Top-down vs. bottom-up guidance of eye movements in real-world scene search

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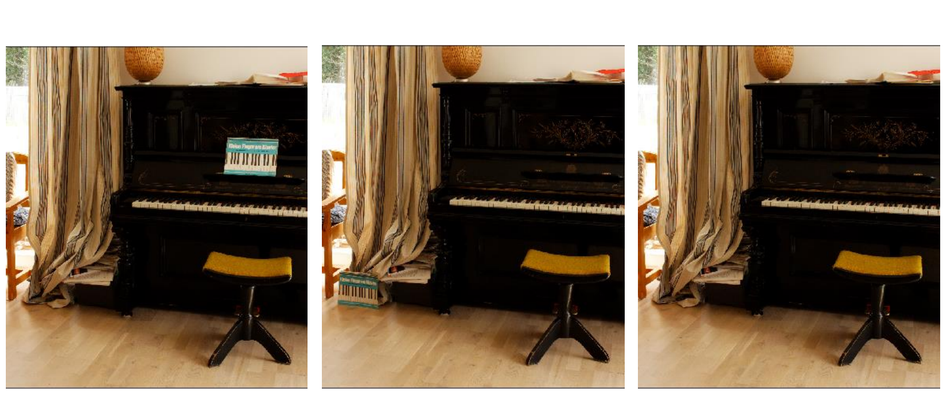
Experiment and Data

- Eye tracking data and contextual prior
- Search task with 130 images
- 3 search conditions

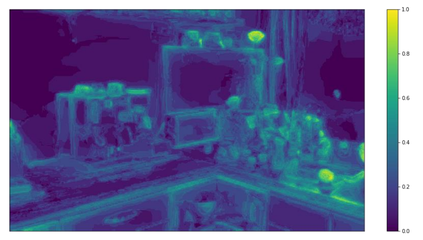


expected unexpected lacking

Extract fixation points

Calculate saliency maps

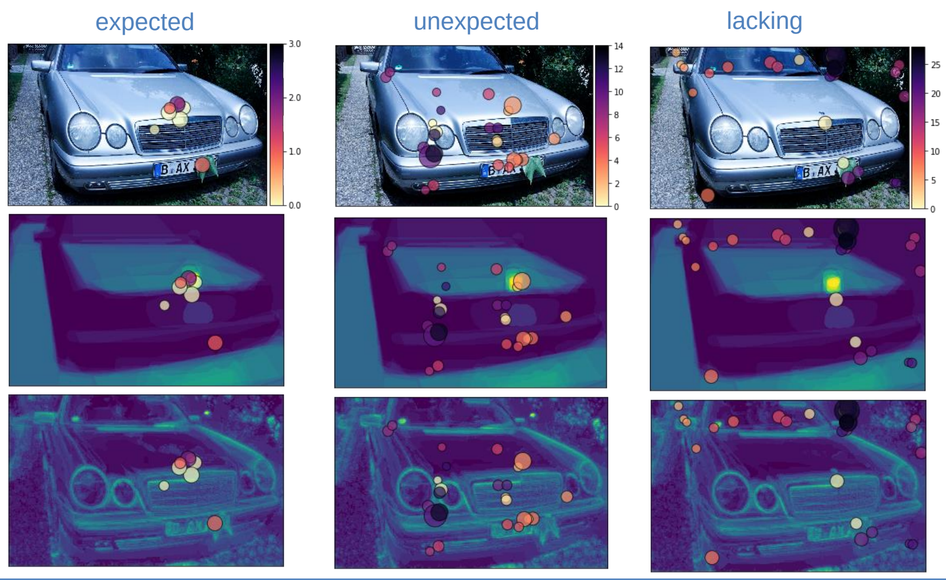
Normalize context and saliency maps



Our main hypotheses:

