

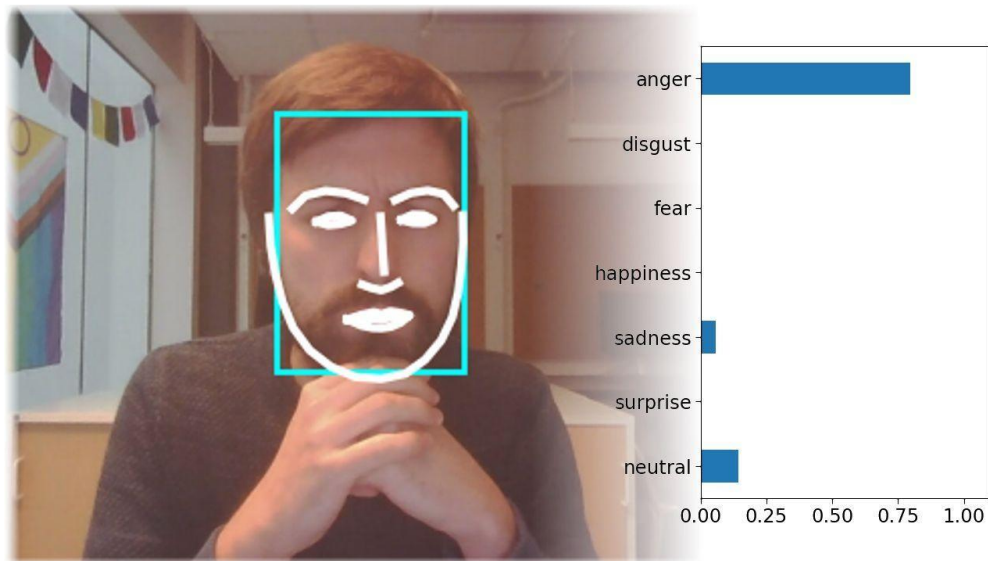


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Lab 1: Computer Vision

Roman Denkin

Based on presentation by Marc Fraile Fabrega





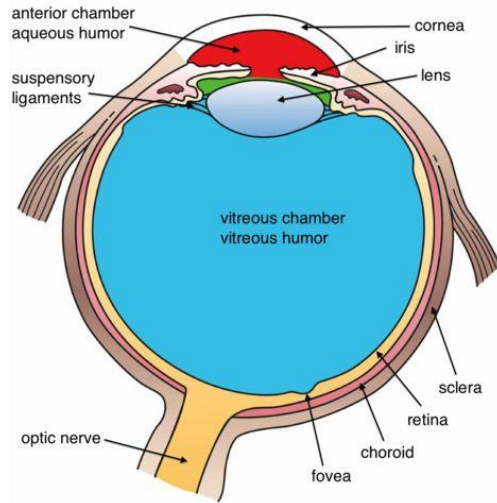
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Digital Imaging

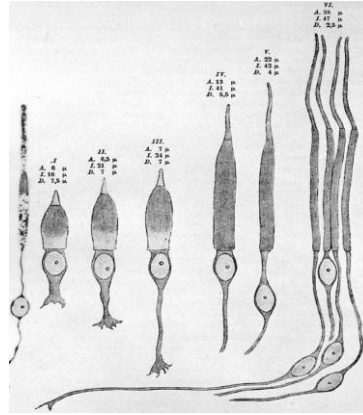
- Human vision
- Color is an illusion
- Faking color for monkey brains
- Raster images



