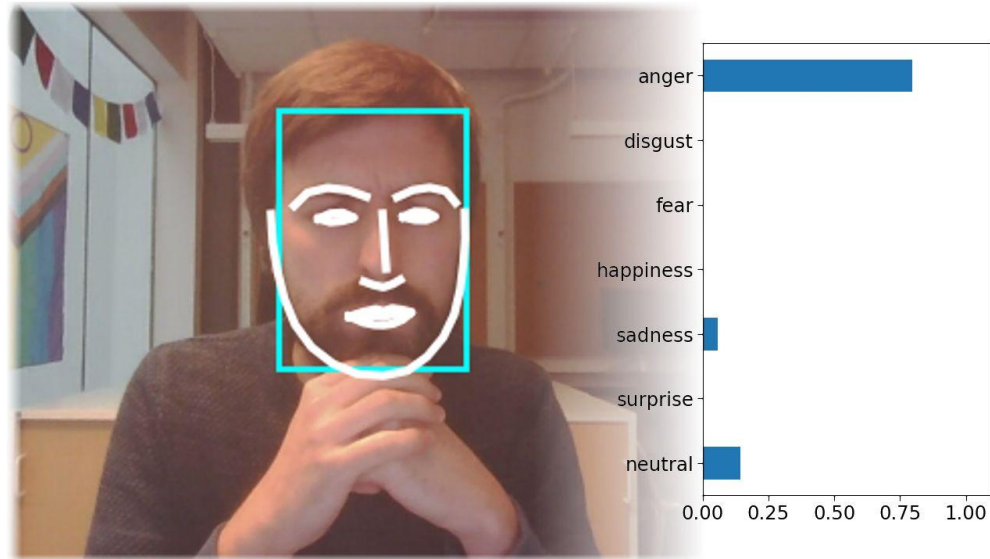




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# Lab 1: Computer Vision

Marc Fraile





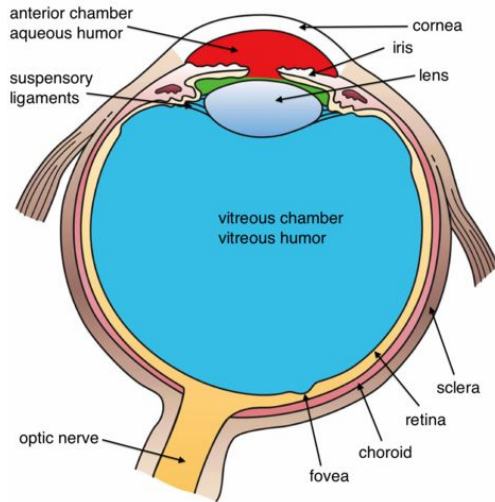
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# Digital Imaging

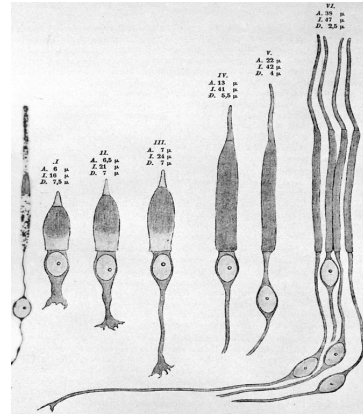
- Human vision
- Color is an illusion
- Faking color for monkey brains
- Raster images



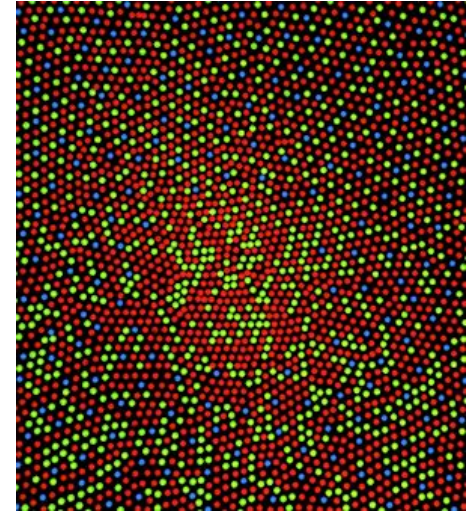
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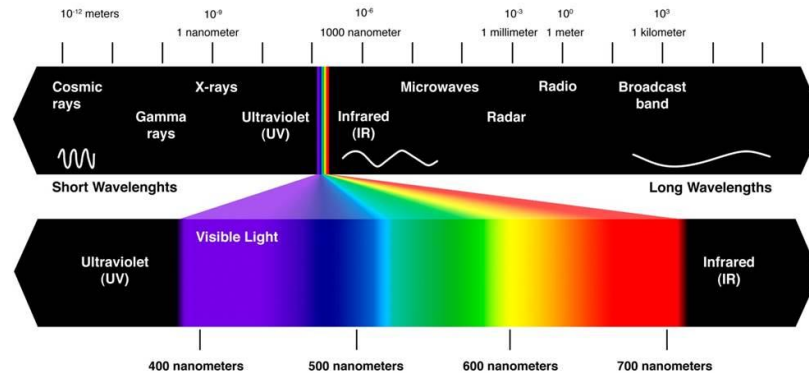
structure of the eye



