

Motivation

- Eye contact plays a crucial aspect in the social development of young children.
- Atypical patterns of gaze and eye contacts have been identified as potential early signs of Autism Spectrum Disorder (ASD) [1].
- Current uses of eye tracking in autism research is limited by only presenting stimuli on a computer monitor.

Method

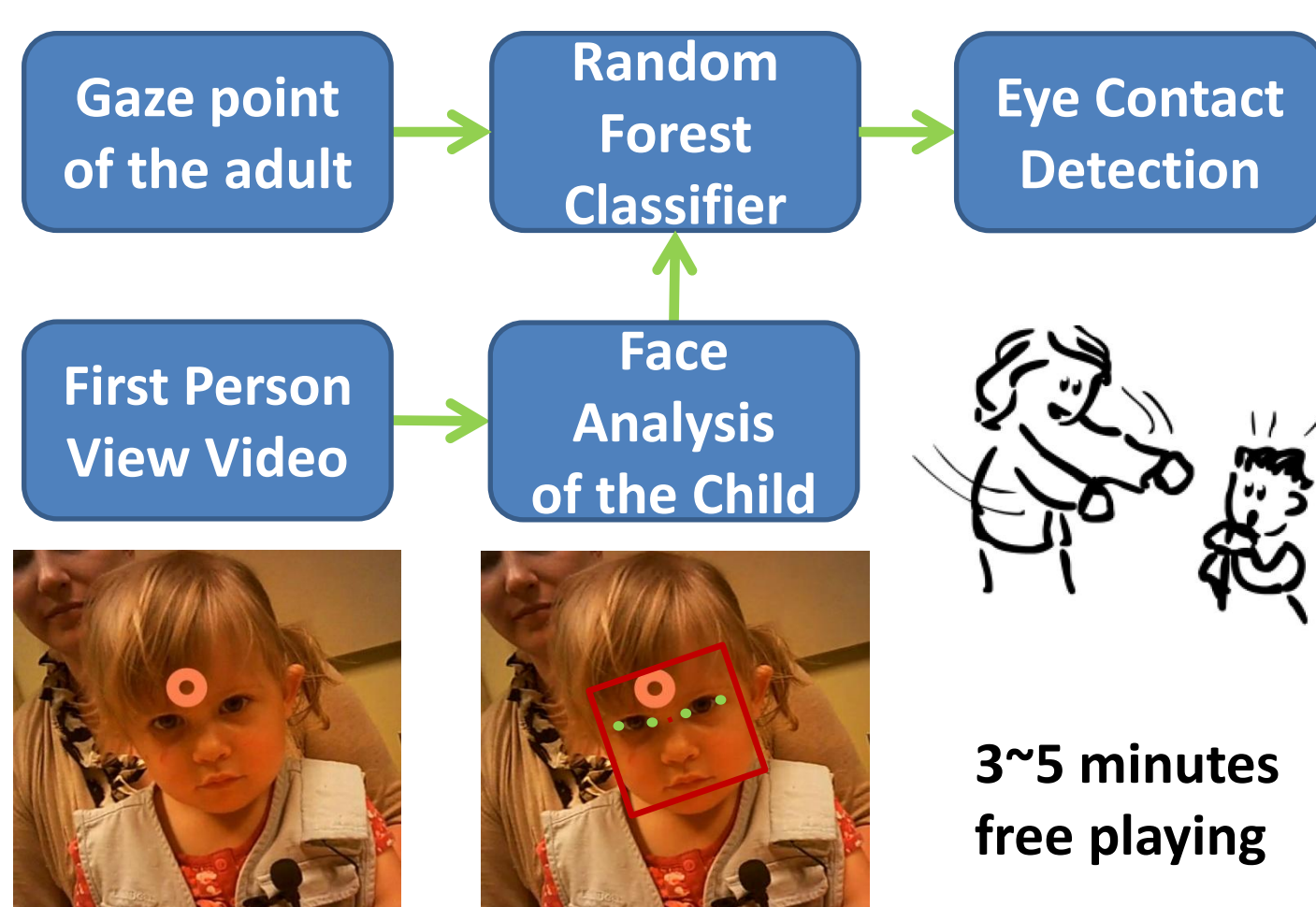


Fig. 2 Flow chart of our system.

- The eye tracking glasses records the first person view video and captures the adult's gaze.
- We use computer vision method to analysis the child's face in the video and predict their gaze direction.
- Eye contact is then detected as the event of simultaneous, mutual looking at faces by the dyad.

