JPEG compression of color images

Guillaume Tochon

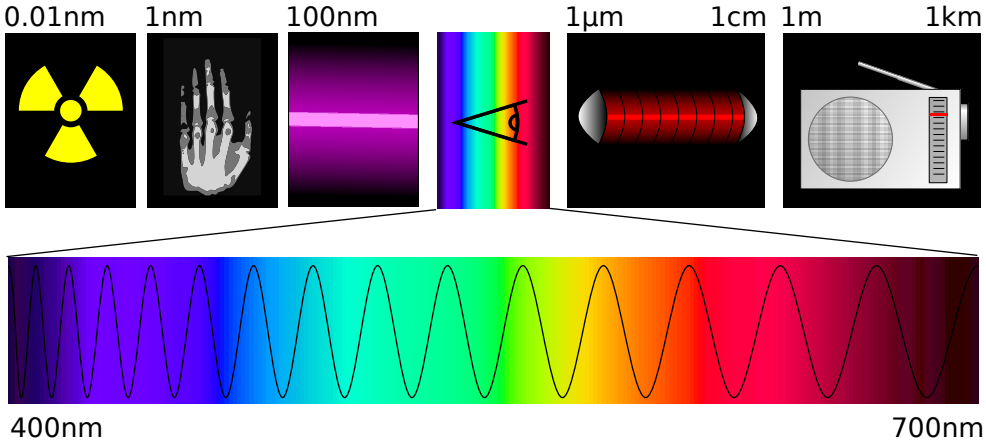
guillaume.tochon@lrde.epita.fr

LRDE, EPITA

What is color?

What is color?

From a physical standpoint, the *visible* light is an electromagnetic radiation whose wavelength is comprised between $\sim$400 nm and $\sim$700 nm (frequency between $\sim$430 THz and $\sim$750 THz).
$\Rightarrow$ It constitutes only a tiny portion of the whole electromagnetic spectrum.



Perceived color	Wavelength interval	Frequency interval
Red	$\sim$700-635 nm	$\sim$430-480 THz
Orange	$\sim$635-590 nm	$\sim$480-510 THz
Yellow	$\sim$590-560 nm	$\sim$510-540 THz
Green	$\sim$560-520 nm	$\sim$540-580 THz
Cyan	$\sim$520-490 nm	$\sim$580-610 THz
Blue	$\sim$490-450 nm	$\sim$610-670 THz
Violet	$\sim$450-400 nm	$\sim$670-750 THz

The visual perception can be tricky...

Which one is the “true” blue?

The visual perception can be tricky...

Which one is the “true” blue?

Which inner rectangle is darker?

The visual perception can be tricky...

Which one is the “true” blue?

Which inner rectangle is darker?

→ They are both the same color

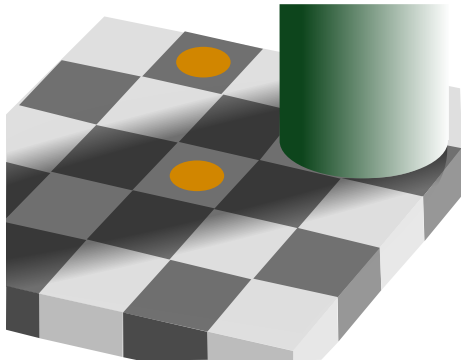
The visual perception can be tricky...

Which one is the “true” blue?

Which inner rectangle is darker?

→ They are both the same color ■

Which yellow dot is brighter?



The visual perception can be tricky...

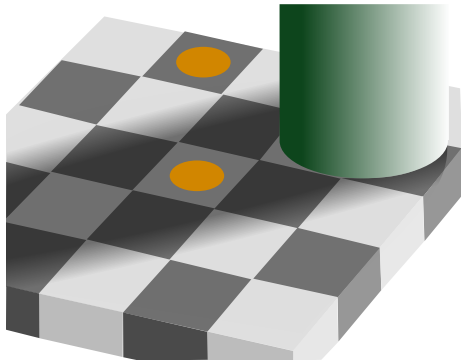
Which one is the “true” blue?

Which inner rectangle is darker?

→ They are both the same color

Which yellow dot is brighter?

→ Again, they are both the same color



The visual perception can be tricky...

Which one is the “true” blue?

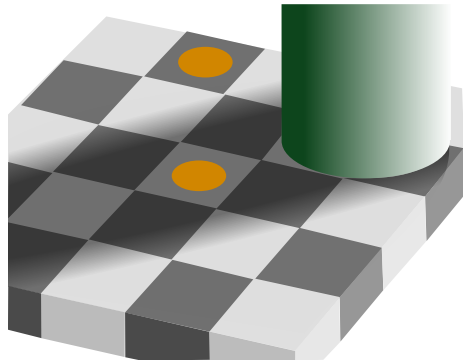
Which inner rectangle is darker?

