Exercise III
White Balancing

Due on May 9th, 2014

The Problem

$$\rho_k = \int_\lambda E(\lambda) S(\lambda) R_k(\lambda) d\lambda,\ k = R, G, B$$

Chromatic Adaptation

- …is the ability of the human visual system to adapt to the color of the illuminant and to approximately preserve the appearance of an object.

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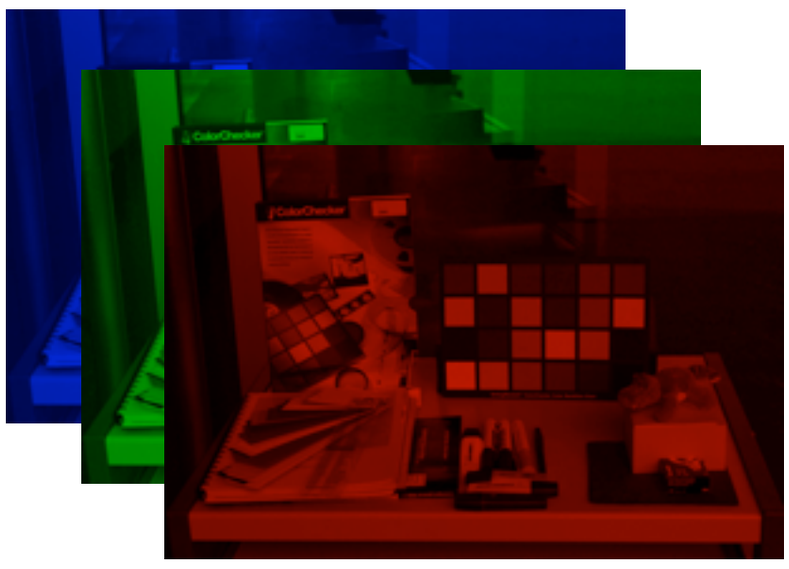
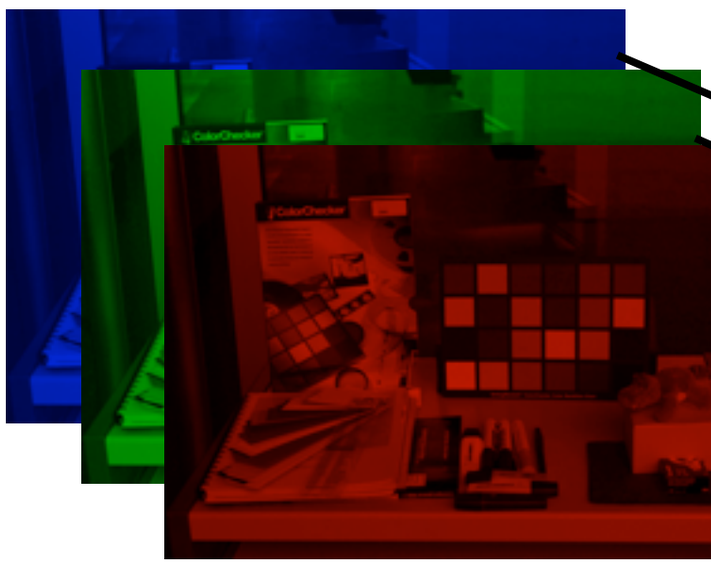
White Balancing

- Gray World
- Weighted GrayWorld
- MaxRGB

Gray World

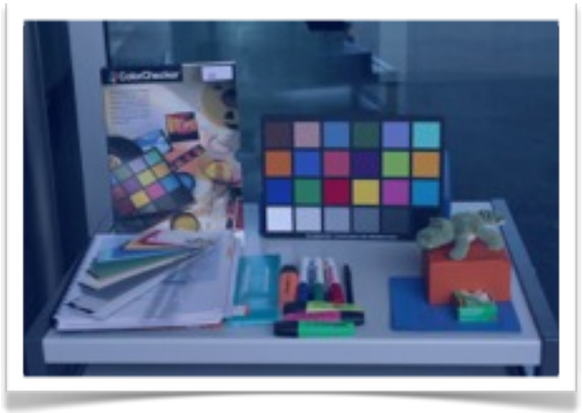


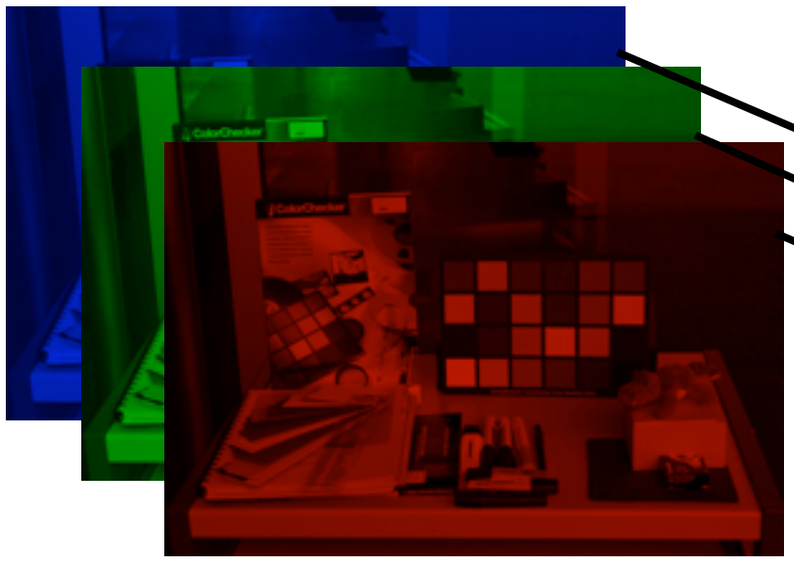
Gray World



ave(R)=ave(B)=ave(G)=ave(Image)

