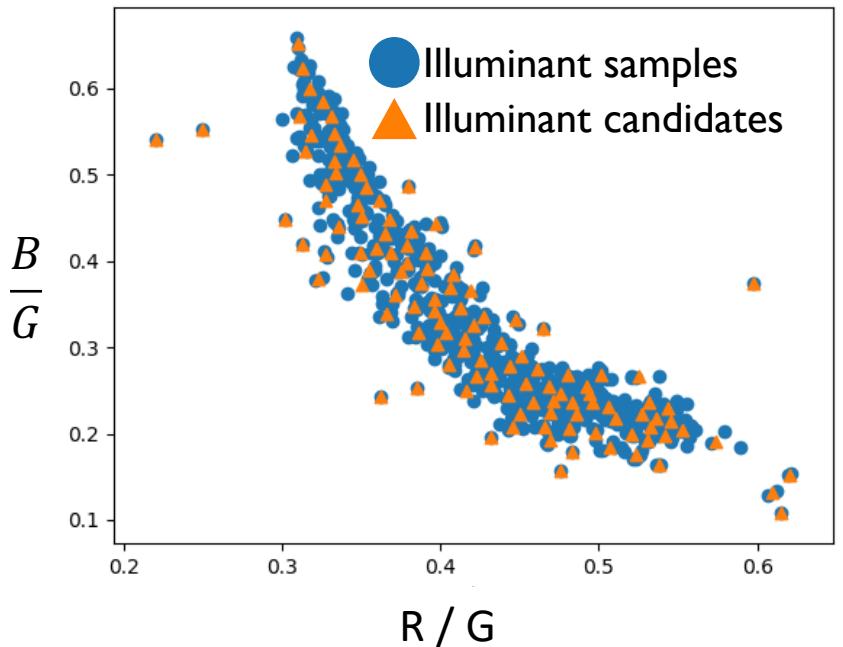


Learn to identify well
white balanced images

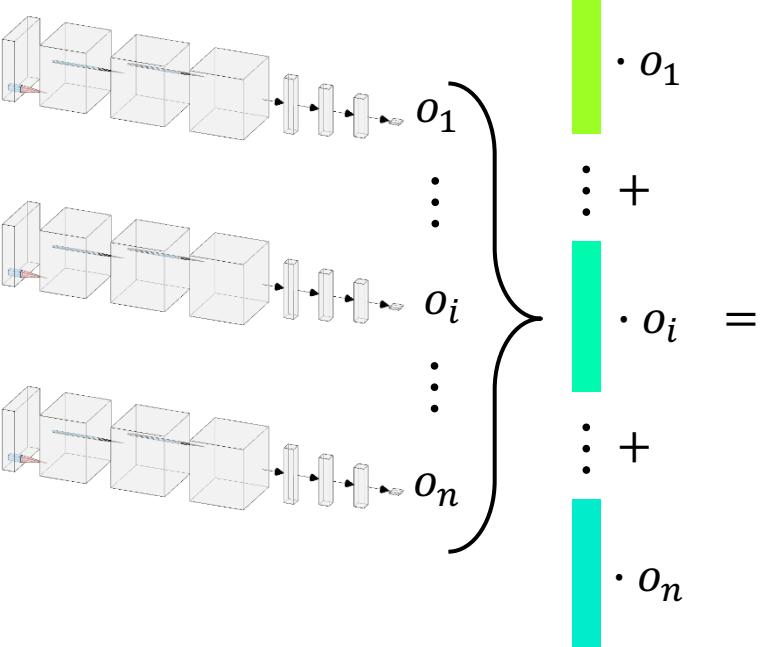
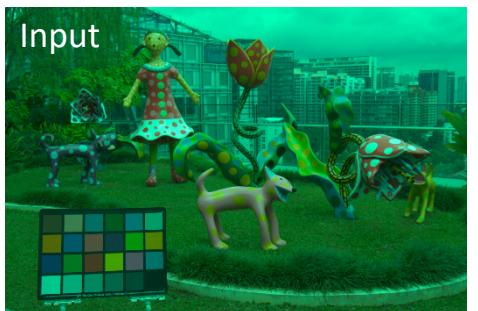


