Human vision

- **Vision** is our most powerful sense in aiding our perception of the 3D world
- Retina is \(~1000\text{mm}^2\). Contains millions of **photoreceptors** (120 mil. rods and 7 mil. Cones for color sampling)
- The human eye resolution is equivalent to that of a digital camera with more than 500Megapixels!
- Provides **enormous** amount of information: data-rate of \(~3\text{GBytes/s}\)
  \(\Rightarrow\) a large proportion of our brain power is dedicated to processing the signals from our eyes
Computer vision | definition

- Automatic extraction of “meaningful” information from images and videos

Semantic information

Geometric information
Computer vision | why is it hard?

- Half of primate cerebral cortex is devoted to visual processing
- Achieving human-level visual perception is probably “AI-complete”
Computer vision | challenges

- Viewpoint changes
- Illumination changes
- Object intra-class variations
- Inherent ambiguities: many different 3D scenes can give rise to a particular 2D picture
Computer vision | applications

- 3D reconstruction and modeling
- Recognition
- Motion capture
- Augmented reality:
- Video games and tele-operation
- Robot navigation and automotive
- Medical imaging

Google Earth, Microsoft’s Bing Maps

Mars rover Spirit used cameras for visual odometry