



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A’ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**COURSE NAME : 19EC513 – IMAGE PROCESSING AND COMPUTER
VISION**

III YEAR / V SEMESTER

**Unit I- DIGITAL IMAGE FUNDAMENTALS AND
TRANSFORMS**

**Topic : Structure of human eye, Image formation, Brightness
adaptation and discrimination**

Structure of human eye, Image formation, Brightness adaptation and discrimination/ 19EC513/ IMAGE PROCESSING AND
COMPUTER VISION /Ms.K.SANGEETHA/ECE/SNSCE



Elements of Visual Perception



The field of [digital image processing](#) is built on the foundation of mathematical and probabilistic formulation, but human intuition and analysis play the main role to make the selection between various techniques, and the choice or selection is basically made on subjective, visual judgements.

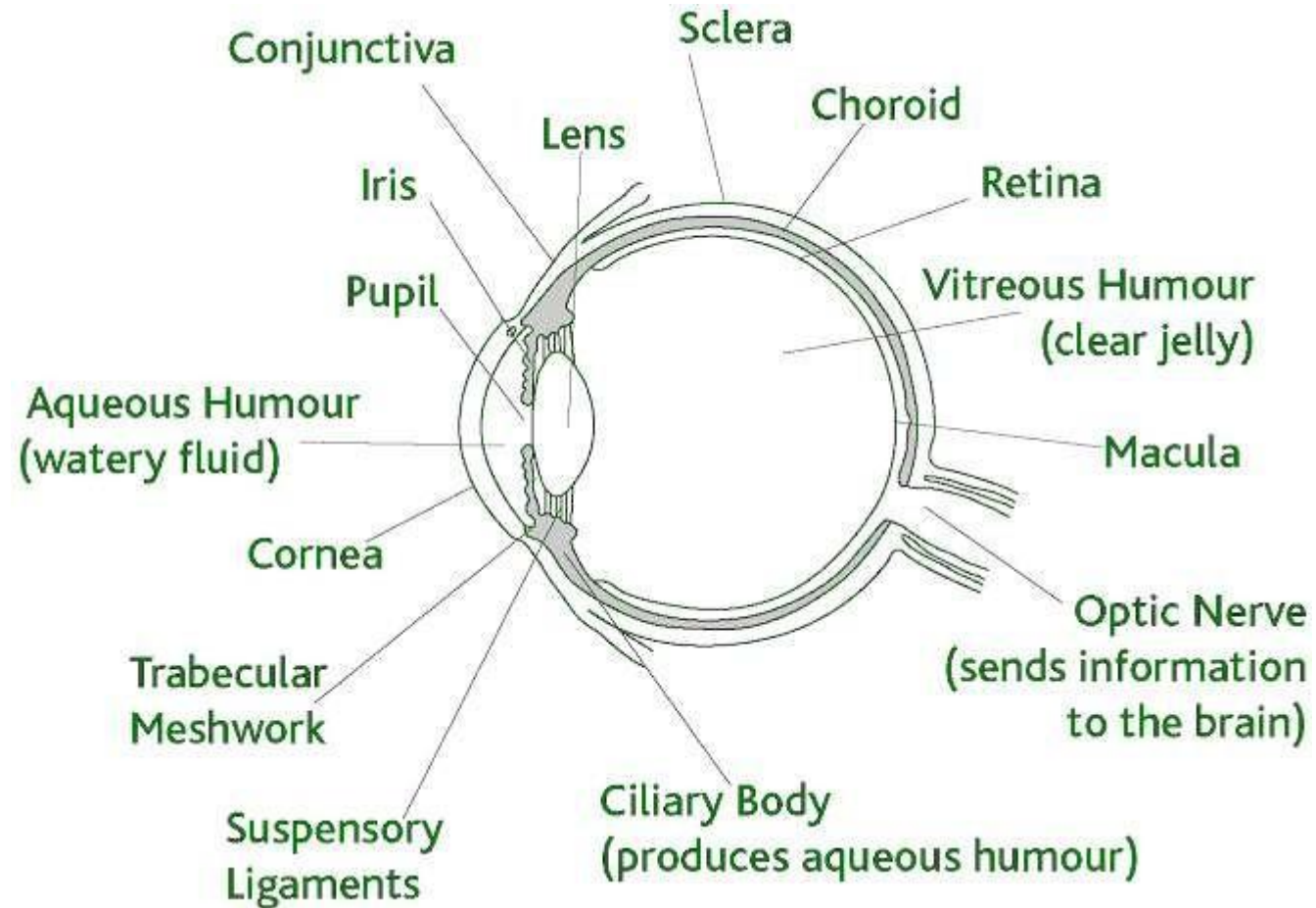
In human visual perception, the eyes act as the sensor or camera, neurons act as the connecting cable and the brain acts as the processor.