# Human vision



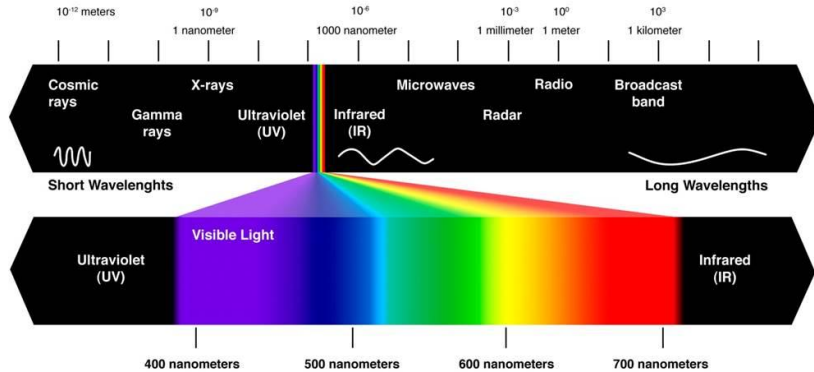
distribution of cones  
in the retina



light spectrum



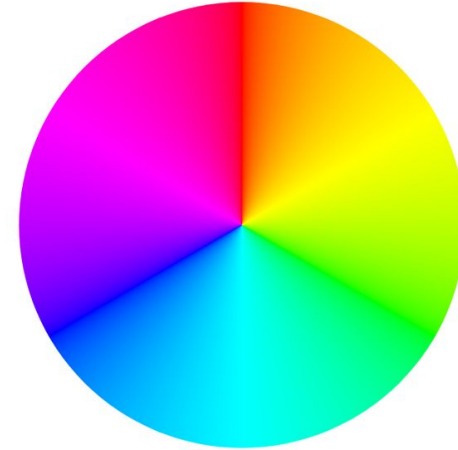
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light spectrum: **linear**

Purple and red are completely different!

# Color is an illusion



color perception: **circular**

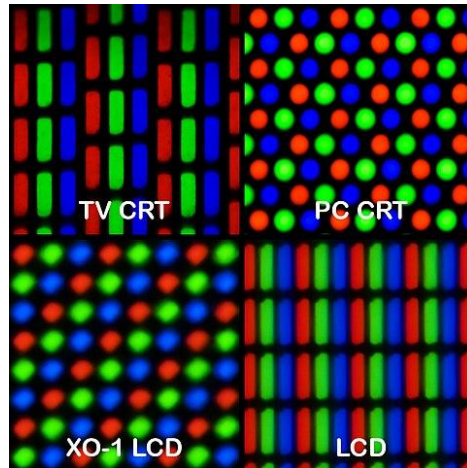
Pink closes the gap.

**Color perception** is not **physical reality**



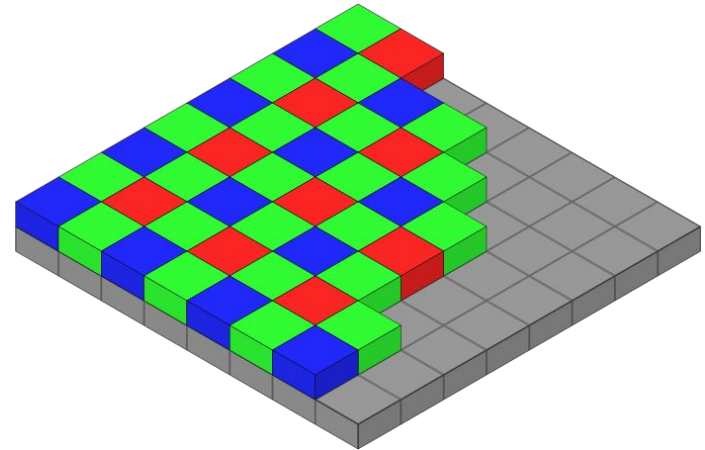
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# Faking color for monkey brains



Screens use **RGB**

From far away, colored light mixes.



