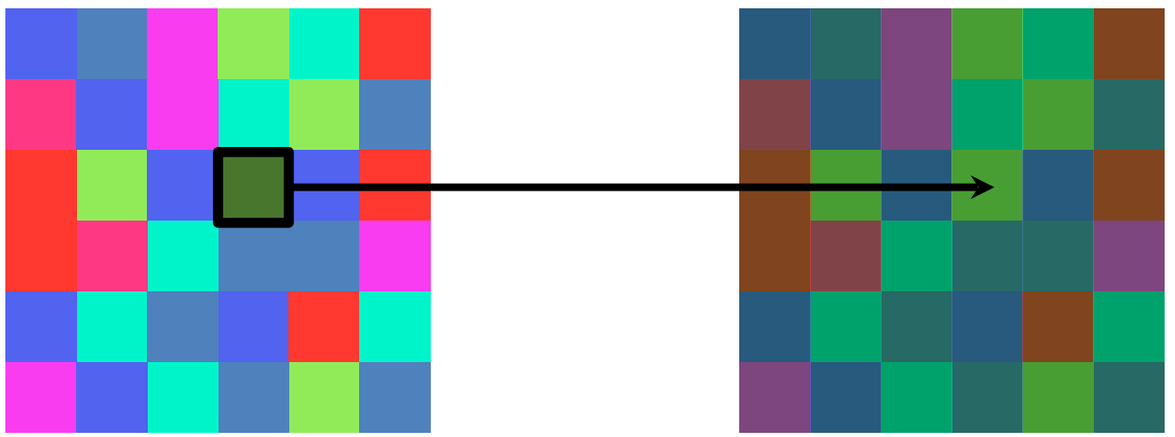
Point Processing

16-385 Computer Vision (Kris Kitani)

Carnegie Mellon University

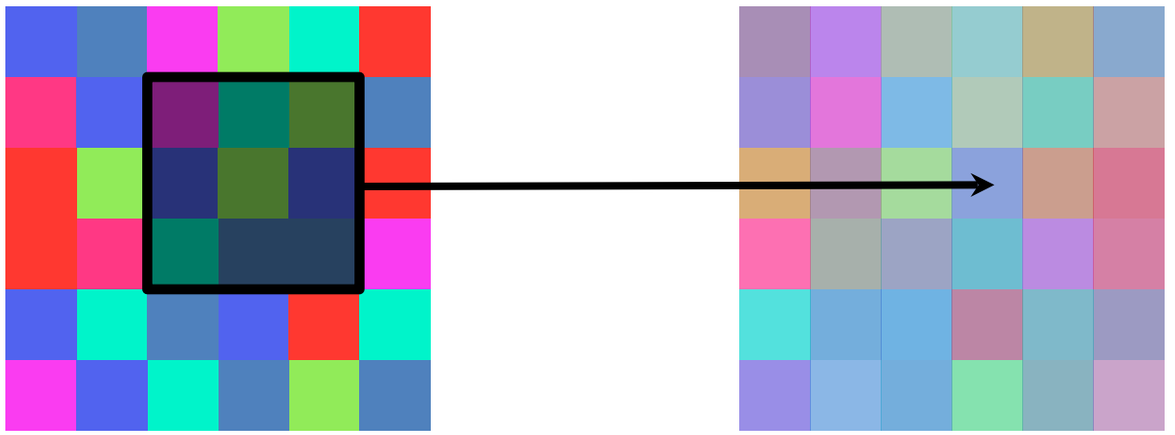
What kind of image filtering can we perform?