→ They are both the same color

Which yellow dot is brighter?

→ Again, they are both the same color

→ But so are their surrounding gray squares !



The visual perception can be tricky...

Which one is the “true” blue?

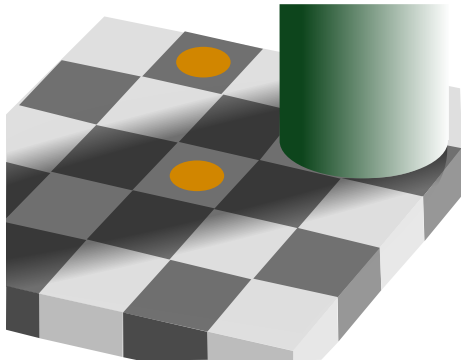
Which inner rectangle is darker?

→ They are both the same color

Which yellow dot is brighter?

→ Again, they are both the same color

→ But so are their surrounding gray squares !



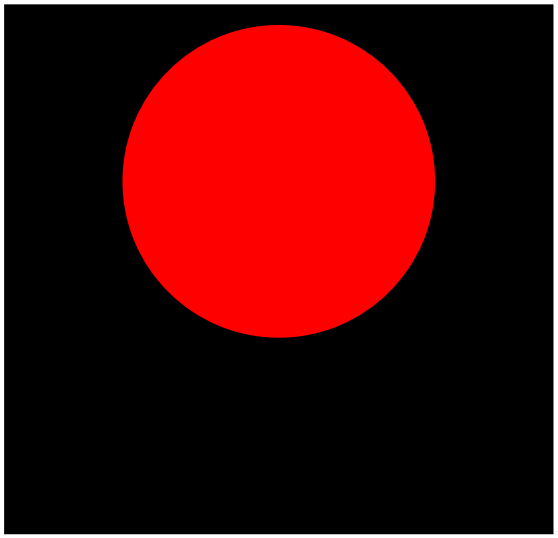
Is the dress white and gold or black and blue?

Color synthesis

Trichromy color theory: any color can be reproduced by combining only three *primary* colors (none can be obtained as a combination of the other two).

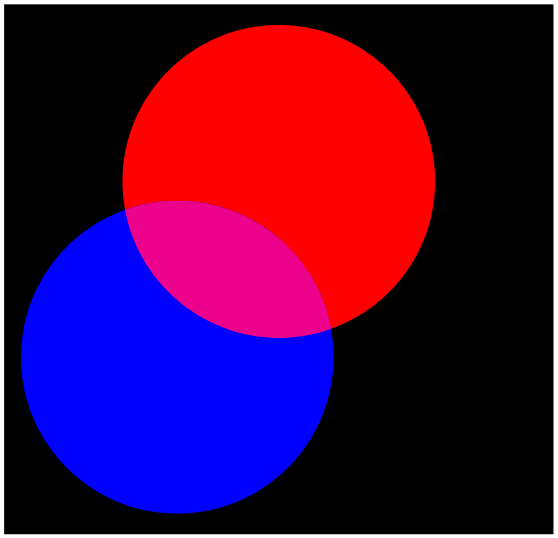
Color synthesis

Trichromy color theory: any color can be reproduced by combining only three *primary* colors (none can be obtained as a combination of the other two).



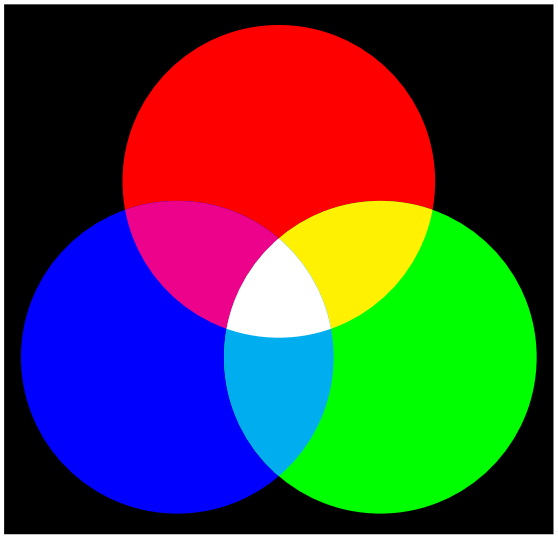
Color synthesis

Trichromy color theory: any color can be reproduced by combining only three *primary* colors (none can be obtained as a combination of the other two).