Cameras use **RGB**

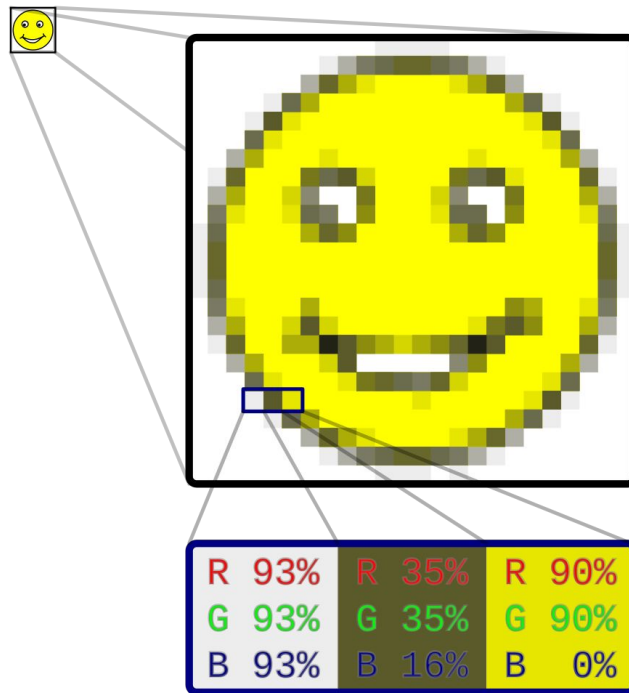
Always need more precision on **Green**.

**Great! We can fake it!**



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# Raster images



3D arrays: (**height**, **width**, **channels**)

we load images as 3D arrays



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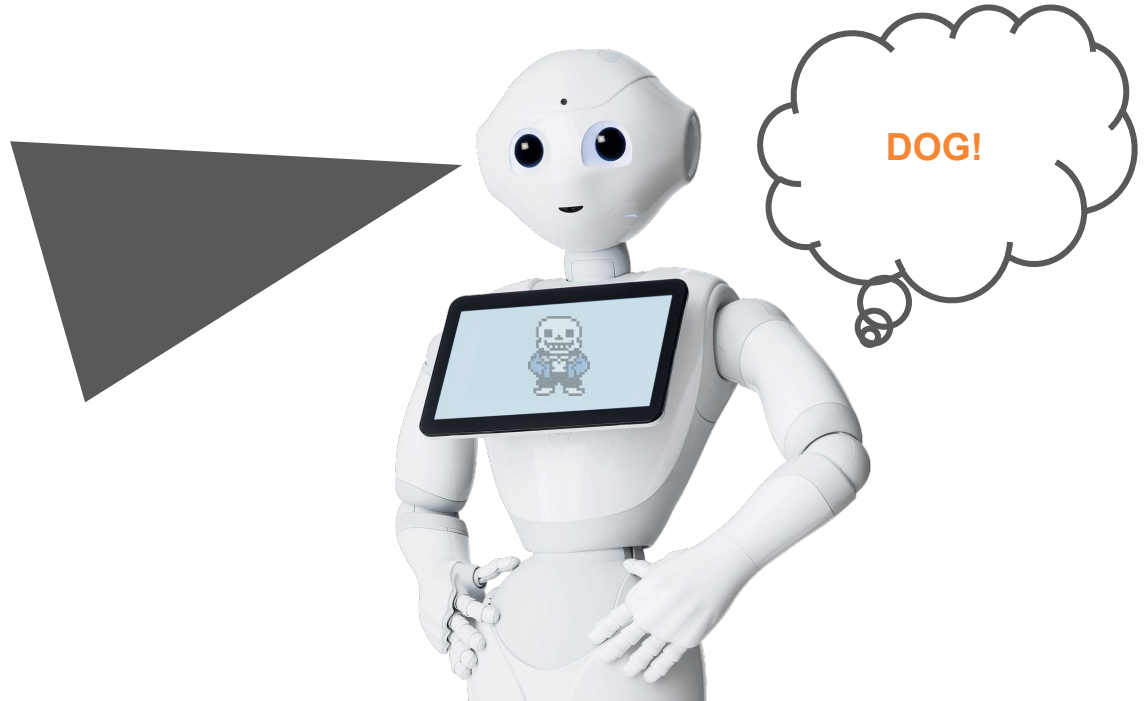
# Computer Vision

- What is computer vision?
- Feature extraction
- End-to-End
- Which approach is best?



