A Trainable Model of Saliency-based Visual Attention

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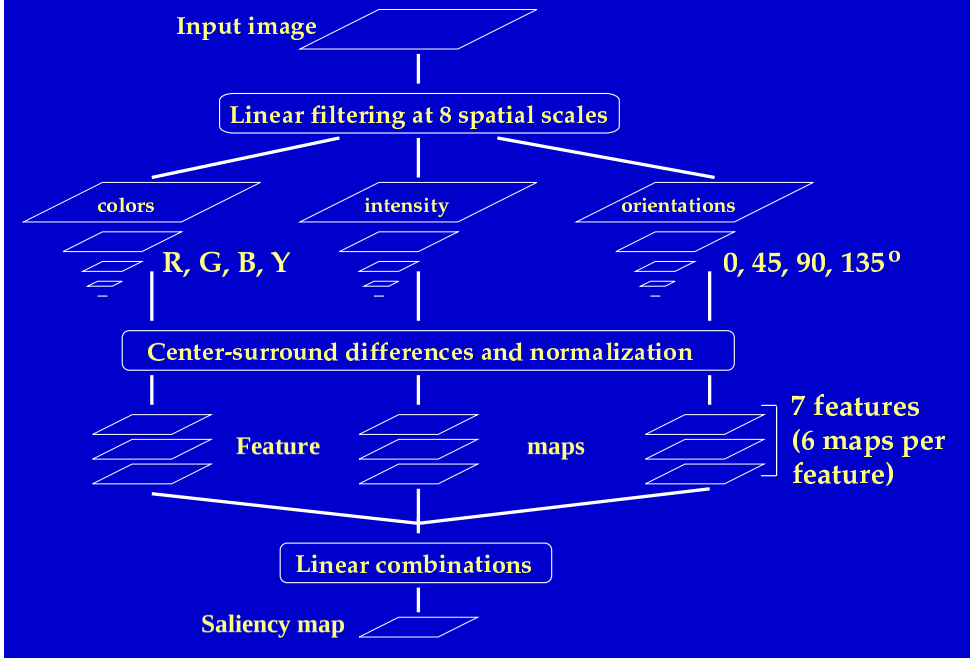
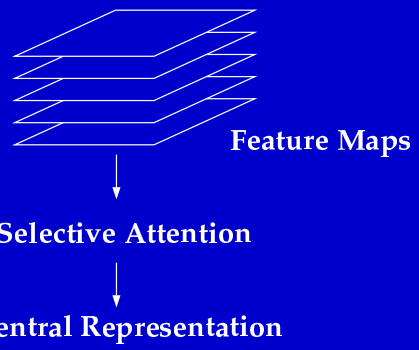
Extraction of Visual Features



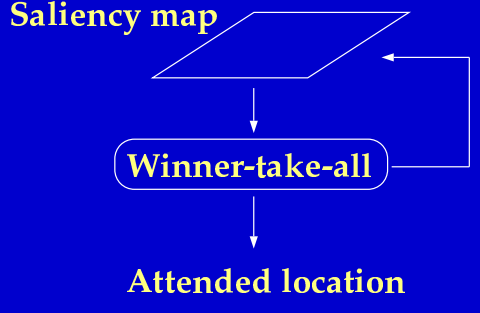
Overview

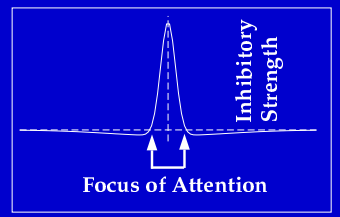
Model Architecture

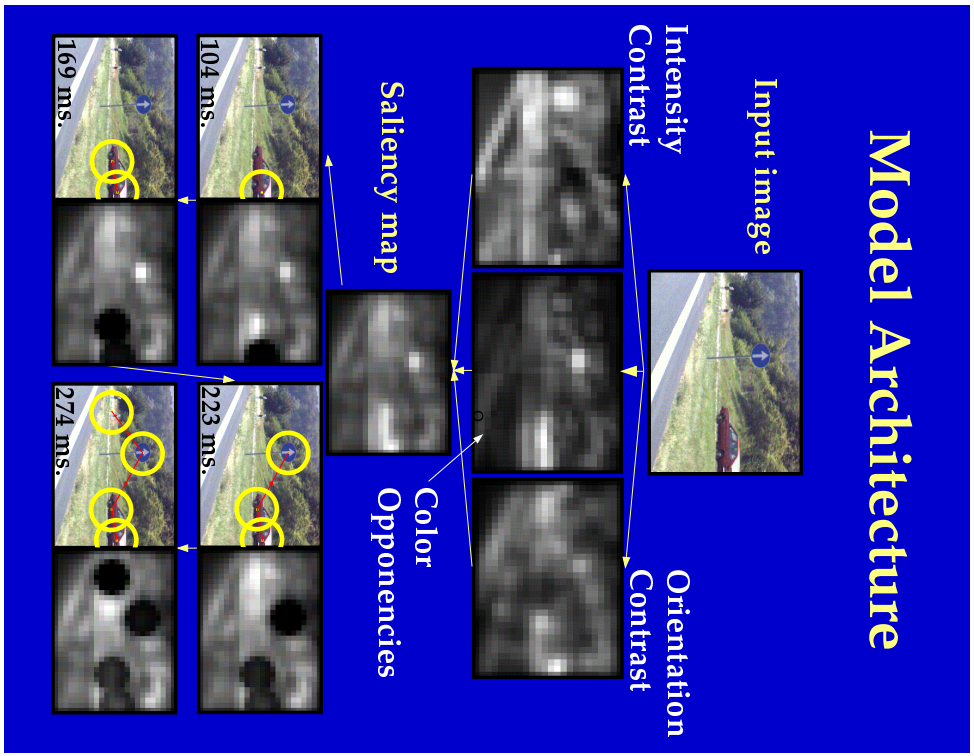


- Extraction of early visual features
- saliency map
- dynamical attention shifting