The basic elements of visual perceptions are:

1. Structure of Eye
2. Image Formation in the Eye
3. Brightness Adaptation and Discrimination

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➤ Structure of Eye:





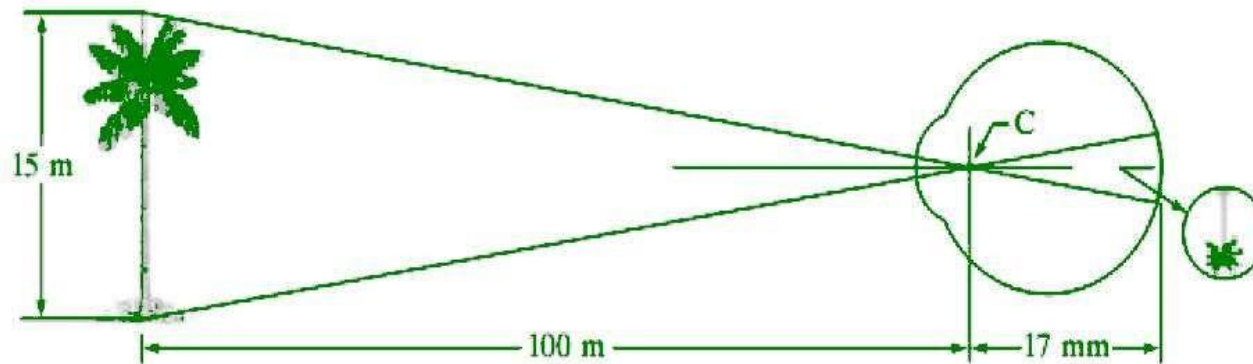
Structure of Eye:

- The human eye is a slightly asymmetrical sphere with an average diameter of the length of 20mm to 25mm. The eye is just like a camera. The external object is seen as the camera take the picture of any object. Light enters the eye through a small hole called the pupil, a black looking aperture having the quality of contraction of eye when exposed to bright light and is focused on the retina which is like a camera film.
- The lens, iris, and cornea are nourished by clear fluid, know as anterior chamber. The fluid flows from ciliary body to the pupil and is absorbed through the channels in the angle of the anterior chamber. The delicate balance of aqueous production and absorption controls pressure within the eye.
- Cones in eye number between 6 to 7 million which are highly sensitive to colors. Human visualizes the colored image in daylight due to these cones. The cone vision is also called as photopic or bright-light vision.
- Rods in the eye are much larger between 75 to 150 million and are distributed over the retinal surface. Rods are not involved in the color vision and are sensitive to low levels of illumination.

- **Image Formation in the Eye:**

When the lens of the eye focus an image of the outside world onto a light-sensitive membrane in the back of the eye, called retina the image is formed. The lens of the eye focuses light on the photoreceptive cells of the retina which detects the photons of light and responds by producing neural impulses.

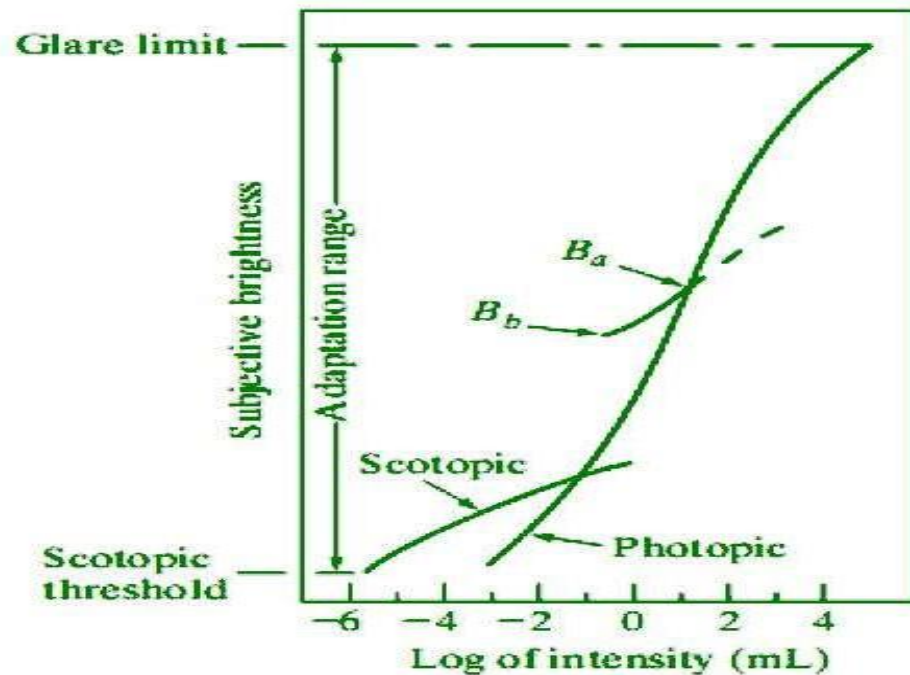
- The distance between the lens and the retina is about 17mm and the focal length is approximately 14mm to 16mm



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Brightness Adaptation and Discrimination:

- Digital images are displayed as a discrete set of intensities. The eyes ability to discriminate black and white at different intensity levels is an important consideration in presenting image processing result.
- The range of light intensity levels to which the human visual system can adapt is of the order of 10^{10} from the scotopic threshold to the glare limit. In a photopic vision, the range is about 10^6 .





Any Query????

Thank you.....