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# What is computer vision?



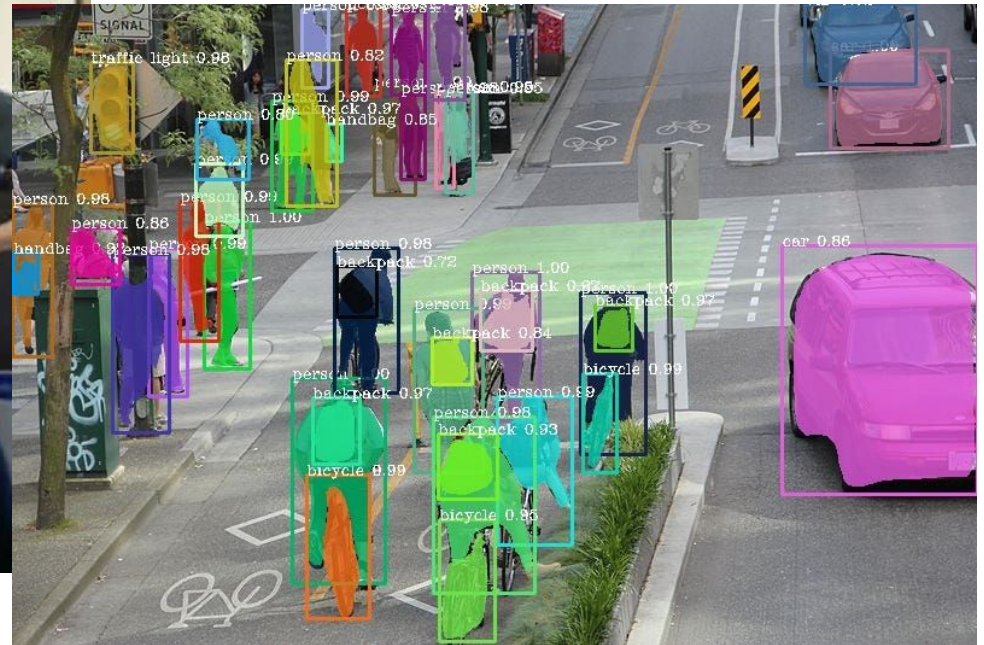
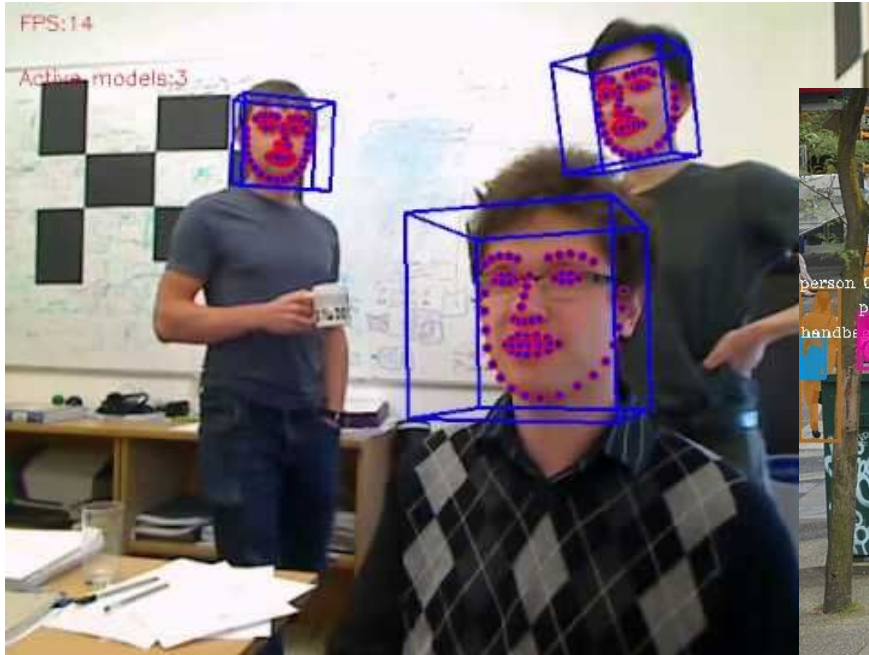
**Any approach** that lets a computer **interpret images** and video!