Point Operation



point processing

Neighborhood Operation

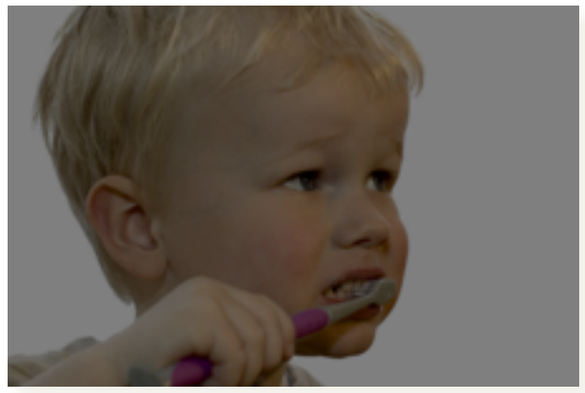


filtering

Original

Darken

Lower Contrast

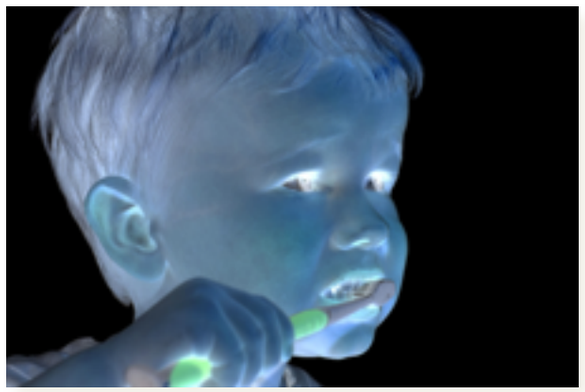


Nonlinear Lower Contrast

x

pixel value

Invert



Lighten

Raise Contrast

Nonlinear Raise Contrast

Original

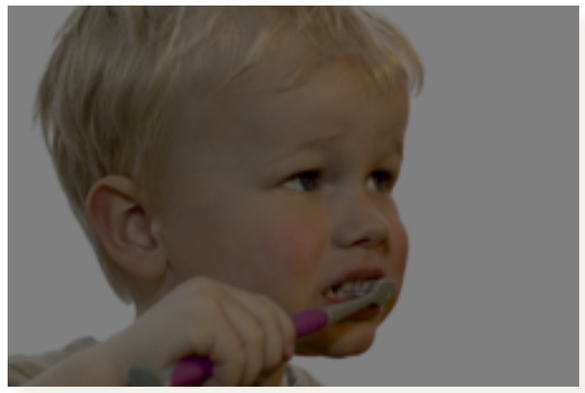
x

Darken

$x - 128$

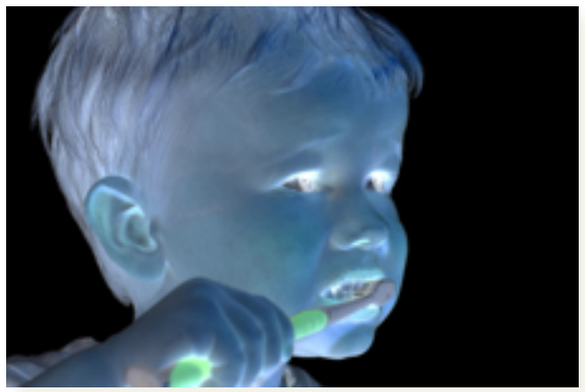
how would you code this?

