Active Vision: attention

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Slides credit:Bob Fisher & Bas Boom

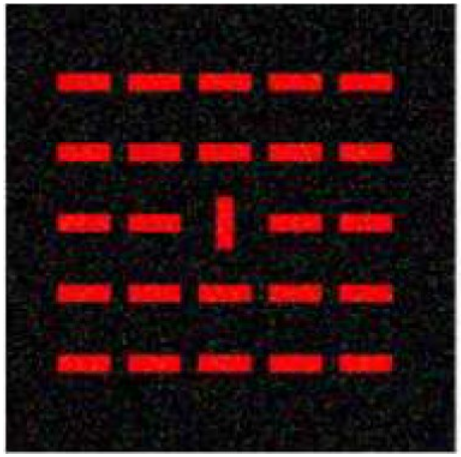
Eye movements

- Increase the effective resolution by *saccade* movements of high resolution area (fovea)
- Creates impression that see complete detailed scene, but this is illusory

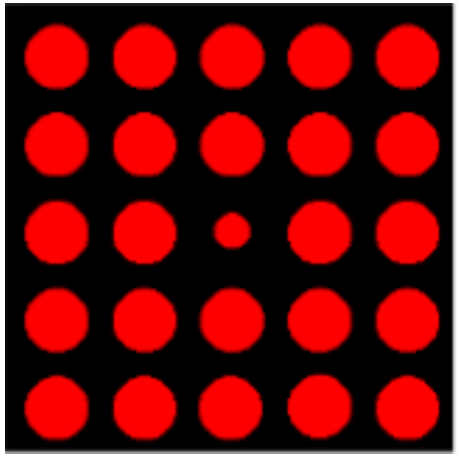
Attention from image properties

Variations in colour, size, orientation, texture are *salient*

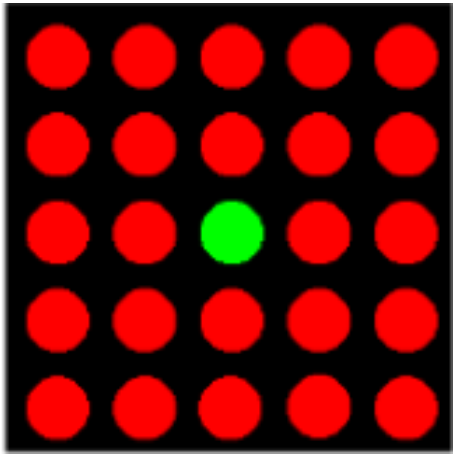
Orientation



Size



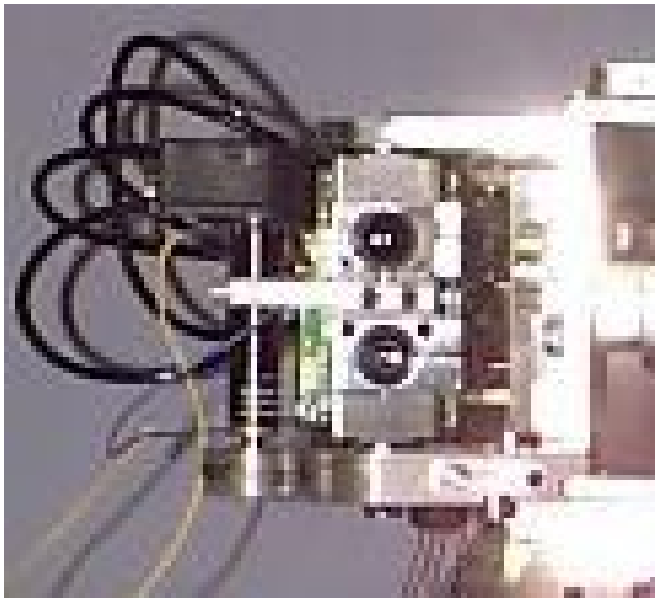
Colour



Spot the odd one out?

