

# Biological Vision and Applications

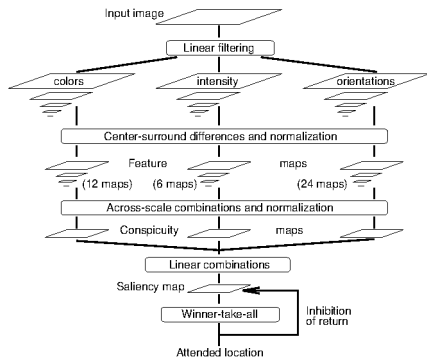
## Module 05-03: Visual attention: Extensions to Itti's model



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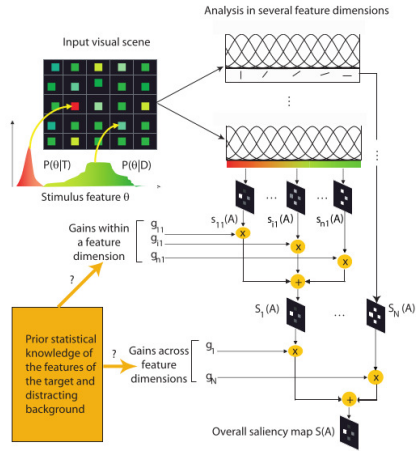
# Itti's model

## Recap



- Based on cognitive theories of early vision
- Features used: Color, Intensity and Orientations
  - ▶ Equal weights to all features
- Models bottom-up attention
- Provides static saliency map
- Eye movement guided by
  - ▶ Winner Take All policy
  - ▶ Return Inhibition policy
- Remains a reference model till date
- WTA and RI policies are common to all classical models

# Adaptation to top-down attention

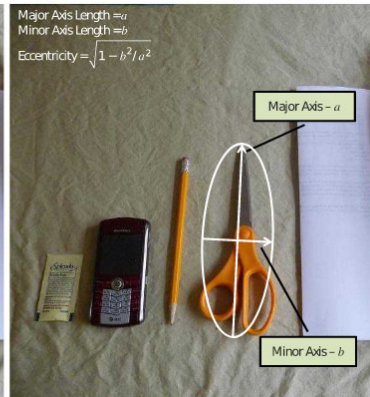
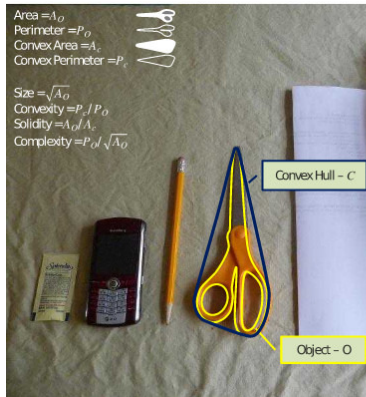


- Visual search task
- Weights assigned to features based on task requirement
- Weights learned from statistical features of target and distractors
- Inflexible

# Extension of feature set

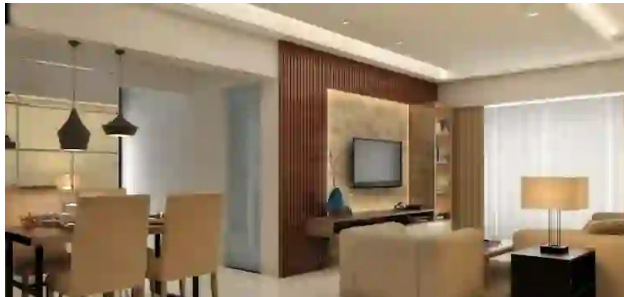
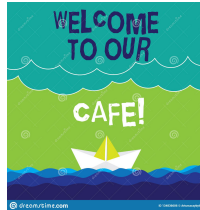
## Object level attributes

- Recall what is likely to be a foreground object
  - Local motion (for video)
  - convex-ness ...



# Extension to feature set (contd.)

What draws human attention? – Rethinking the principles



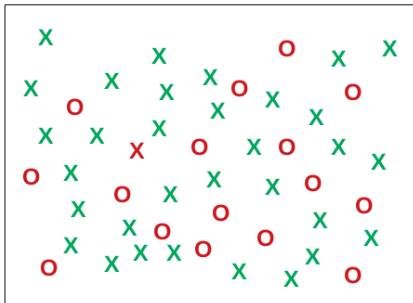
- Semantic features
  - ▶ Human face and emotions
  - ▶ Text
  - ▶ Man-made objects designed to be watched (TV, clock, ...)
  - ▶ Objects with sound, smell, taste, touch attributes
  - ▶ Objects interacted with (touched or gazed upon by) humans (a computer mouse, ...)
  - ▶ ...

# Early fusion vs. late fusion

When to fuse the conspicuity maps?

- Early fusion
  - ▶ As in Itti's model
  - ▶ Fused immediately after normalization
  - ▶ Overall saliency map created after fusion
- Late fusion
  - ▶ Create saliency map based on one feature
  - ▶ Fuse conspicuity maps from the other features for the competing locations
    - ▶ One at a time
  - ▶ Computationally more efficient

# More on Late Fusion



- Example: In finding red **X** problem,
  - ▶ Based on color saliency, get all red objects first
  - ▶ Fuse shape based saliency next
    - ▶ Only where we find red
- What is the priority sequence of features
  - ▶ General agreement on “color first”
  - ▶ No clear consensus on others



No quiz for module 05-03  
But, we have an experiment

End of Module 05-03