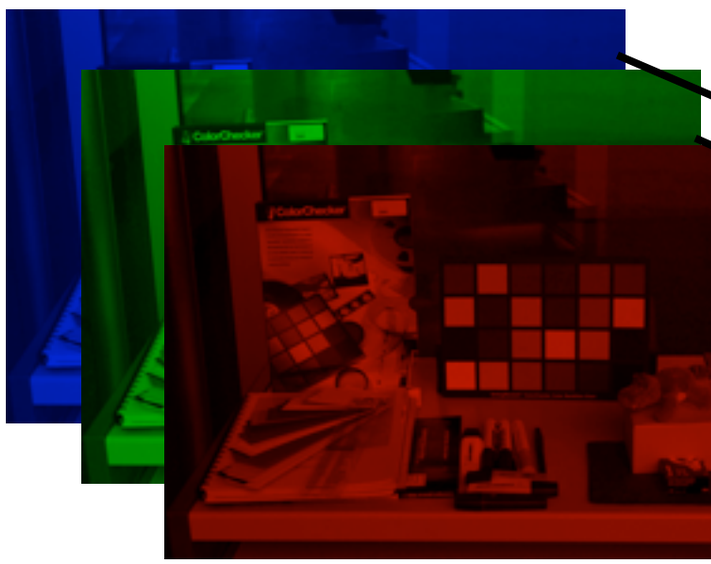
Gray World





ave(R)=ave(B)=ave(G)=ave(Image)

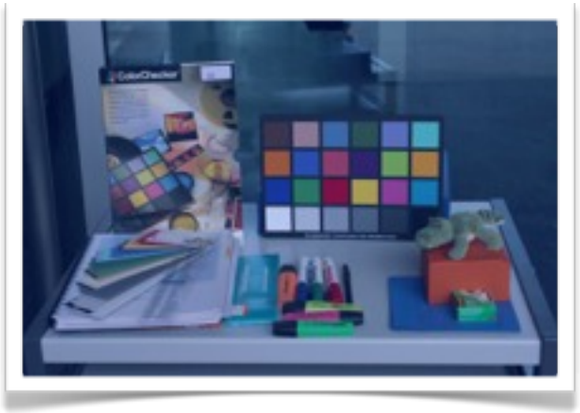
Gray World

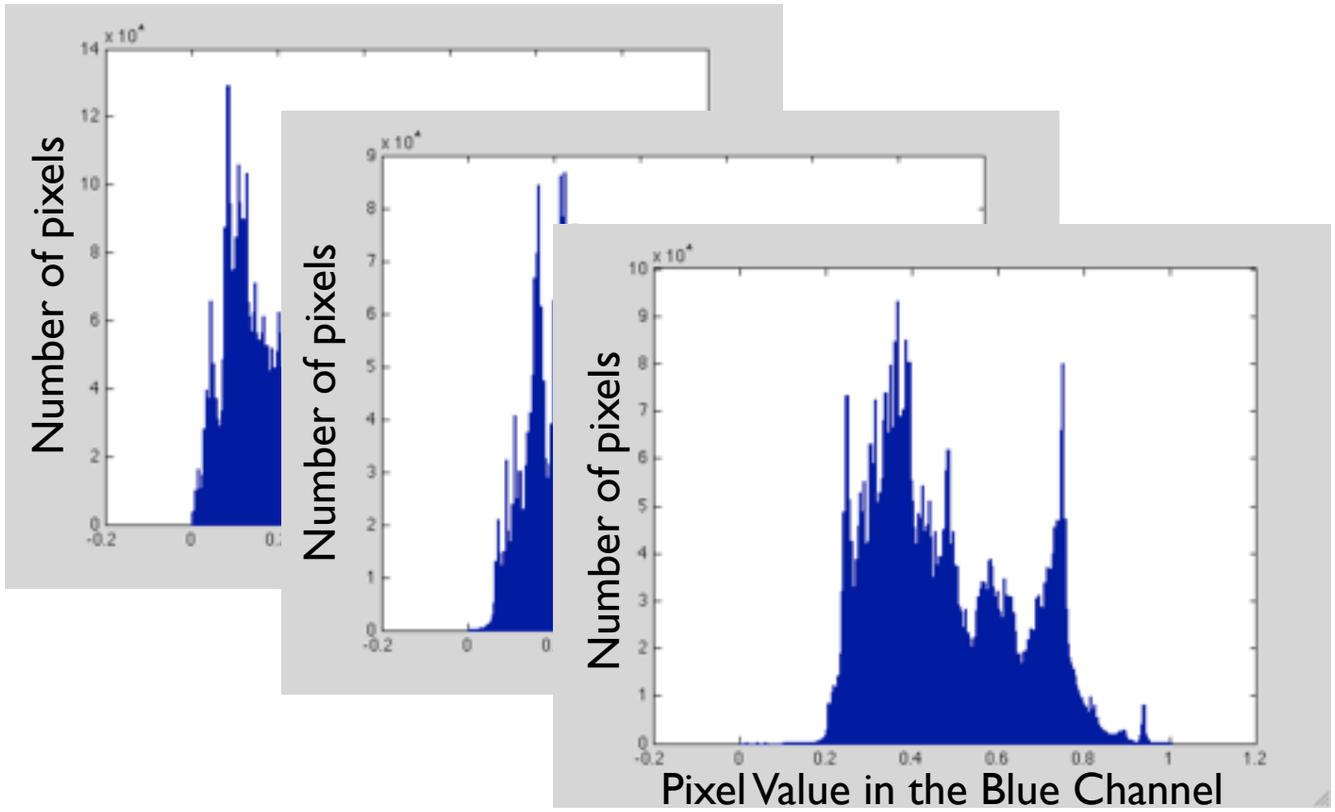


ave(R)=ave(B)=ave(G)=ave(Image)

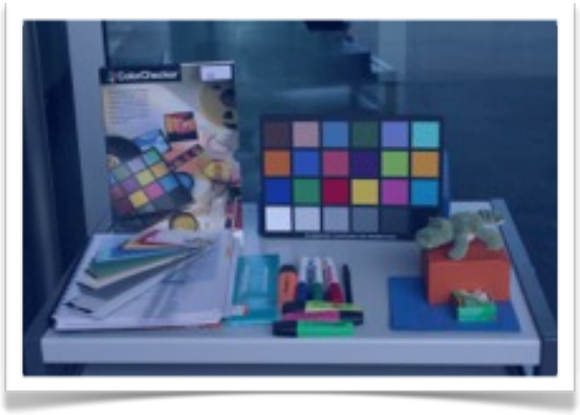
- When does it give good results?
- What are its limitations?