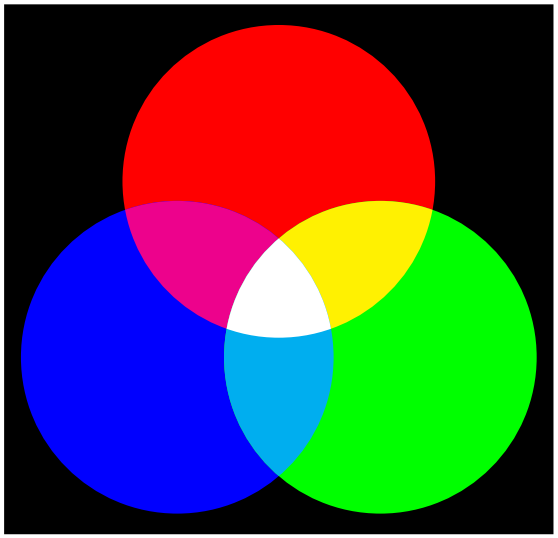
Color synthesis

Trichromy color theory: any color can be reproduced by combining only three *primary* colors (none can be obtained as a combination of the other two).

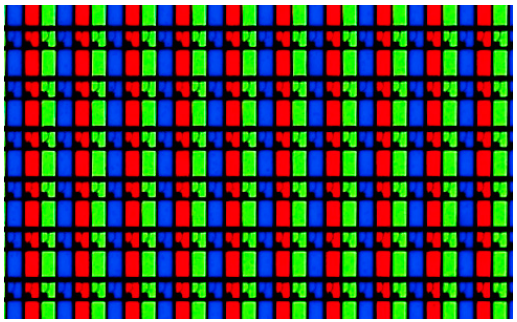


Color synthesis

Trichromy color theory: any color can be reproduced by combining only three *primary* colors (none can be obtained as a combination of the other two).



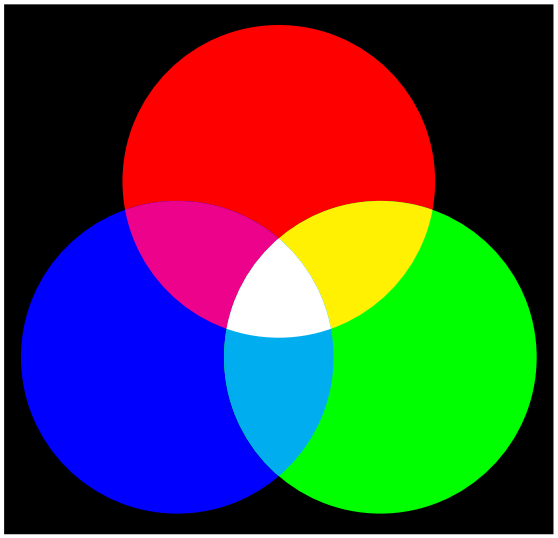
Additive synthesis



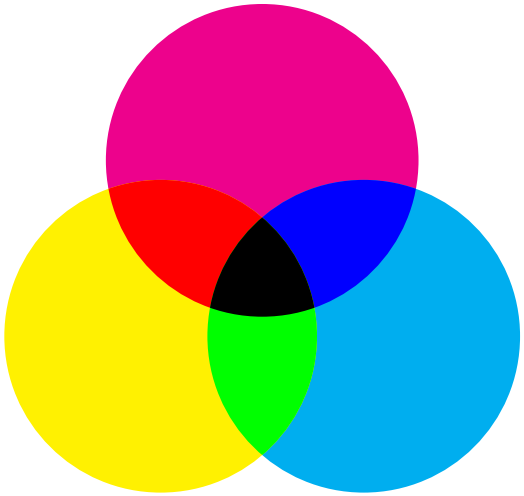
Zoom on LCD subpixels

Color synthesis

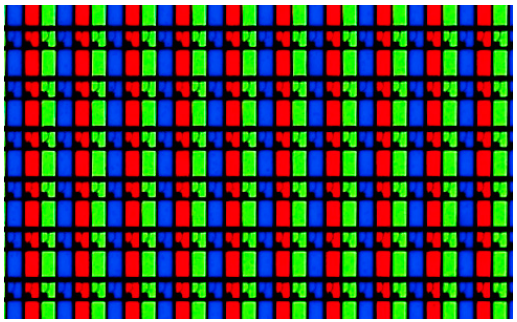
Trichromy color theory: any color can be reproduced by combining only three *primary* colors (none can be obtained as a combination of the other two).



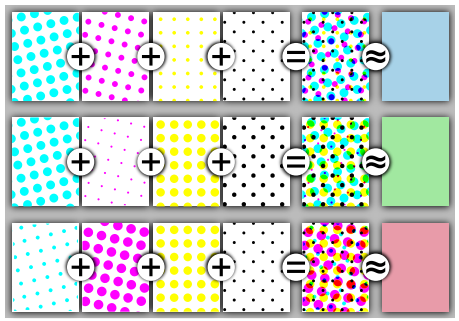
Additive synthesis



Subtractive synthesis



Zoom on LCD subpixels



Halftone CYMK printing