Conclusion

- We present a novel alternative approach to measure child-adult gaze behavior in dyadic naturalist interactions.
- The method is applicable to monitor the eye contact events as early cues for Autism. And the preliminary results are promising

Reference

1. Jones W, Carr K, Klin A. Absence of preferential looking to the eyes of approaching adults predicts level of social disability in 2-year-old toddlers with autism spectrum disorder. Arch Gen Psychiatry. 2008 Aug
2. Omron OKAO Library http://www.omron.com/r_d/coretech/vision/okao.html
3. SMI Eye Tracking Glasses. <http://www.eyetracking-glasses.com/>

Overview

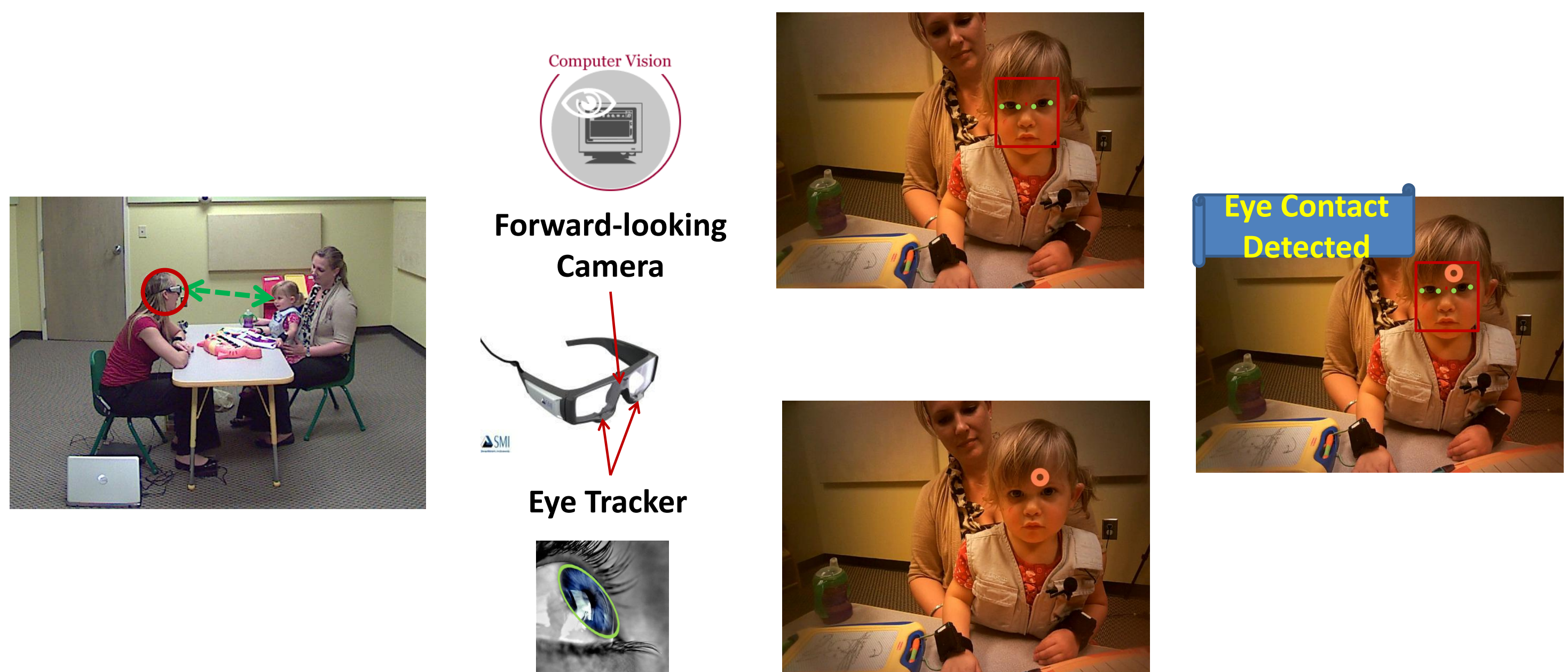


Fig. 1 An automatic system for detecting moments of eye contact between an adult and a child, based on a single pair of wearable eye tracking glasses worn by the adult.