Eye movements and localisation

- Knowing where the eye/camera is pointing tells us the direction of objects of interest (requires proprioception to know relative angles)
- Can also extract depth through motion parallax



Attention from motion

- Can use optical flow-field to determine where to redirect the eyes – moving stimuli are *salient*
- Mechanism to determine new eye position:
  - Calculate the flow field
  - Enhance changes to detect new stimuli
  - Smooth to offset noise
  - Implement ‘winner-take-all’ connection to choose most salient movement, and inhibit return to same location
- Note that then have to solve problem of mapping visual target onto correct motion of camera

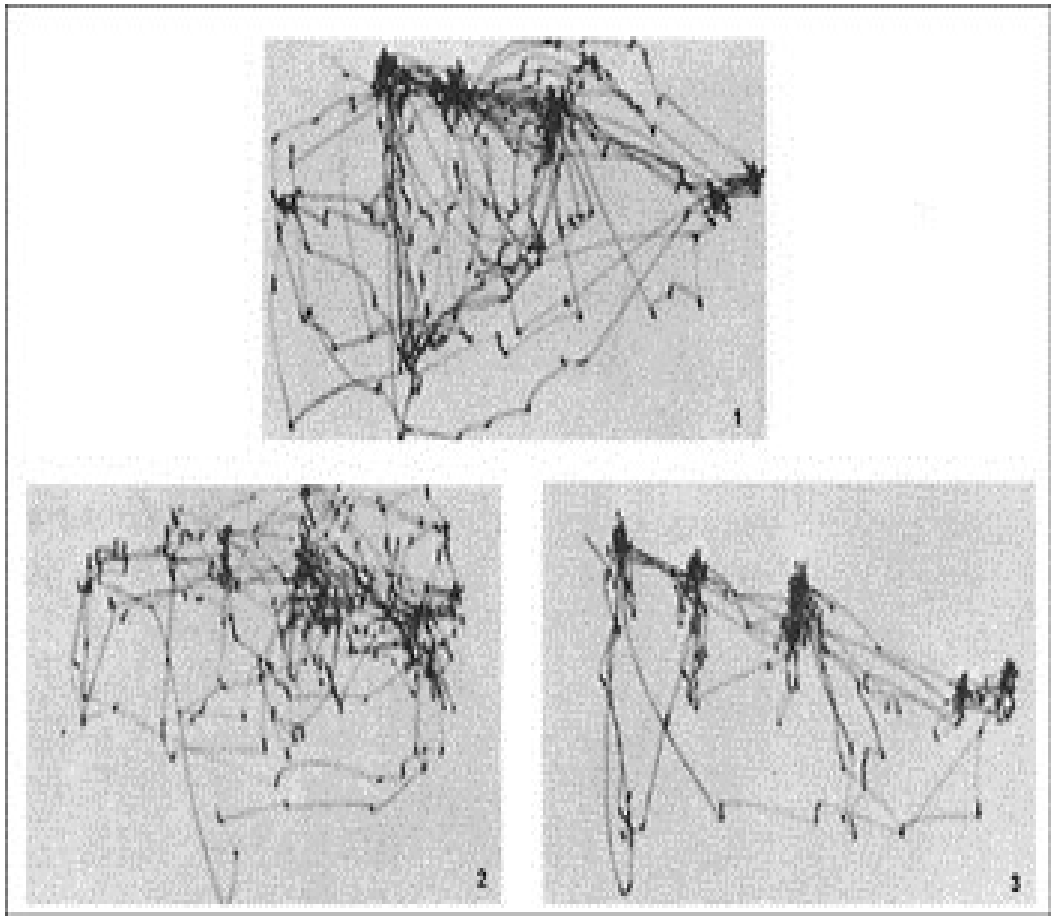
Vijayakumar et al. 2001

Eye movements

- Increase the effective resolution by *saccade* movements of high resolution area (fovea)
- Creates impression that see detailed scene, but this is illusory
- Task dependent, indicates attention

Eye movement patterns indicate attention and task

1. Describe room.
2. What was happening before?
3. People's ages.



Lecture Overview

+ Vision systems don’t need to analyse all of image
+ Different properties attract attention
+ Task determines what is important as well as image data