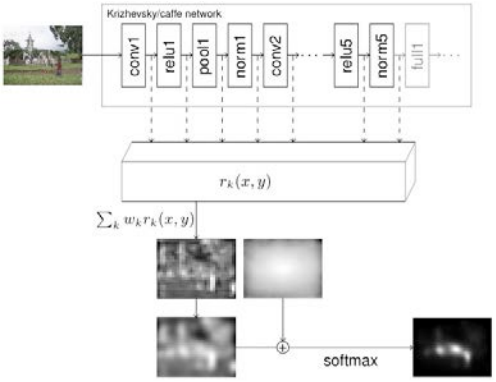
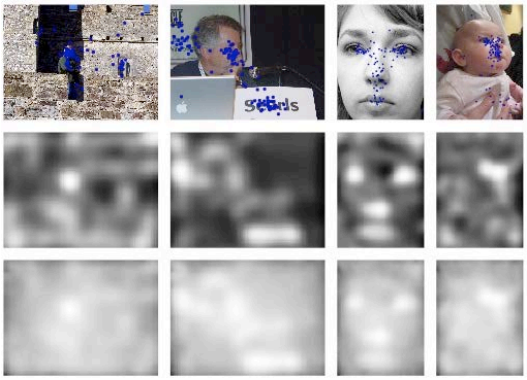
Computational Neuroscience Seminar

Jumping ahead from 1/3 to 1/2 of understanding image based saliency





Matthias Kümmerer

Werner Reichardt Centre for Integrative Neuroscience
Max Planck Institute for Biological Cybernetics, Tübingen
http://bethgelab.org/

Monday, May 11, 2015
11am-noon
Fung Auditorium, Powell-Focht Bioengineering Building
University of California San Diego

Abstract: Among the wide range of complex factors driving where people look, the properties of an image that are predictive for fixations under free viewing conditions have been studied most extensively. Here we frame saliency models probabilistically as point processes, allowing the calculation of log-likelihoods and bringing saliency evaluation into the domain of information theory. We compare the information gain of all high-performing state-of-the-art models to a gold standard and find that only one third of the explainable spatial information is captured. Thus, contrary to previous assertions, purely spatial saliency remains a significant challenge. Our probabilistic approach also offers a principled way of understanding and reconciling much of the disagreement between existing saliency metrics. Finally, we present a novel way of reusing existing neural networks that have been pre-trained on the task of object recognition in models of fixation prediction. Using the well-known network "AlexNet" developed by Krizhevsky et al., 2012, we come up with a new saliency model, "Deep Gaze I", that accounts for high-level features like objects and popout. It significantly outperforms previous state-of-the-art models on the MIT Saliency Benchmark and explains more than half of the explainable information.
Joint work with Tomas Wallis, Lucas Theis, and Matthias Bethge

Organized by:
Institute for Neural Computation: http://inc.ucsd.edu
University of California San Diego

Sponsored by:
Qualcomm: http://www.qualcomm.com
Brain Corporation: http://www.braincorporation.com