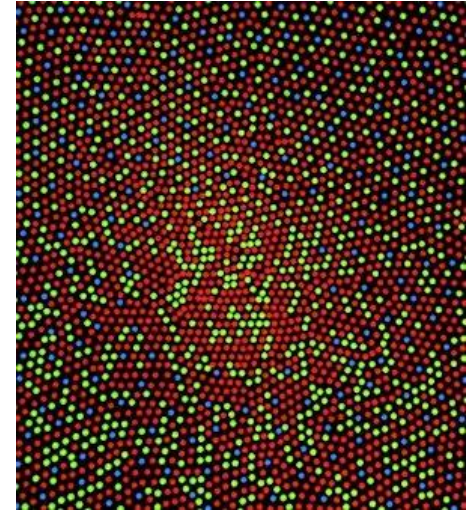
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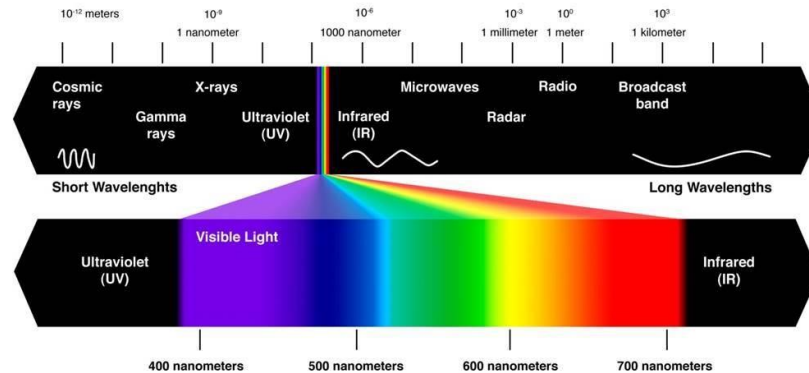
structure of the eye



Human vision



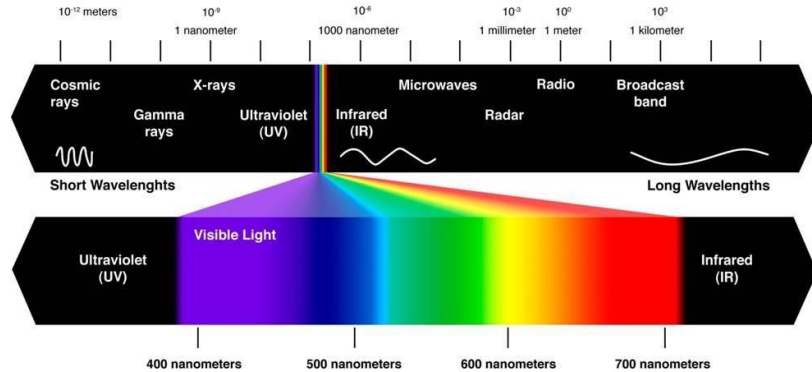
distribution of cones
in the retina



light spectrum



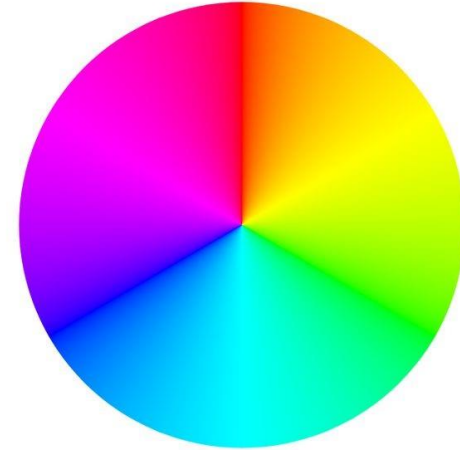
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light spectrum: **linear**

Purple and red are completely different!

Color is an illusion



color perception: **circular**

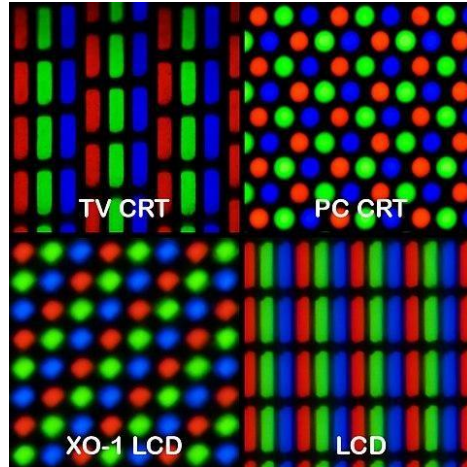
Pink closes the gap.