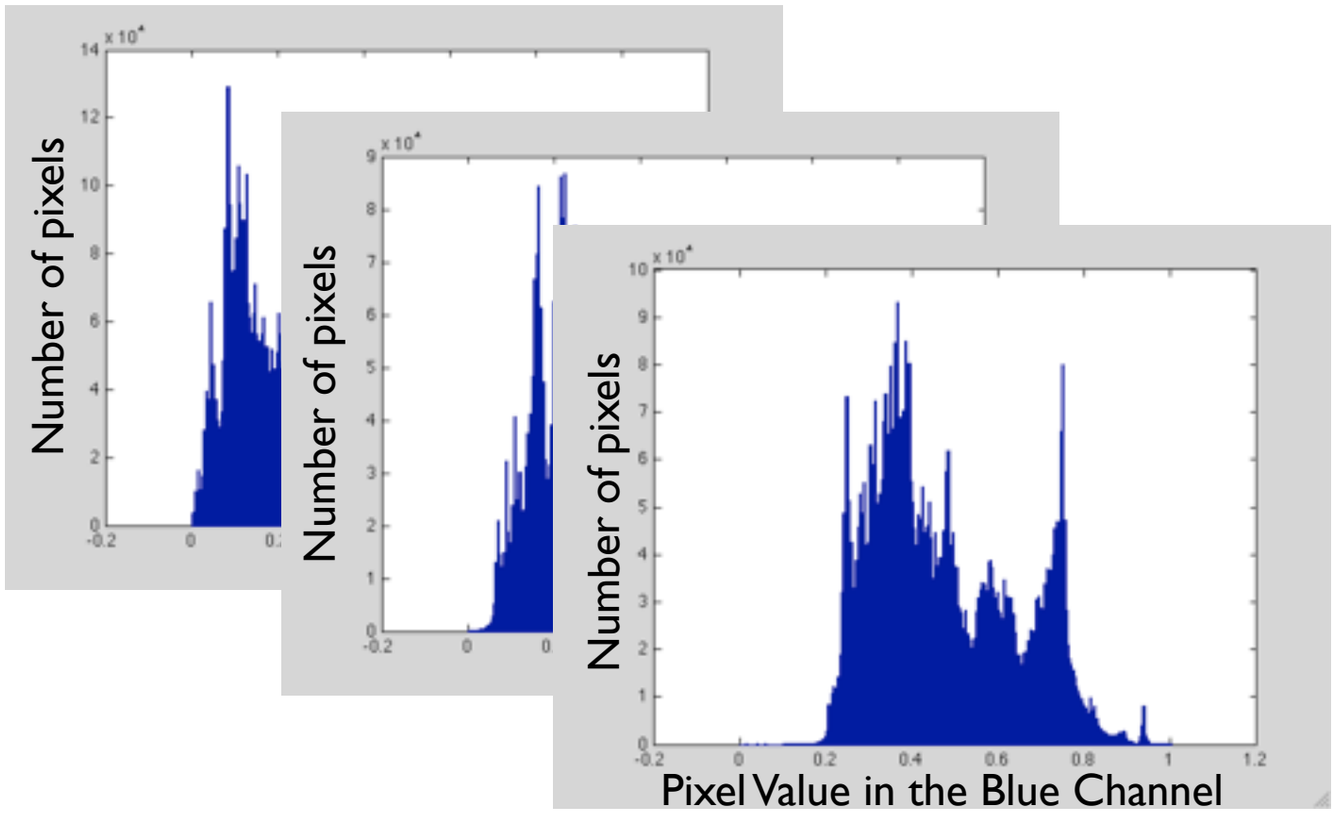
Weighted Gray World





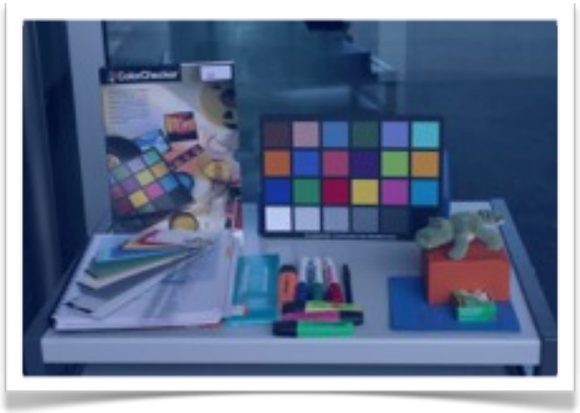
Weighted Gray World

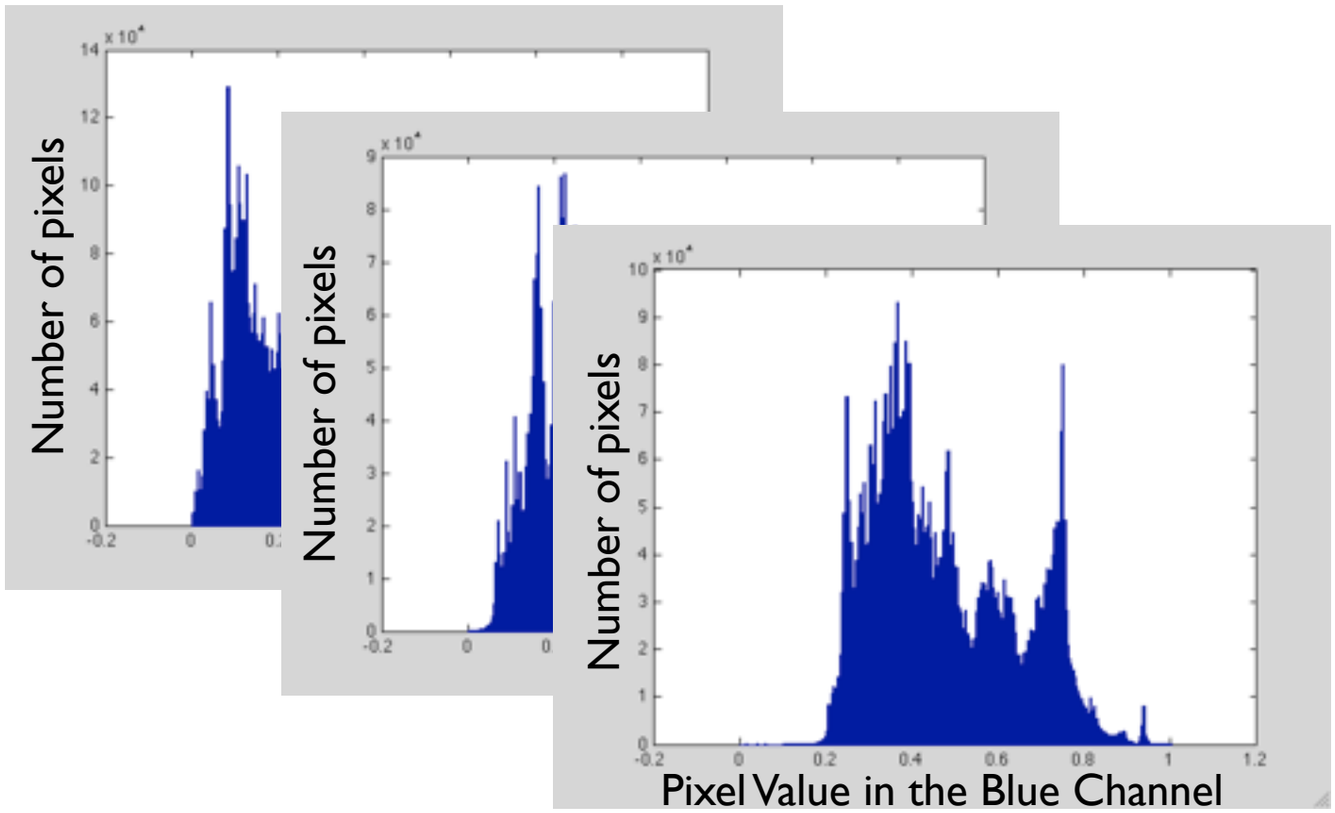




ave(nonzero(hist(R)))=
ave(nonzero(hist(G)))=