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1. Illuminant candidate selection



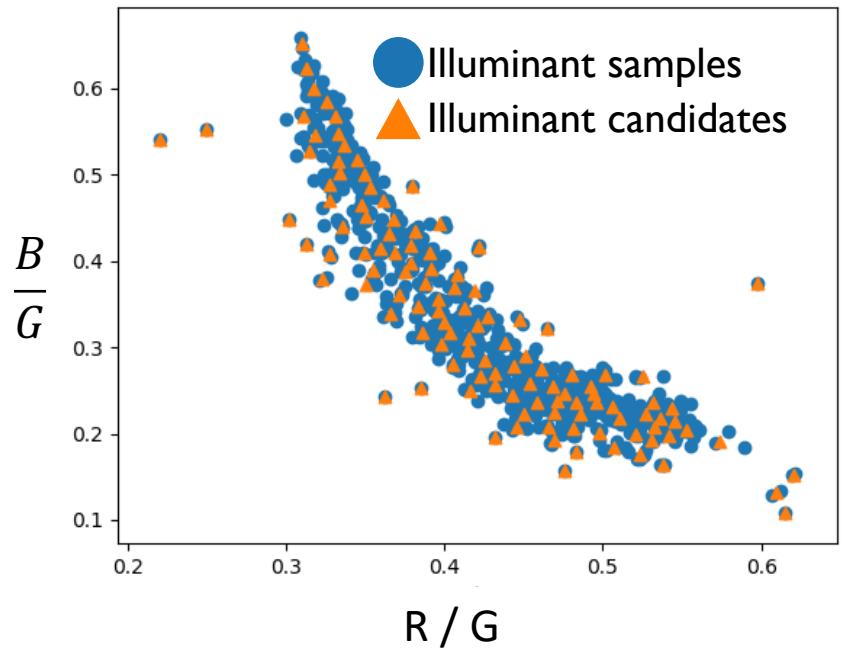
2. Correct image with n candidates



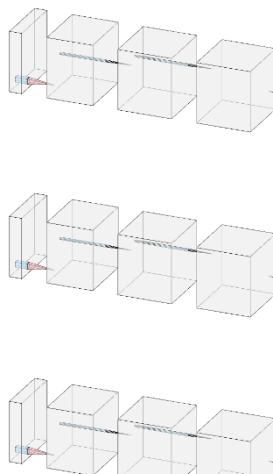
3. Combine candidate illuminants

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1. Illuminant candidate selection



