Vision as a Computational Problem
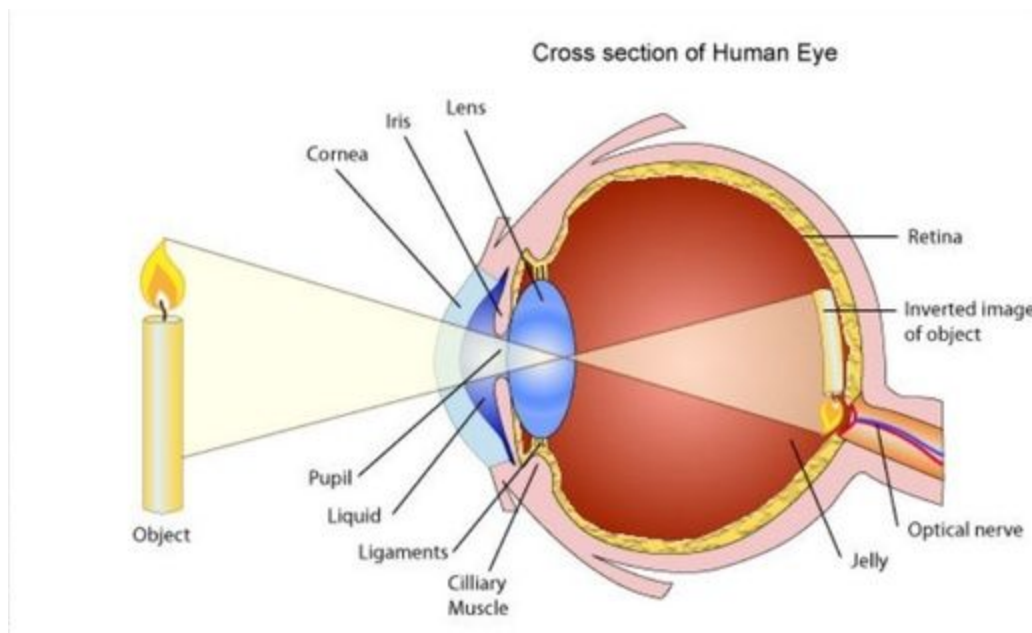
The ways in which we can treat human vision as a computational problem.
Relatively new idea -> 1970

Human Vision:
If we get an idea of how Human Vision works, we can represent it as a computational problem

The Eye is like a pinhole camera:

Cross section of Human Eye

We interpret the patterns of light falling onto our retina to translate them into 3D objects.

Mathematically, recovering 3D figures from 2D is impossible.

There are infinite 3D structures which may generate a particular 2D image.

Examples of Optical Illusions:

While trying to interpret the 2D image as a 3D object, we make educated guesses which are honed through millions of years of evolution.

Illusions can tell us something about the computational side of the human vision - what kinds of algorithms are we humans using.

Walter Wick - Impossible dog house:

Approximation of a Vision Problem:

   Given a grayscale image(1000x1000), interpret what the image is about (example: a hand holding a cube)

Assumptions which we may make:
   1. We have two eyes, so we get 2 images from certain angles of that object
   2. Also, our retinas do not return an evenly distributed array. Our resolution is greater in the central area called the fovea.

We would like a computer program to take this image matrix and make justified guesses. -> starting point of Computer Vision problem.