Lower Contrast



Nonlinear Lower Contrast

Invert



Lighten

Raise Contrast

Nonlinear Raise Contrast

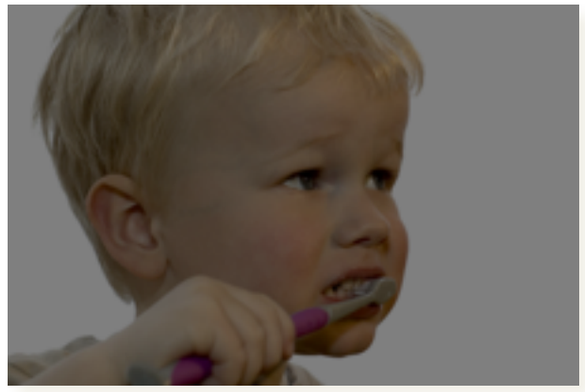
Original

x

Darken

$x - 128$

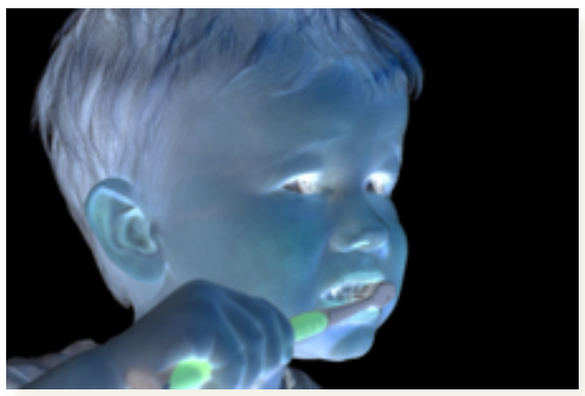
Lower Contrast



$\frac{x}{2}$

Nonlinear Lower Contrast

Invert



Lighten

Raise Contrast

Nonlinear Raise Contrast

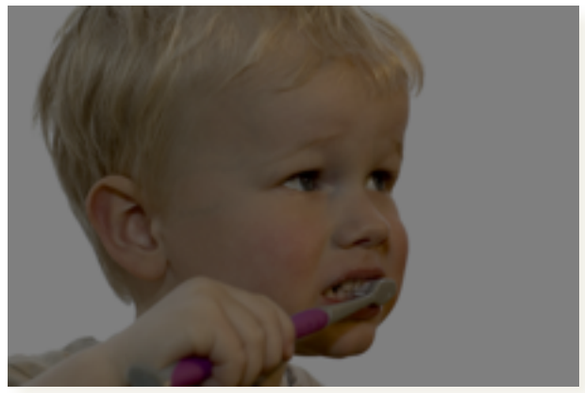
Original

$$x$$

Darken

$$x - 128$$

Lower Contrast

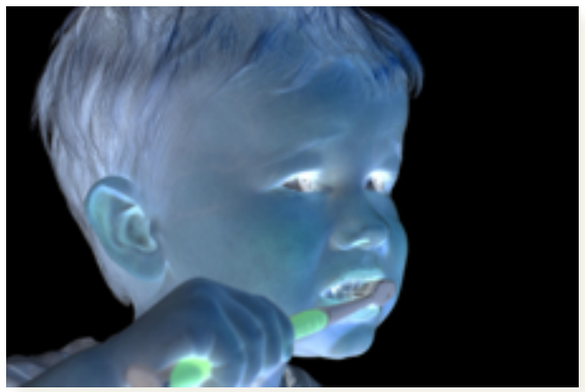


$$\frac{x}{2}$$

Nonlinear Lower Contrast

$$\left(\frac{x}{255}\right)^{1/3} \times 255$$

Invert



Lighten

Raise Contrast

Nonlinear Raise Contrast

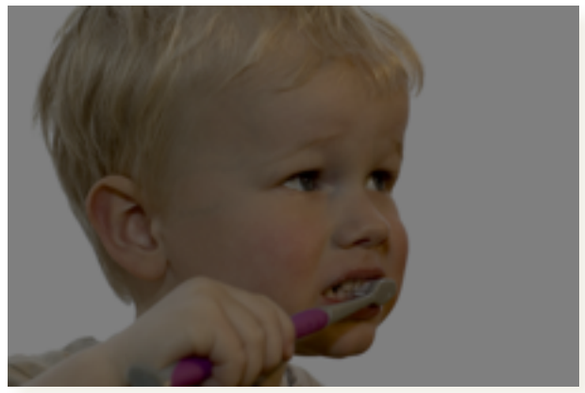
Original

$$x$$

Darken

$$x - 128$$

Lower Contrast

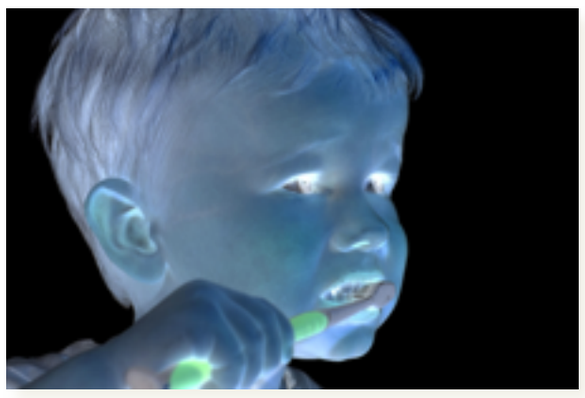


$$\frac{x}{2}$$

Nonlinear Lower Contrast

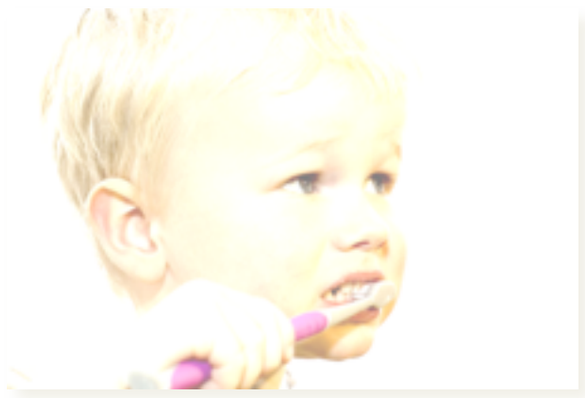
$$\left(\frac{x}{255}\right)^{1/3} \times 255$$

