Background Subtraction
&
Mean transfer

Background subtraction

Background Subtraction

like the same

foreground

Background

pixel $_{ij}$ = $\begin{bmatrix} R \\ G \\ B \end{bmatrix} - \begin{bmatrix} R \\ G \\ B \end{bmatrix}$ pixel $_{ij}$

Pixel-wise Subtraction

pixel $_{ij}$ = $\begin{bmatrix} |R-R| \\ |G-G| \\ |B-B| \end{bmatrix}$

Subtracted Img (color)

Covert ⟶ Grayscale

Creating Mask

Pixel = 0.3R + 0.59G + 0.11B
$_{ij}$

Subtracted Img (Grayscale)

Remember!

0 → black

255 → white

0 ⟵ Brighter / Darker ⟶ 255

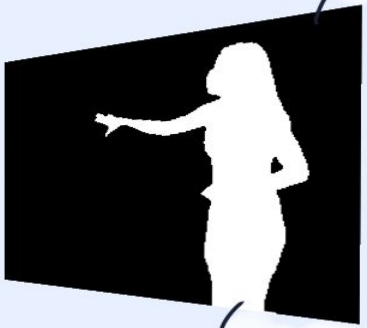
Background Subtraction (cont.)

Subtracted Img
Grayscale, 1 channel

< Threshold ?

yes → 0
Background

no → 255
foreground

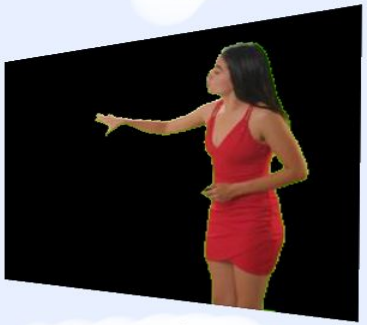


0 : black

255 : white

Mask

× element wise multiplication



Segmented Img

$0 \times \begin{bmatrix} R \\ G \\ B \end{bmatrix} \rightarrow \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

$\frac{255}{255} \times \begin{bmatrix} R \\ G \\ B \end{bmatrix} \rightarrow \begin{bmatrix} R \\ G \\ B \end{bmatrix}$

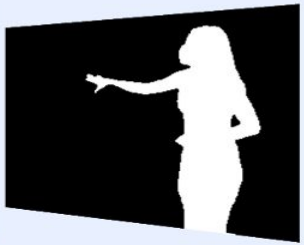
+ Mask

+ Fake BG

New Image, with Fake BG

Combining Images.

1) Comparing Pix 2 Pix



mask $_{ij}$ == 0 ⟶ new_img $_{ijk}$ = fake bg $_{ijk}$

mask $_{ij}$!= 0 ⟶ new_img $_{ijk}$ = segmented $_{ijk}$

New img

2) Element wise Addition + Multiplication.

mask

Mask Inversion

$255 - mask_{ij}$

mask'

× Element wise Multiplication

⇒

+

$\frac{mask'}{255}$ x fake background

Element wise Addition

Mean transfer

Mean transfer

input Img

Convert to Grayscale

gray scale Img

W x W window's mean calculating

output Img

$$\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \text{pixel}_{ij}$$

$$\text{pixel}_{ij} = 0.3R + 0.59G + 0.11B$$

$$\text{pixel}_{ij} = \text{mean}(\text{window})_{ij}$$

Mean Transfer (cont.)

Calculating Mean

for each window

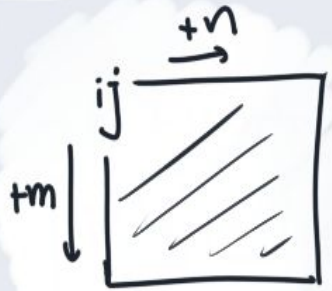
center a window

color color color
color color color
color color color
bound
i
j

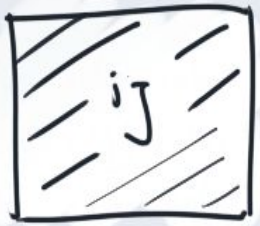
let i := bound ; let j := bound → j := W - bound

i := H - bound

W	=	I
m		i+m
n		j+n



-bound



W	=	I
m		i+m - bound
n		j+n - bound

End of slide!