Learning to Predict Gaze in Egocentric Video

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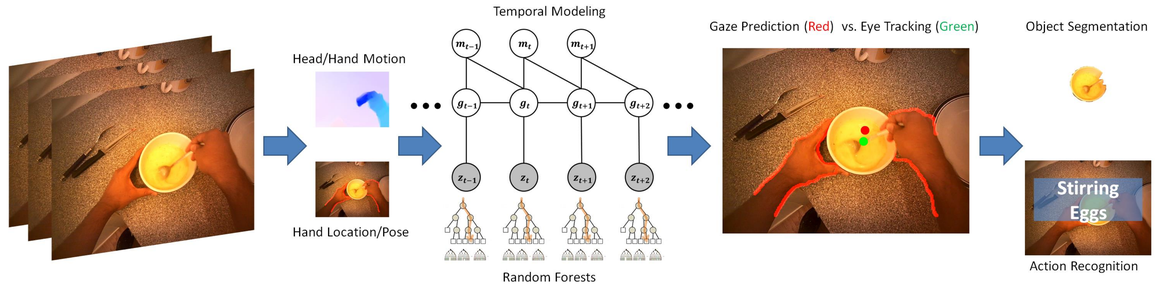
Motivation

"There is nothing more powerful than an idea whose time has come" – Victor Hugo

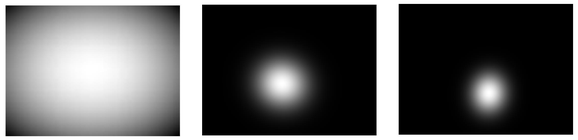
- Gaze is a very important signal
- Predicting the camera wearer's gaze using egocentric cues
- Understanding first person's behavior using predicted gaze

Method

- Modeling the first person's *head-eye / hand-eye* coordination
- *Only* use egocentric cues, e.g. hand pose, head movement
- A temporal dynamic model for fixations

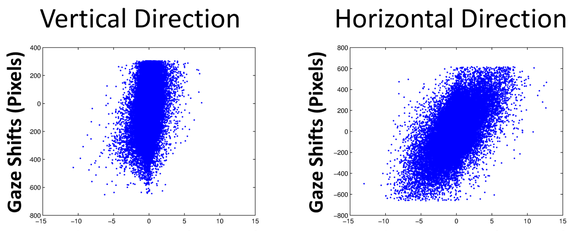


Head-Eye Coordination



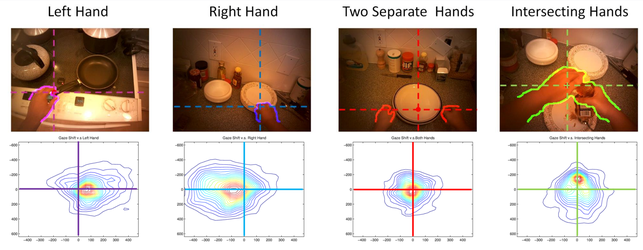
Gaze Density by 2D Gaussian over Image Plane

- Egocentric gaze is statistically different from on-screen eye-tracking, with ***a much stronger center bias***



- Large head motion is always accompanied by a large gaze shift
- Linear correlation of head motion and gaze shift **in horizontal direction**

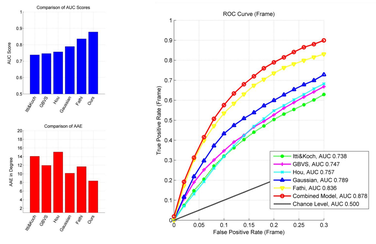
Hand-Eye Coordination

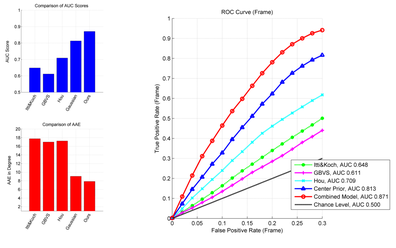


- Peak of gaze distributions around hands, where **manipulations** are most likely to happen

GAZE

- More accurate gaze prediction
- Not using traditional low level features
- Do not require task information

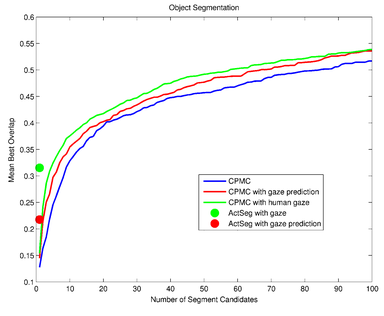


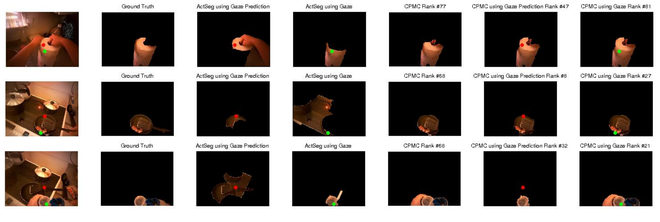


- Current best record for both AUC (+4.2%) and AAE (-1.2 degree)

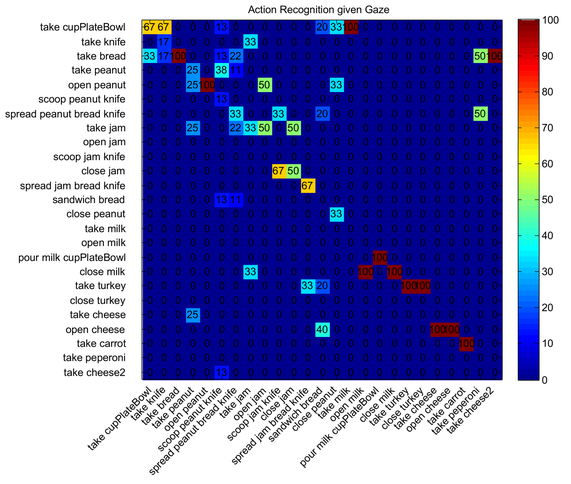
OBJECT

- Object involved in current task
- 94.3% objects with fixations
- Improved object segmentation (+3%)





ACTION



- Action recognition of 25 classes using predicted gazes 29% -> 32.8%
- Action recognition using human gaze s -> 49%

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Reference:
Learning to Predict Gaze in Egocentric Video, ICCV 2013

Acknowledgement:
Potion of this work were funded in part by the National Science Foundation under Grant No.CCF-1029679. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).