Invert



$$255 - x$$

Lighten



Raise Contrast

Nonlinear Raise Contrast

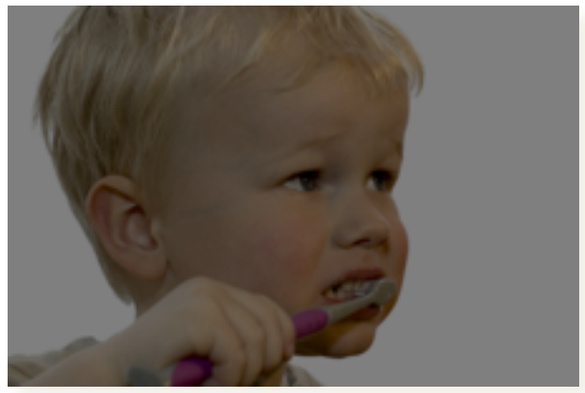
Original

$$x$$

Darken

$$x - 128$$

Lower Contrast

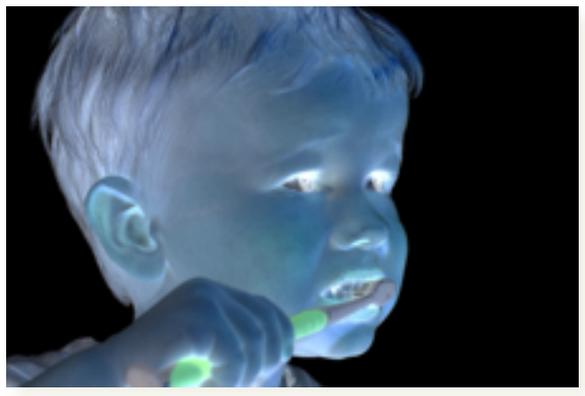


$$\frac{x}{2}$$

Nonlinear Lower Contrast

$$\left(\frac{x}{255}\right)^{1/3} \times 255$$

Invert



$$255 - x$$

Lighten

$$x + 128$$

Raise Contrast

Nonlinear Raise Contrast

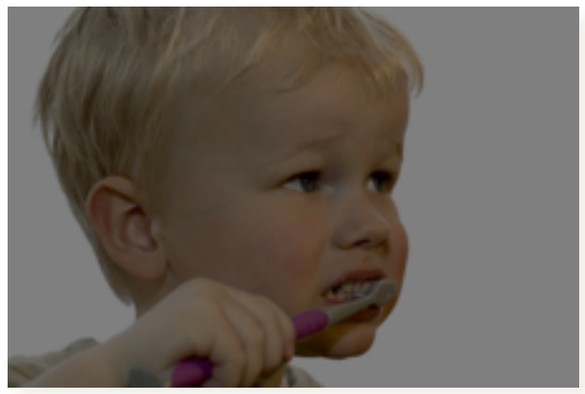
Original

$$x$$

Darken

$$x - 128$$

Lower Contrast

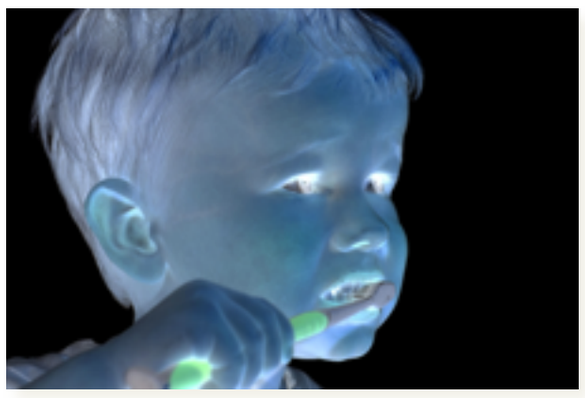


$$\frac{x}{2}$$

Nonlinear Lower Contrast