ave(nonzero(hist(B)))

Weighted Gray World

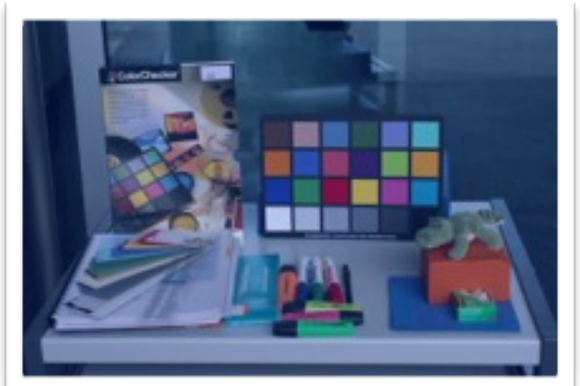


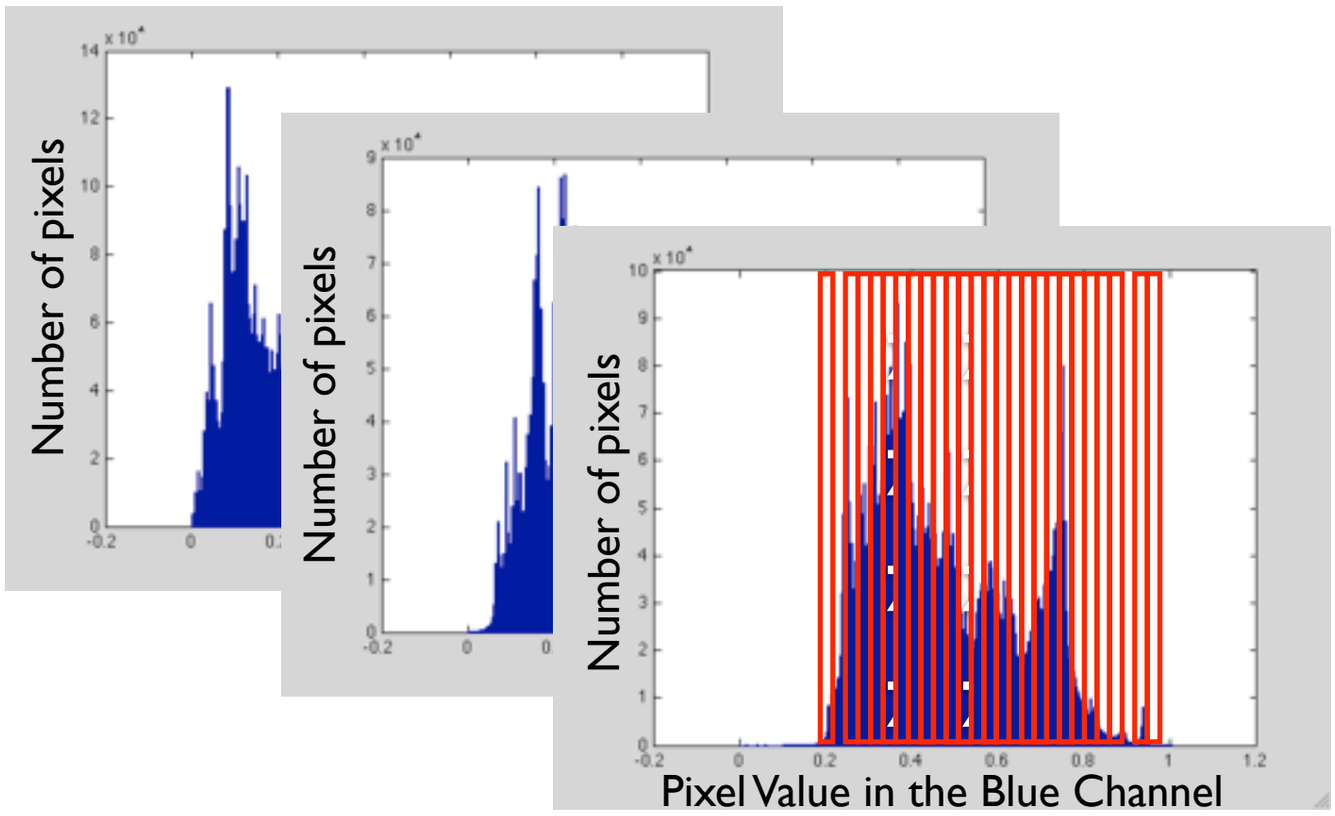


ave(nonzero(hist(R)))=
ave(nonzero(hist(G)))=
ave(nonzero(hist(B)))

[0.0 0.2 0.4 0.6 0.8 1.0]