Dynamical control of Attention







Combination of Features

Supervised learning of feature map weights:

$w \leftarrow w + \eta$ (max. inside target - average max. outside)

Naive linear model

Trained linear model (n=32)

Combination of Features

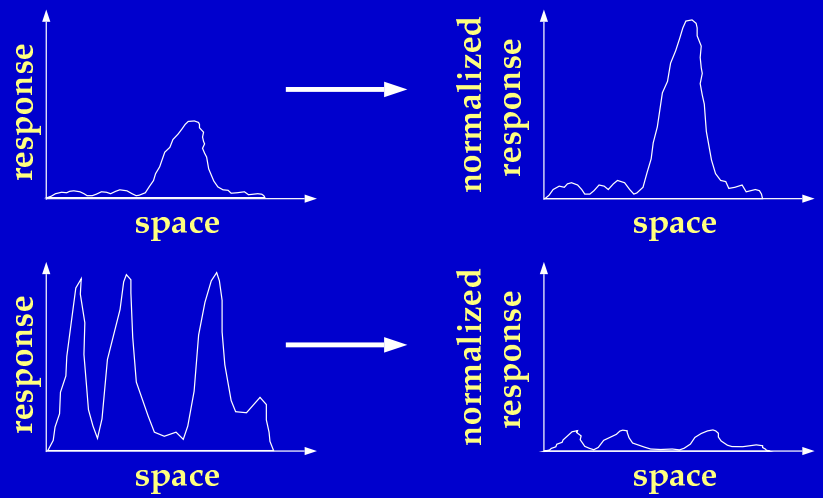
Summation

Color

Intensity

Orientation

Combination of features



Combination of Features

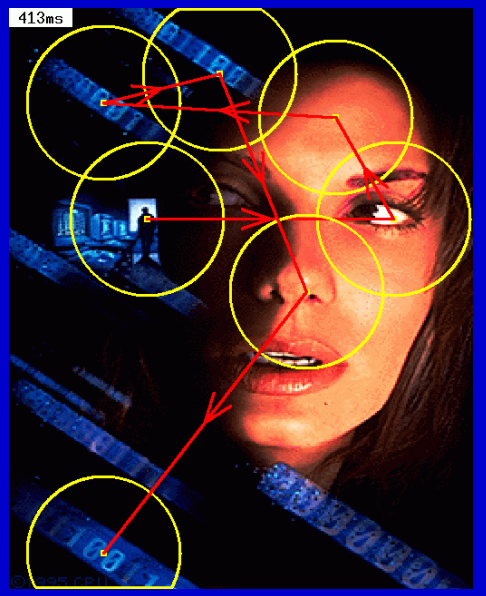
Contents-based non-linear combination:
Map weight = (global max. - average local max.)^2

Color

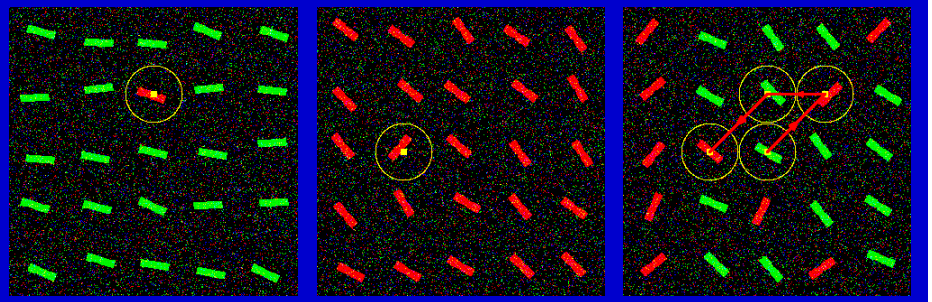
Intensity

Orientation

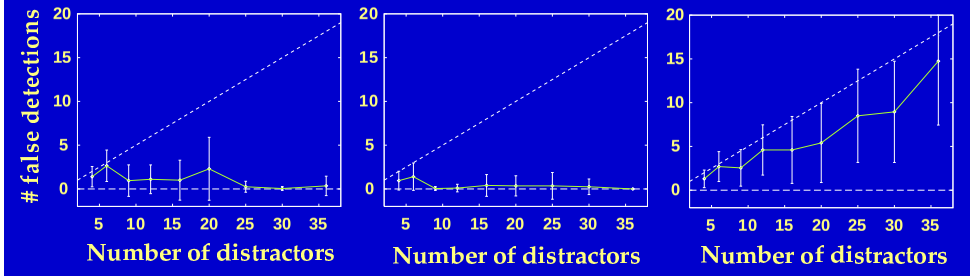
Natural Images



Simulated Psychophysics



Color pop-out | Orientation pop-out | Conjunctive search



Conclusion

Architecture of early primate visual system

Adaptive non-linear feature combination yields best results

"Saliency map" approach works remarkably well on artificial and natural images

1999 Research Portfolio

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