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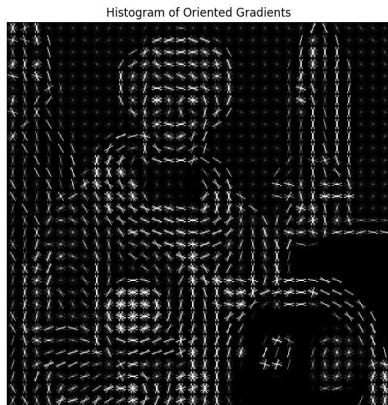
# What is computer vision?





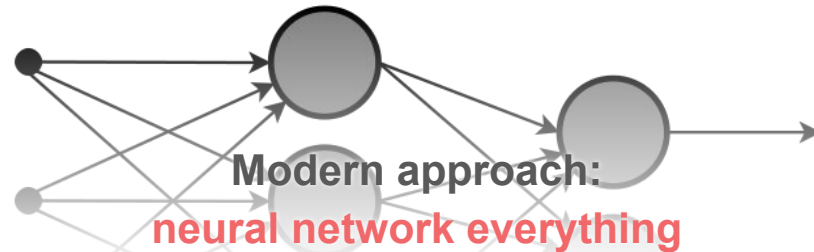
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Classic approach:  
use math to capture texture



# Feature extraction

high level representation of data

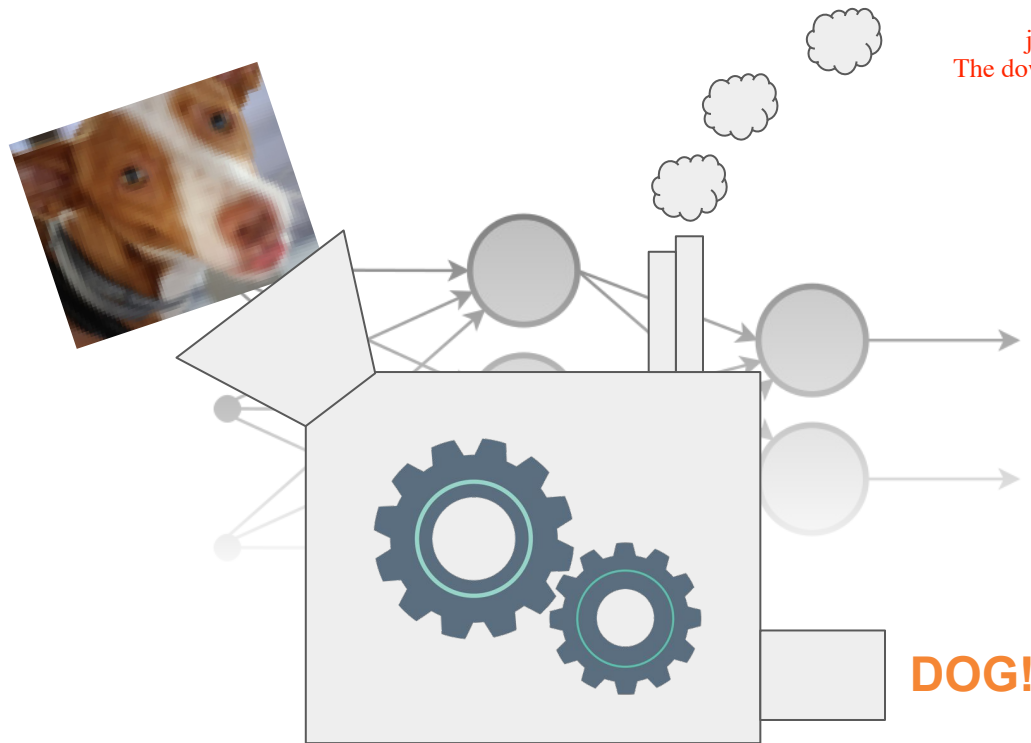




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# End-to-End

just use a neural network for everything!  
The downside is that they use a lot of resources



DOG!



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# Which approach is best?

## Feature Extraction

- Needs reasonable amounts of data.
- Classic methods tend to run fast in the CPU.
- Easy to anonymize samples.

## End-to-End

- Needs LOTS of data.
- Neural networks need GPU acceleration to run, and are resource-intensive.
- Usually contain identifying data.

**Context is king!**