Weighted Gray World



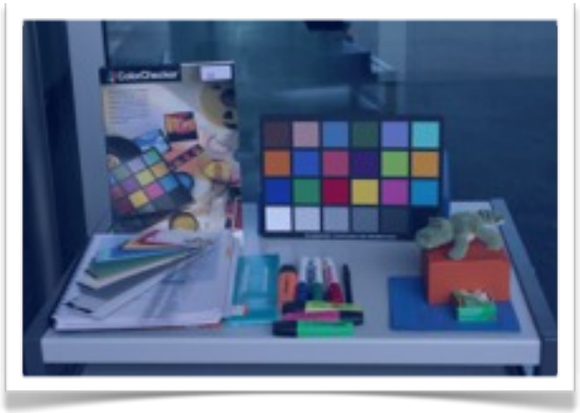


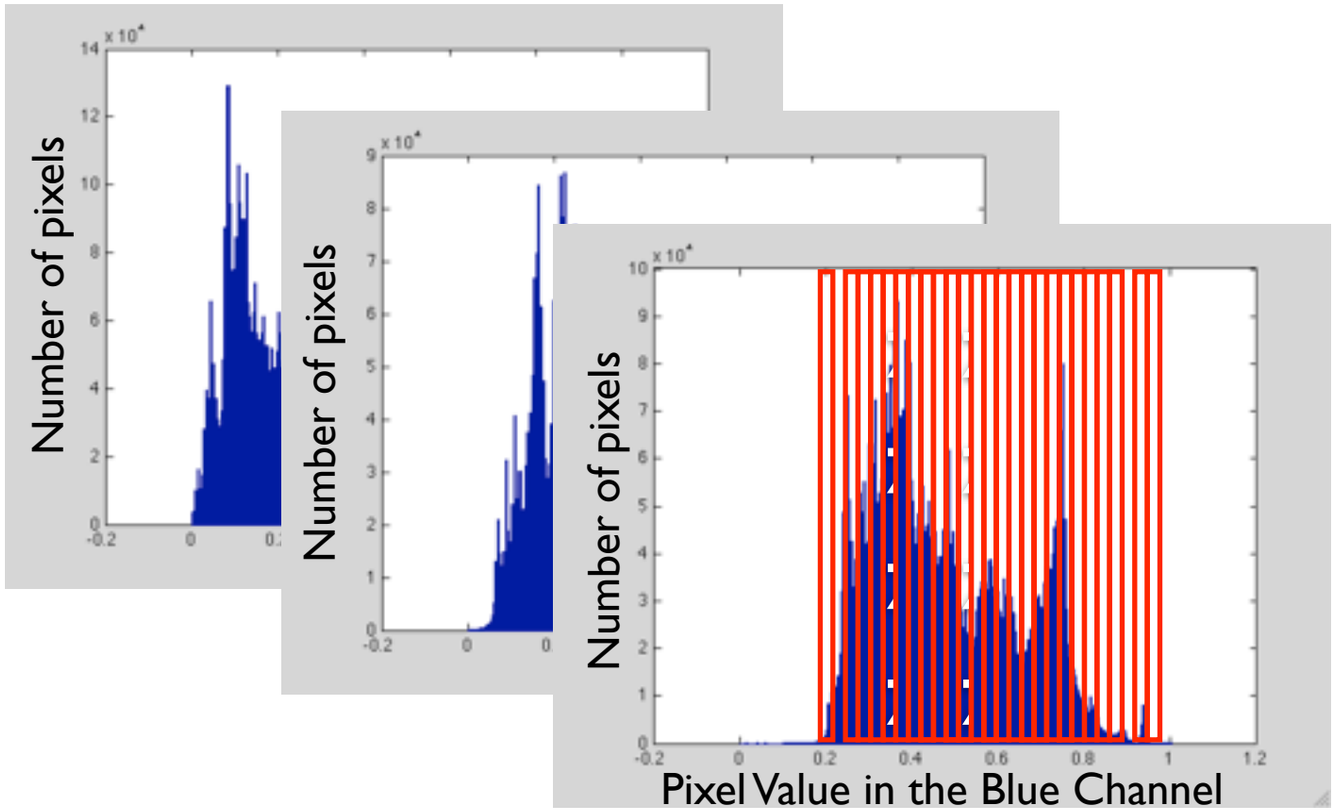
ave(nonzero(hist(R)))=
ave(nonzero(hist(G)))=
ave(nonzero(hist(B)))

[3 5 0 1 2 0]

[0.0 0.2 0.4 0.6 0.8 1.0]

Weighted Gray World





ave(nonzero(hist(R)))=
ave(nonzero(hist(G)))=
ave(nonzero(hist(B)))

[3 5 0 1 2 0]

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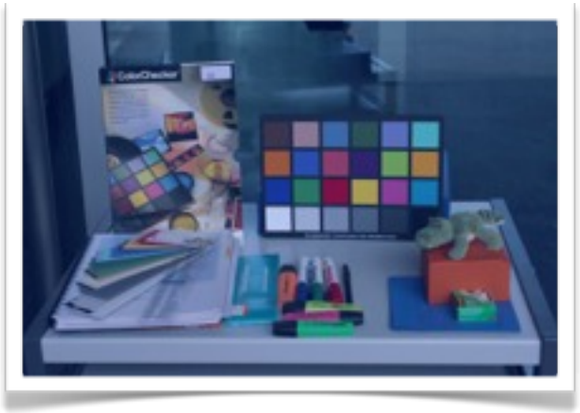
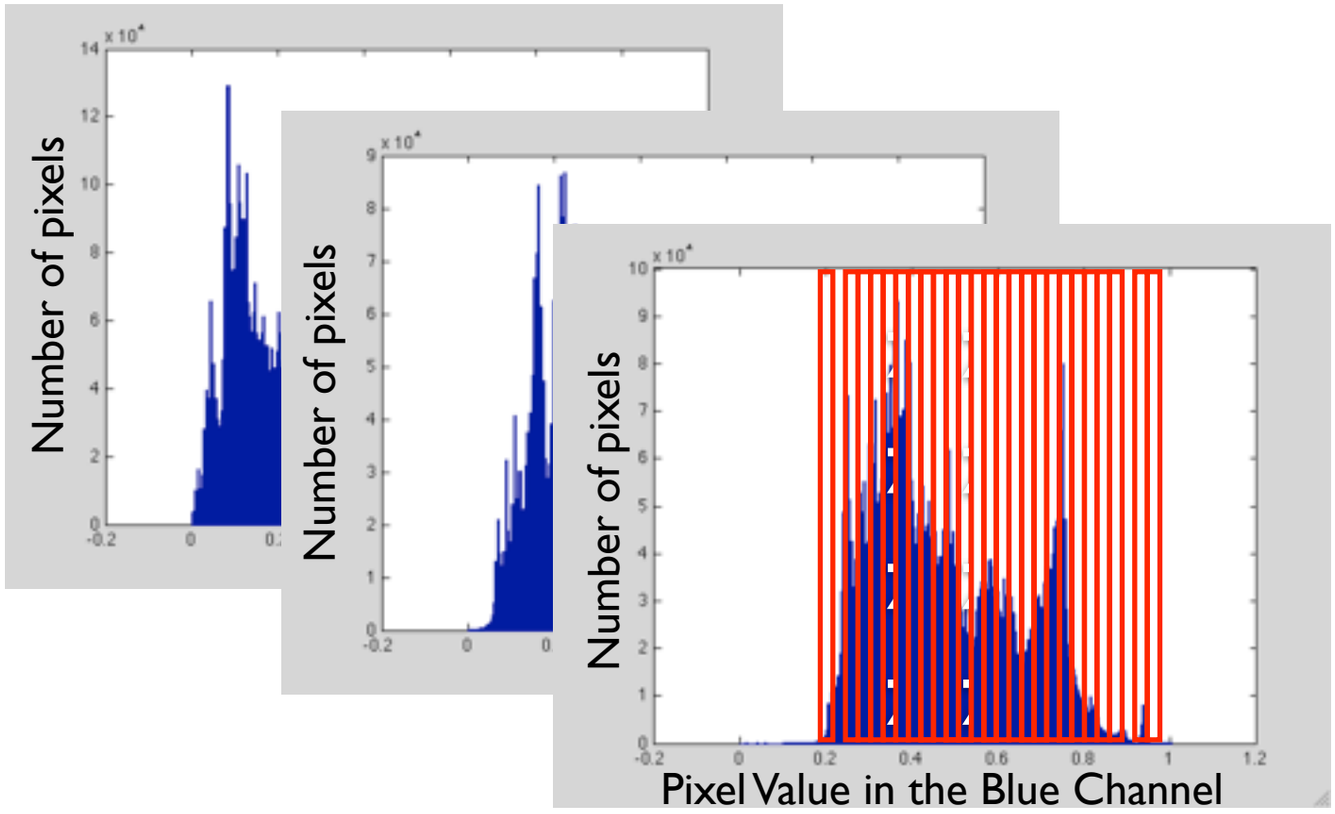
Weighted Gray World