Color perception is not **physical reality**



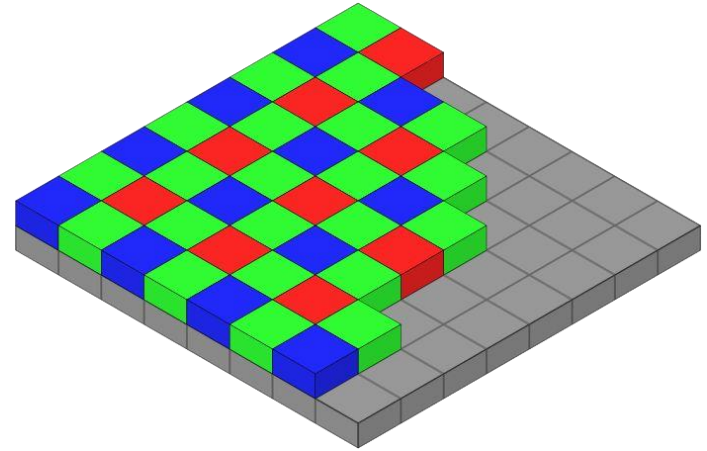
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Faking color for monkey brains



Screens use **RGB**

From far away, colored light mixes.



Cameras use **RGB**

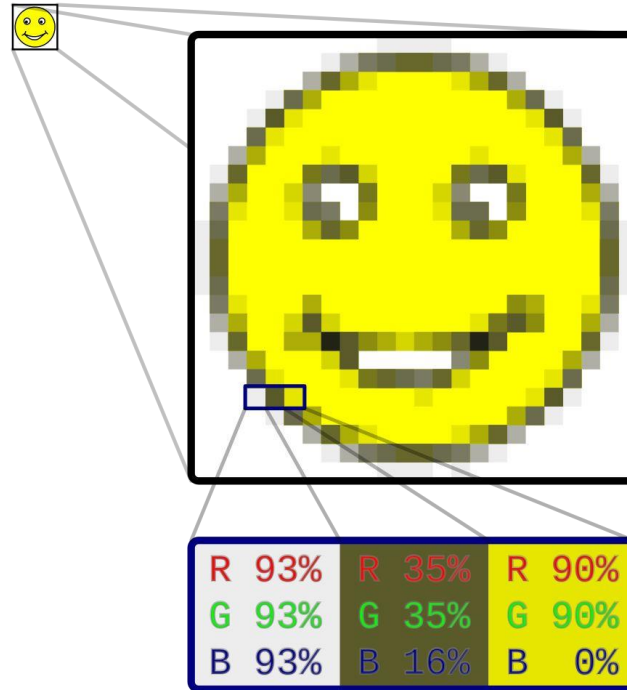
Always need more precision on **Green**.

Great! We can fake it!



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Raster images



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



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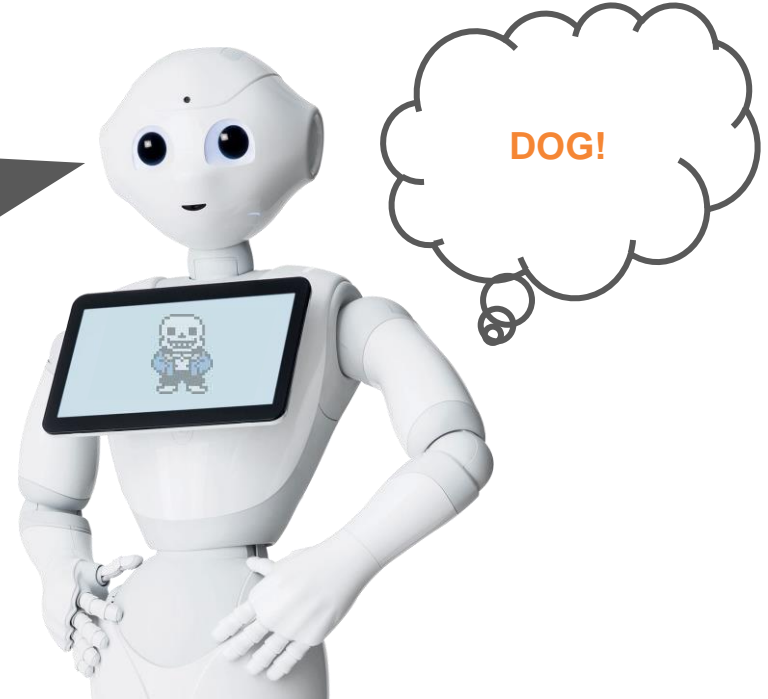
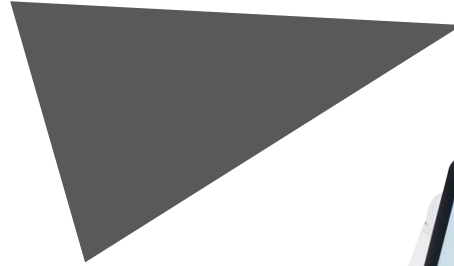
Computer Vision