2. Correct image with n candidates



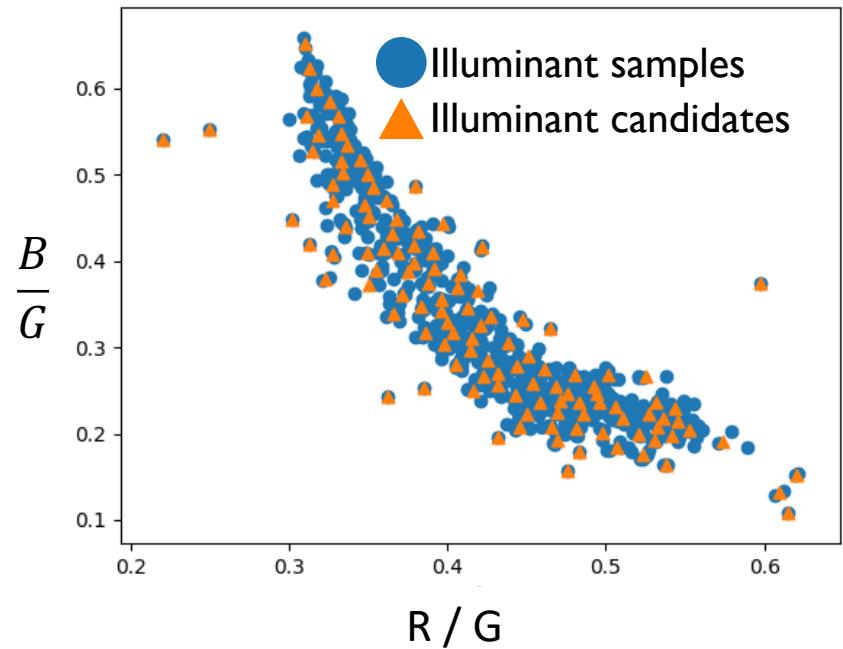
3. Combine candidate illuminants

$$\text{Input} / \begin{matrix} \cdot o_1 \\ \vdots \\ \cdot o_i \\ \vdots \\ \cdot o_n \end{matrix} = \begin{matrix} \cdot o_1 \\ \vdots \\ \cdot o_i \\ \vdots \\ \cdot o_n \end{matrix} + \begin{matrix} \cdot o_1 \\ \vdots \\ \cdot o_i \\ \vdots \\ \cdot o_n \end{matrix}$$

The diagram illustrates the combination of candidate illuminants. On the left, the input image is divided by a vector of weights $[o_1, o_2, \dots, o_n]$. This division is equivalent to summing the input image multiplied by each weight o_i and then dividing by the sum of the weights. The resulting image is shown on the right.

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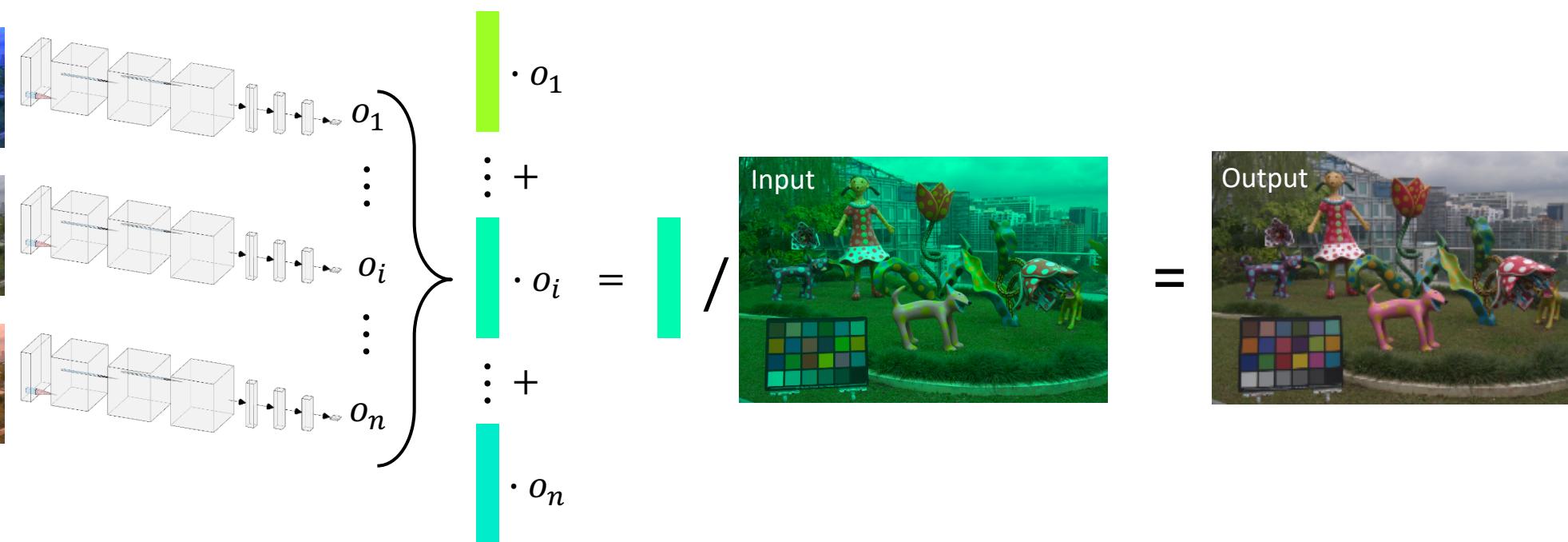
1. Illuminant candidate selection