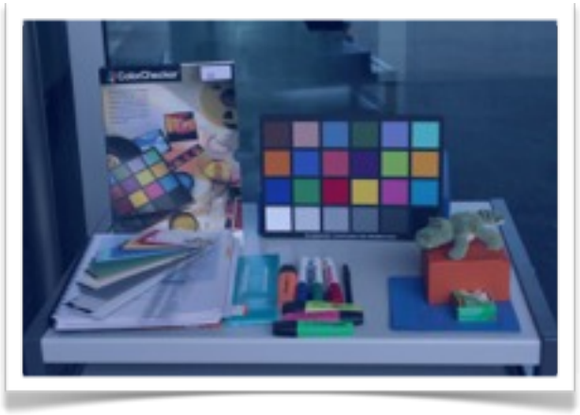
ave(nonzero(hist(R)))=
ave(nonzero(hist(G)))=
ave(nonzero(hist(B)))

[3 5 0 1 2 0]

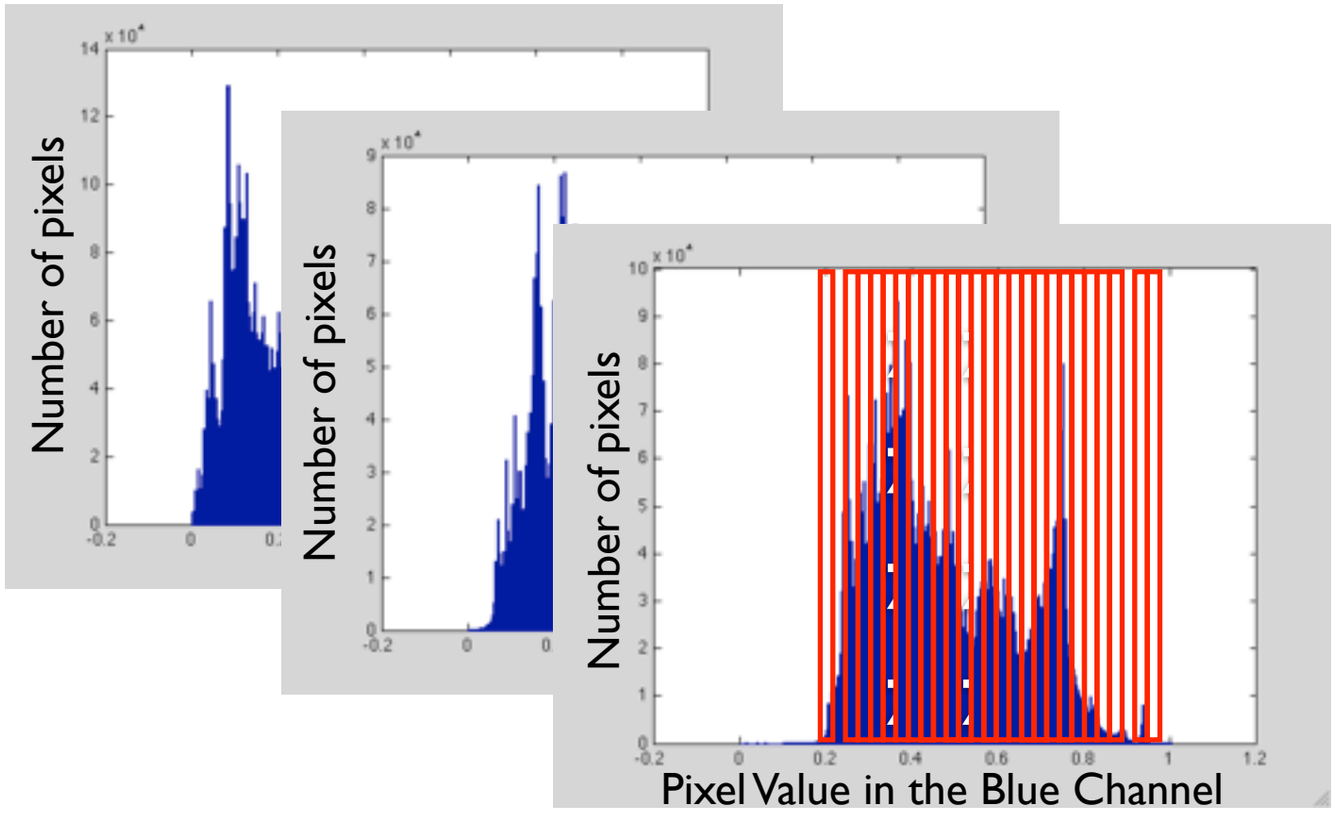
[0.0 0.2 0.4 0.6 0.8 1.0]