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



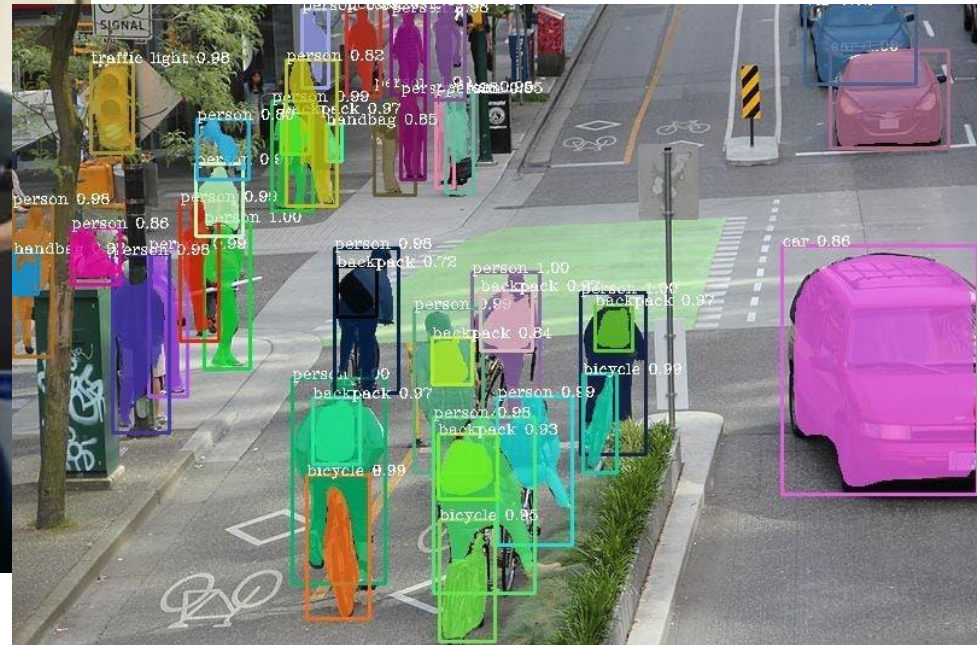
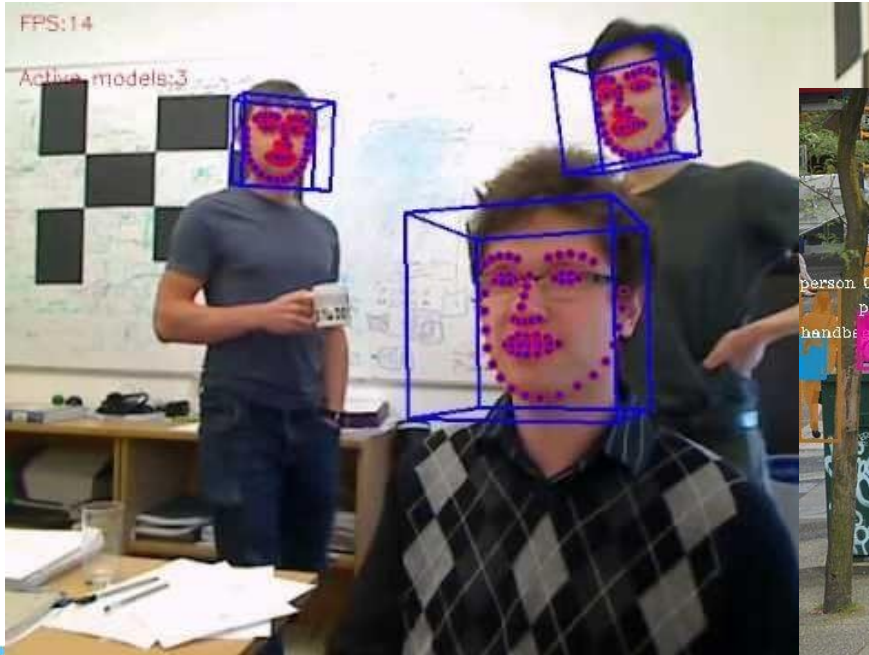
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What is computer vision?