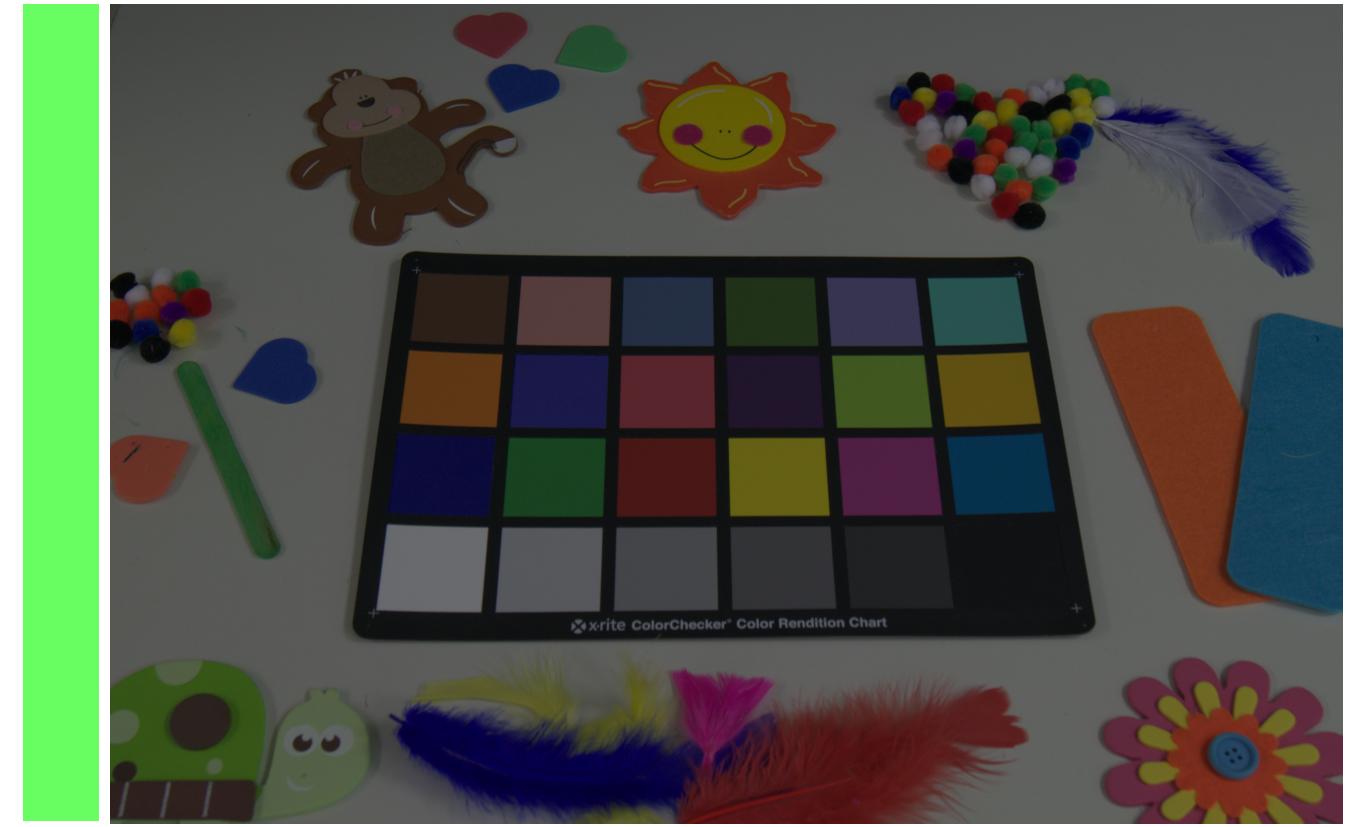
2. Correct image with n candidates



3. Combine candidate illuminants



Results