(0.0 + 0.2 + 0.6 + 0.8)/4 = 0.4

Weighted Gray World



ave(nonzero(hist(R)))=
ave(nonzero(hist(G)))=
ave(nonzero(hist(B)))

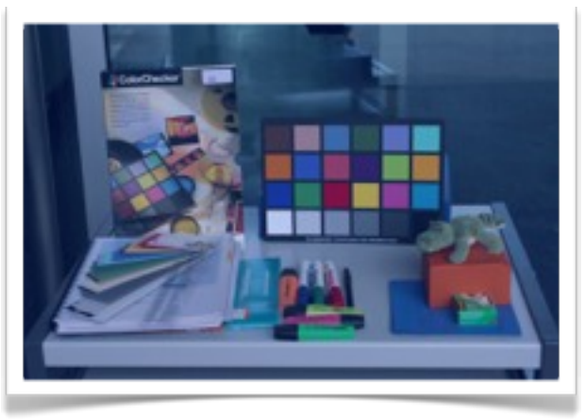


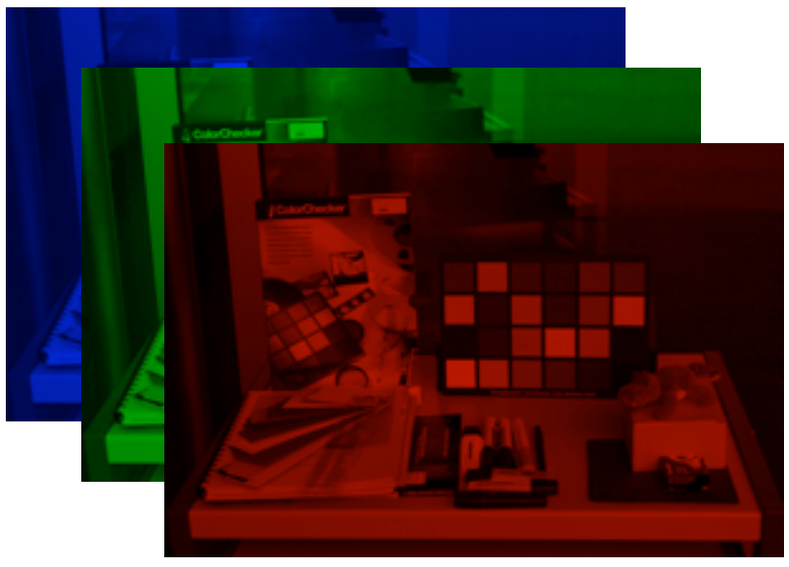
[3 5 0 1 2 0]

[0.0 0.2 0.4 0.6 0.8 1.0]