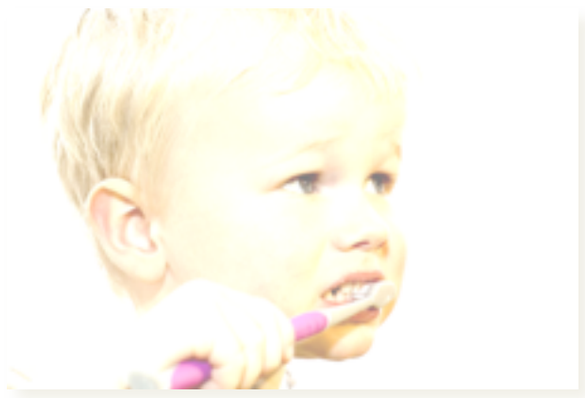
$$\left(\frac{x}{255}\right)^{1/3} \times 255$$

Invert



$$255 - x$$

Lighten



$$x + 128$$

Raise Contrast

$$x \times 2$$

Nonlinear Raise Contrast

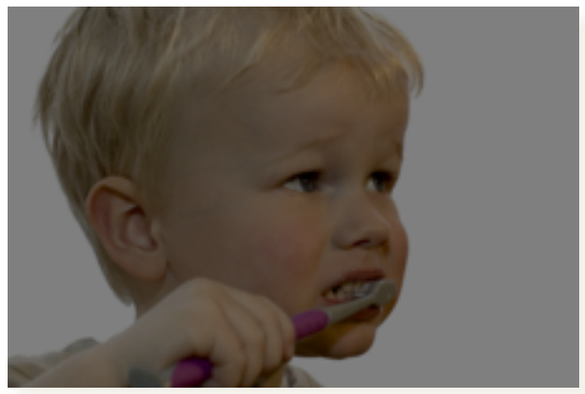
Original

$$x$$

Darken

$$x - 128$$

Lower Contrast

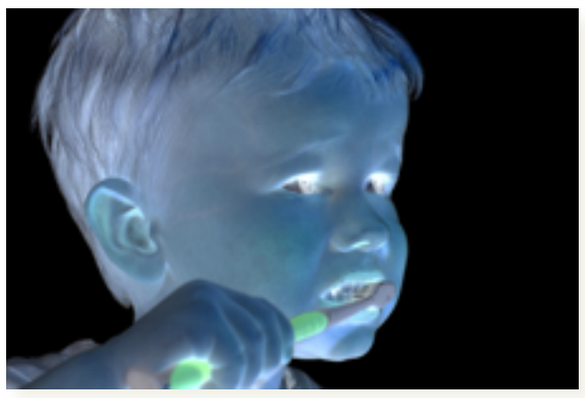


$$\frac{x}{2}$$

Nonlinear Lower Contrast

$$\left(\frac{x}{255}\right)^{1/3} \times 255$$

Invert



$$255 - x$$

Lighten

$$x + 128$$

Raise Contrast

$$x \times 2$$

Nonlinear Raise Contrast

$$\left(\frac{x}{255}\right)^{2} \times 255$$

Other point processes