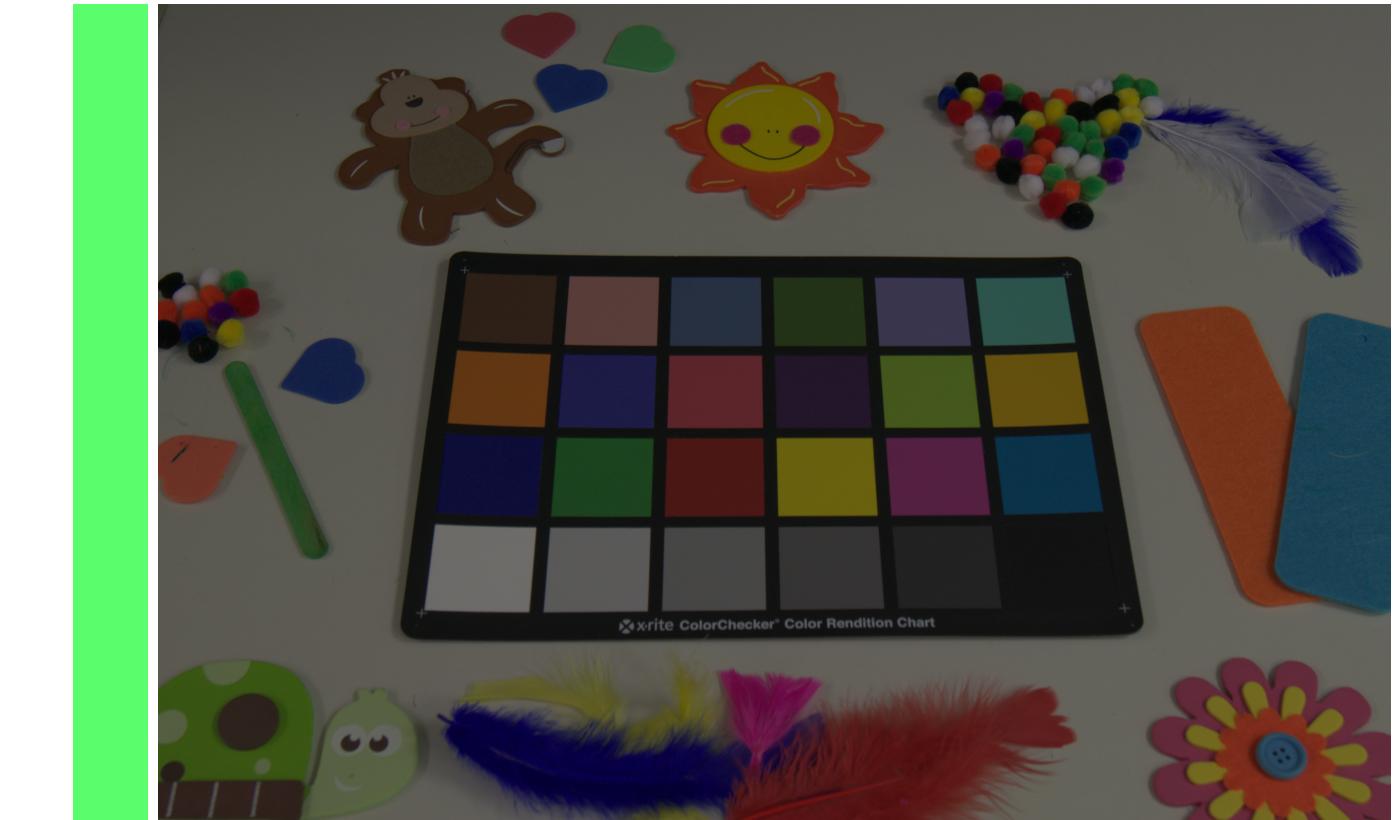
input =

ℓ_{GT} \times R_{GT}



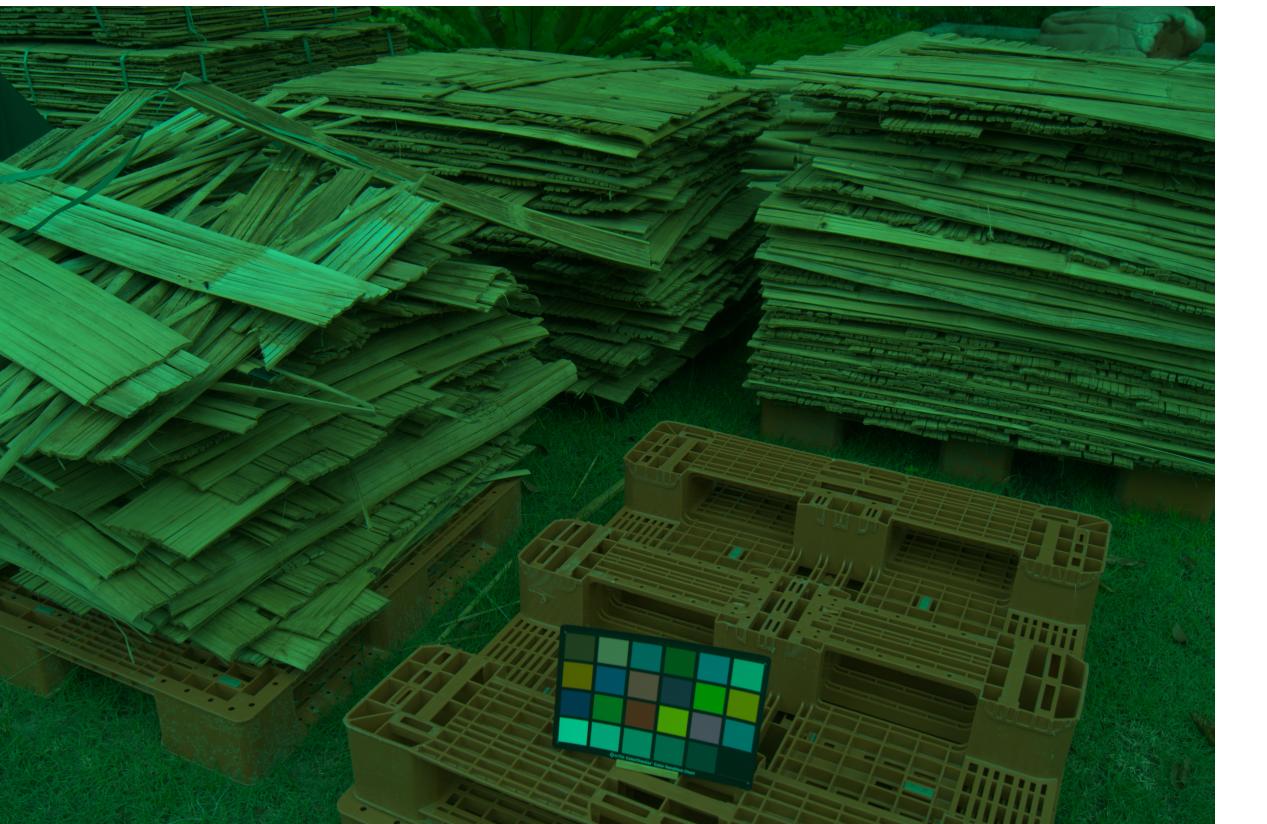
ℓ_{FFCC}

R_{FFCC}



ℓ_{ours}

R_{ours}



input =



$\ell_{GT} \times R_{GT}$



ℓ_{FFCC}

R_{FFCC}



ℓ_{ours}

R_{ours}

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