

Biological Vision and Applications

Module 05-01: Visual attention

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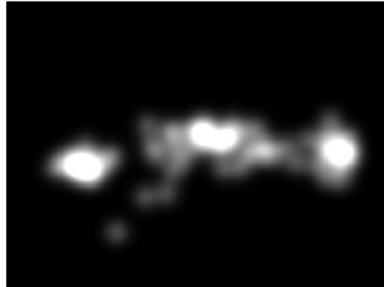


Magnitude of visual data

- Each eye has about 1 million optic nerves coming out of it
- Assume
 - ▶ Each nerve carry 1 bit of data and
 - ▶ Refreshed every $\frac{1}{10}$ th of a second
- Data generated by each eye is 10Mbps (after significant compression)
- Similarly a video camera of modest resolution 1280×768 operating at 30fps generates 700 Mbps
- Now that is a huge data rate
- Do we have to process all that data to understand a scene ?

Attention

We see very little of a scene to understand it's content



- Attention leads to change blindness

Bottom-up Attention

Spontaneously catches attention



- The “red flower” draws spontaneous attention

Top-down Attention

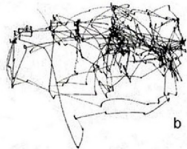
Depends on the task / intention of the observer



- Where is my cat? (Visual search)

Yarbus'es experiment

Eye movements depends on the task of the observer



- Attention is dynamic
 - ▶ Results in saccades and fixations
- Depends on task, such as
 - ▶ (a) Free examination
 - ▶ (b) Estimate the material circumstances of the family
 - ▶ (c) Give the ages of the people
 - ▶ ...

Modeling attention

- Classical approaches
 - ▶ Image feature based
 - ▶ Location based
 - ▶ Object based
- Neural network based approaches
 - ▶ We reserve for the future

Quiz 05-01

End of Module 05-01