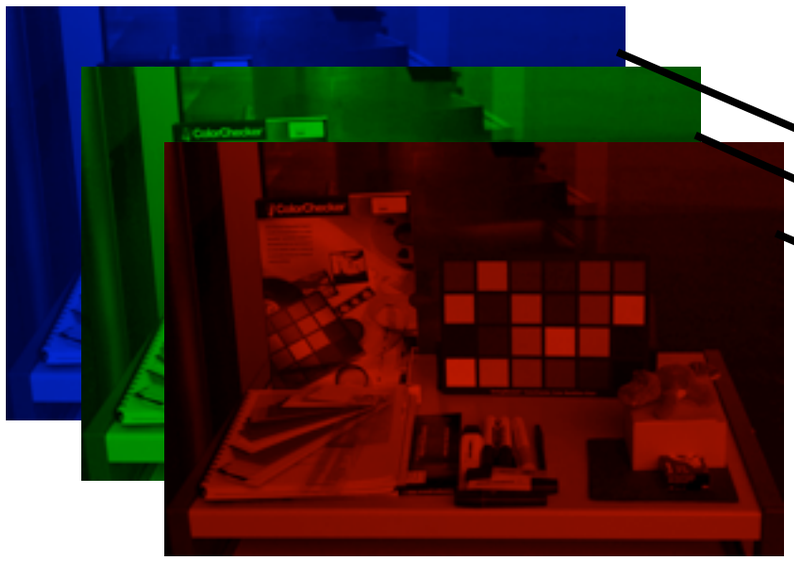
(0.0 + 0.2 + 0.6 + 0.8)/4 = 0.4

MaxRGB



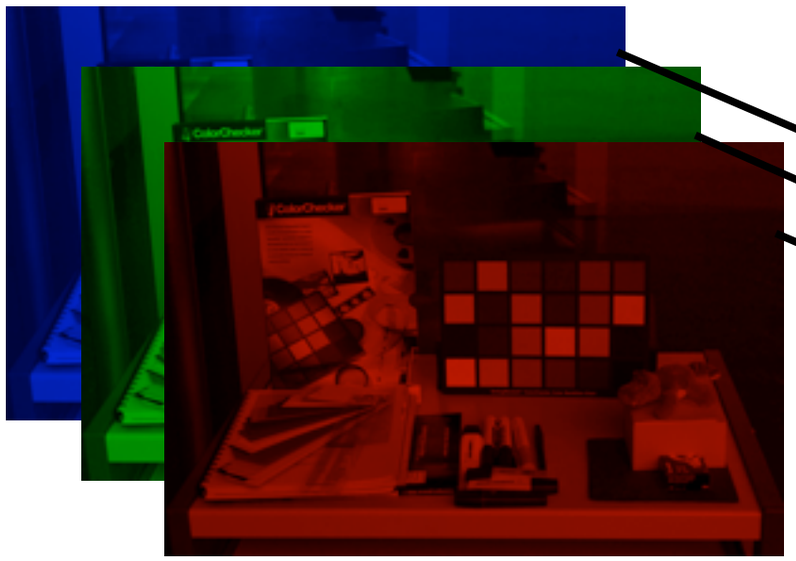


MaxRGB



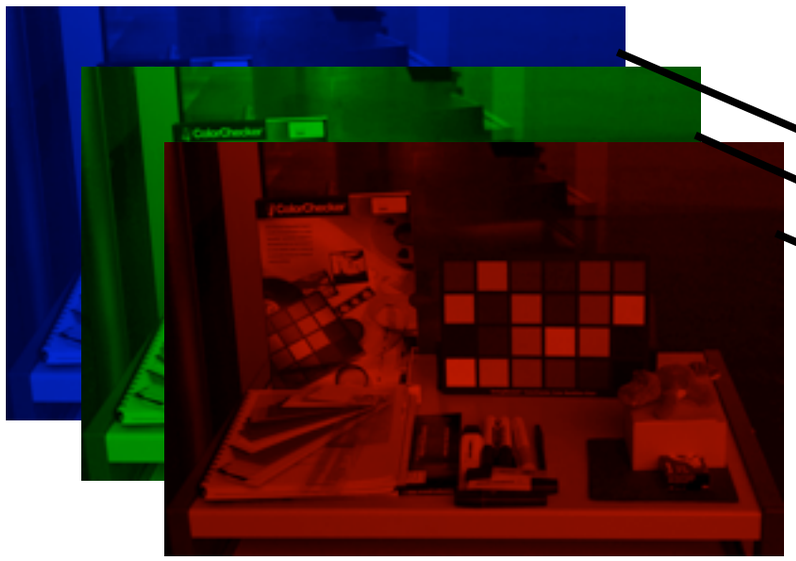
Max(R+G+B)=White

MaxRGB



Max(R+G+B)=White

MaxRGB



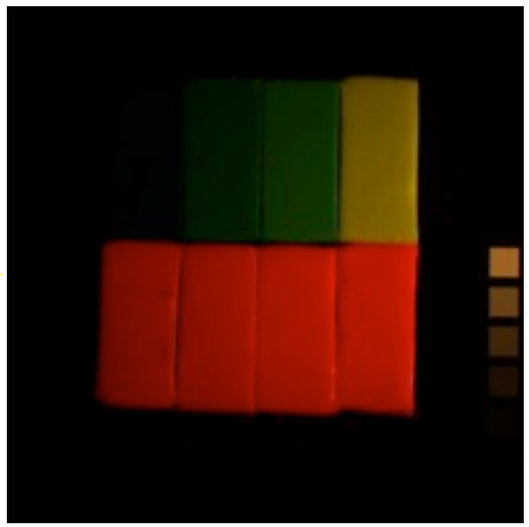
Max(R+G+B)=White

- When does it give good results?
- What are its limitations?

Illuminant Estimation

illuminant
A

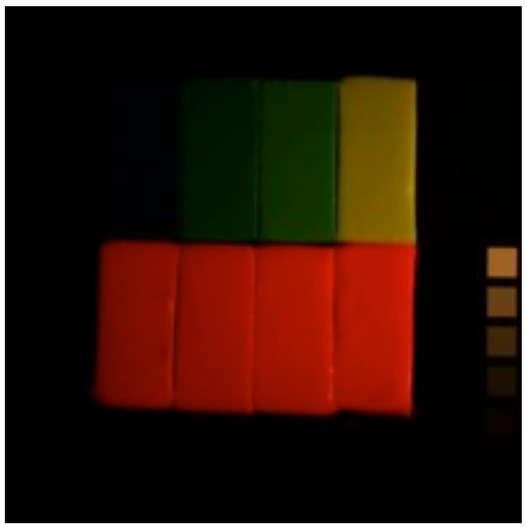
camera sensitivity
R



Illuminant Estimation

illuminant
A

camera sensitivity
R



Illuminant Estimation

illuminant
A

camera sensitivity
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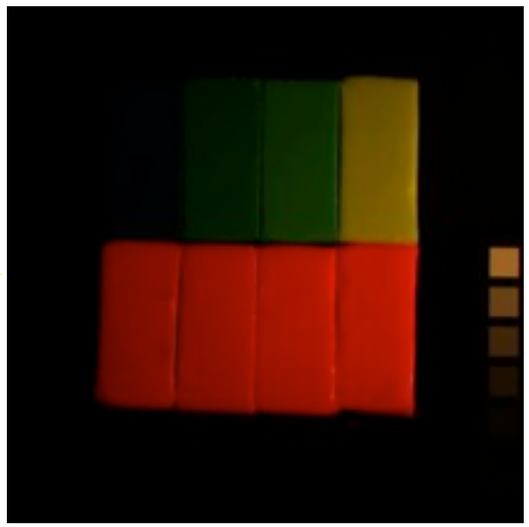


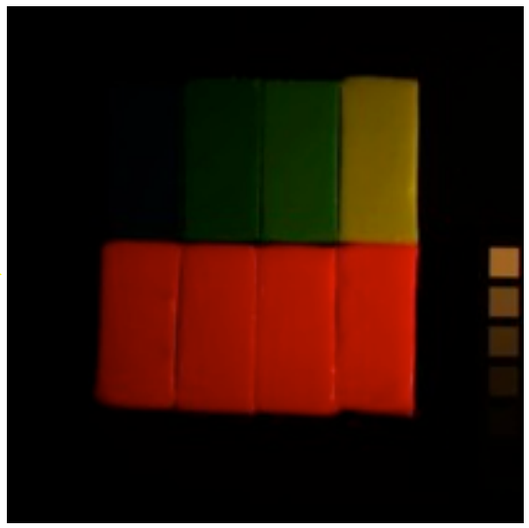
Illuminant Estimation

illuminant

A

camera sensitivity

R



A * R : RGB of the illuminant

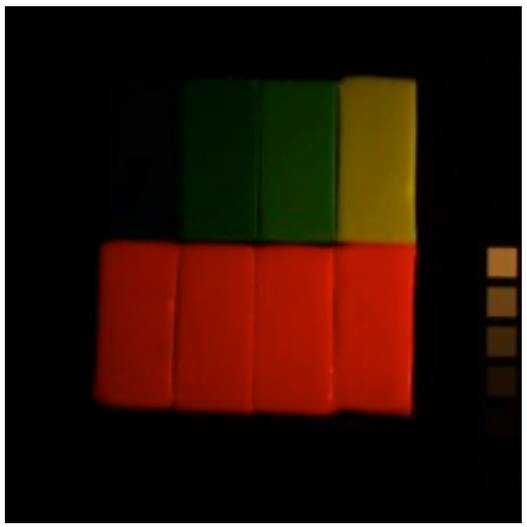
Illuminant Estimation

illuminant

A

camera sensitivity

R



+

A * R : RGB of the illuminant