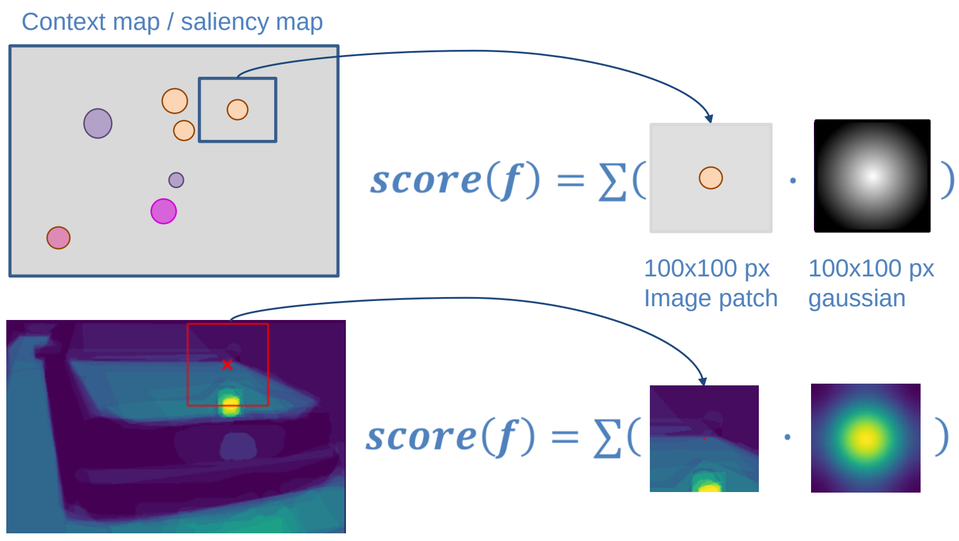
1. Eye movement is guided by saliency and contextual cues
2. Contextual cue plays a more dominant role

Fixation points and Score



Calculate score per fixation point

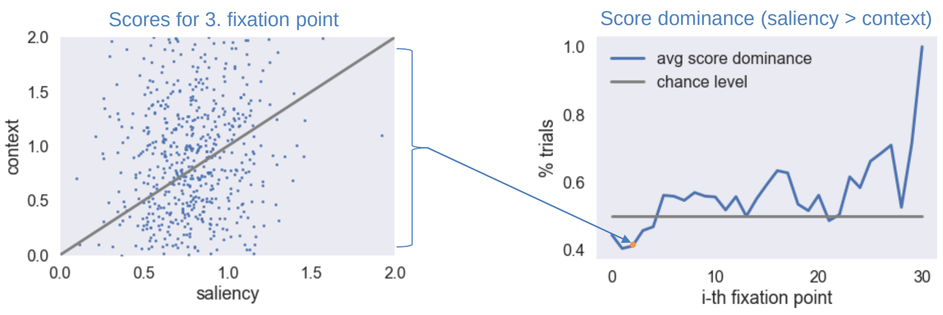
Calculate score per image



Analysis and Results

Score distribution per condition:

Scores per fixation point:



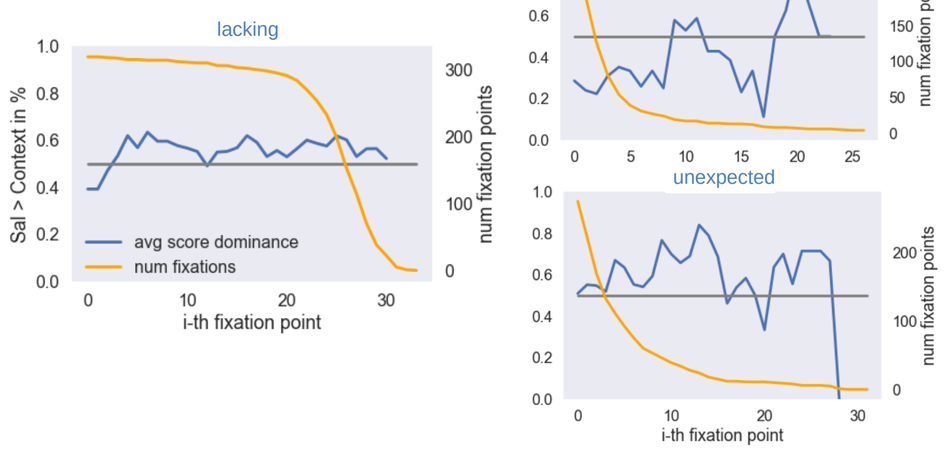
Score distribution

Scores per fixation point

Scores dominance per condition

Scores per scene

Saliency vs. Context dominance per scene type:



Our main Results:

- Both maps contribute to fixation predictions
- Context model not dominant overall
- Context wins initially, saliency quickly takes over

Outlook and References

- Bigger data set, more subject
- Analyzing saccades
- Analyzing pupil dilation
- Multivariate analysis
- Deterministic approach? Markov chains? Reinforcement learning?

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II. Torralba, Antonio, Aude Oliva, Monica S. Castelhano, and John M. Henderson. "Contextual guidance of eye movements and attention in real-world scenes: the role of global features in object search." *Psychological review* 113, no. 4 (2006): 766.

III. Itti, Laurent, Christof Koch, and Ernst Niebur. "A model of saliency-based visual attention for rapid scene analysis." *IEEE Transactions on pattern analysis and machine intelligence* 20, no. 11 (1998): 1254-1259.

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