What is computer vision?

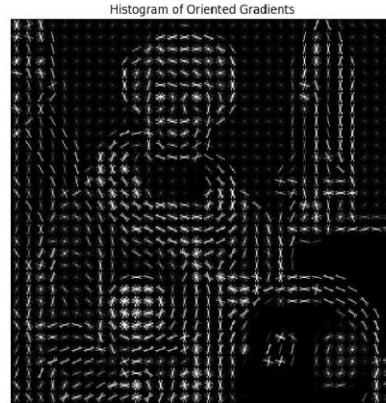




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Classic approach:

use math to capture texture



Feature extraction

Modern approach:

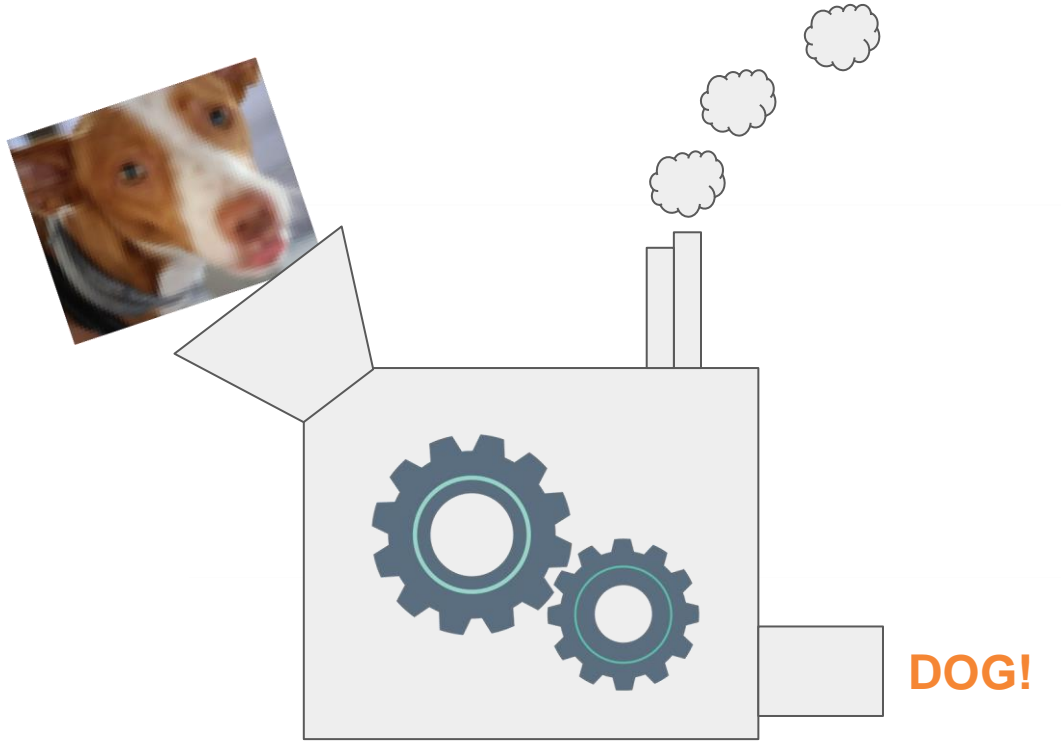
neural network everything





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End-to-End



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**!