Technical Details

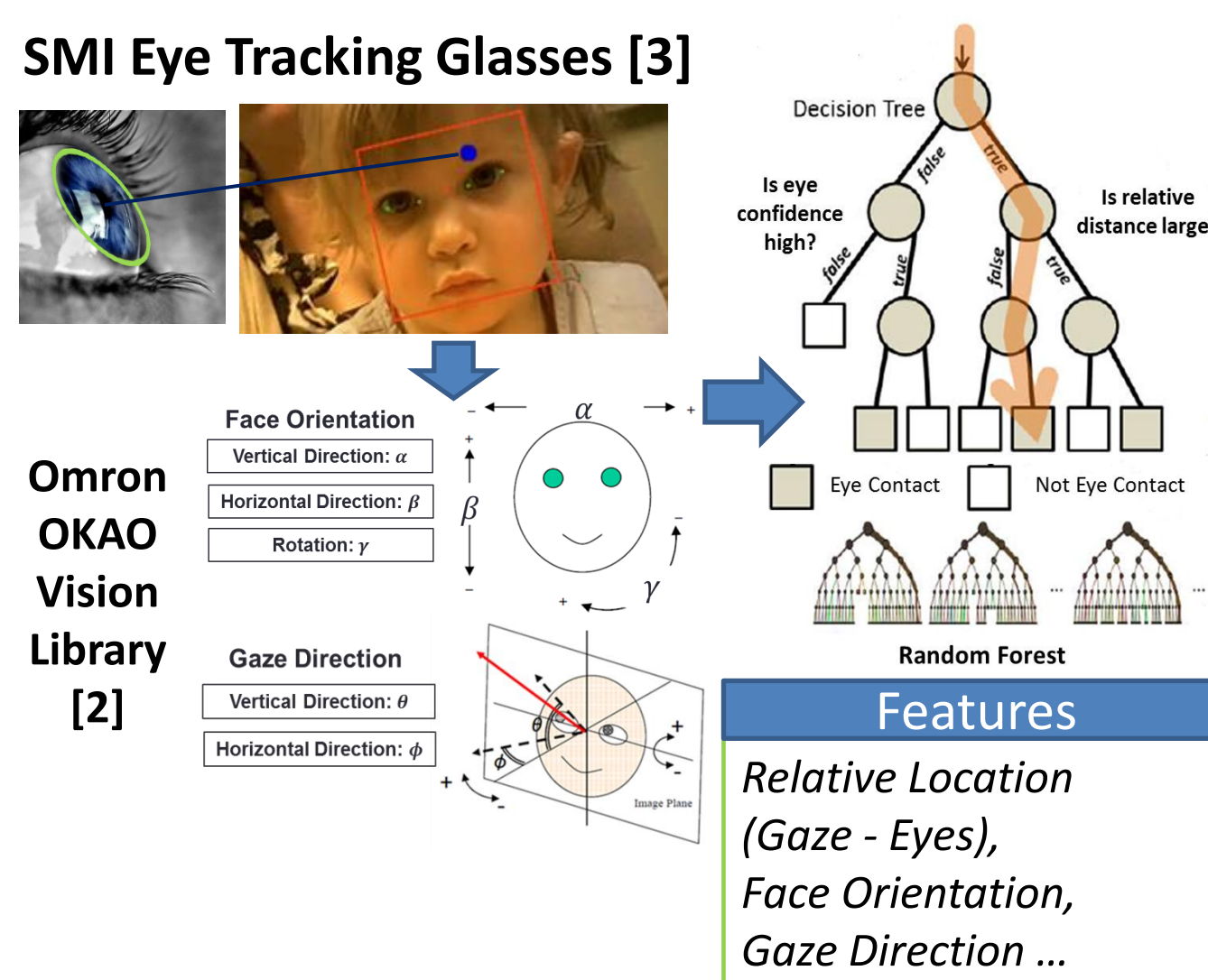
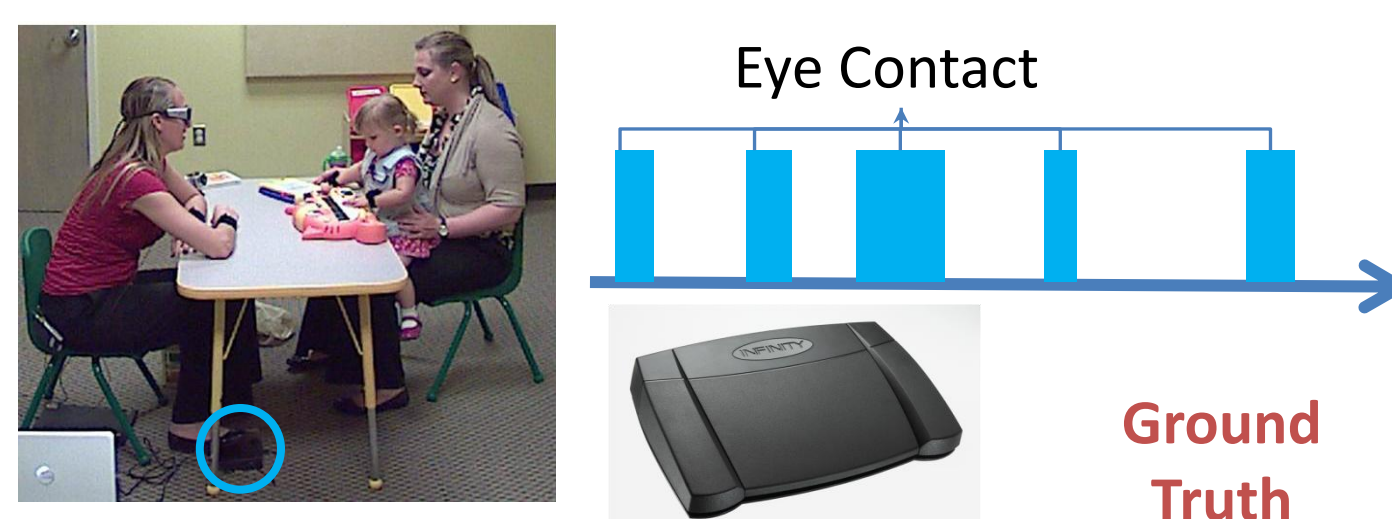


Fig3. A random forest is learned from training data to detect eye contacts

Annotation



- A foot pedal has been introduced to allow the adult providing annotation of the eye contacts.
- The foot pedal data is further used as the ground truth for training

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).

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Results

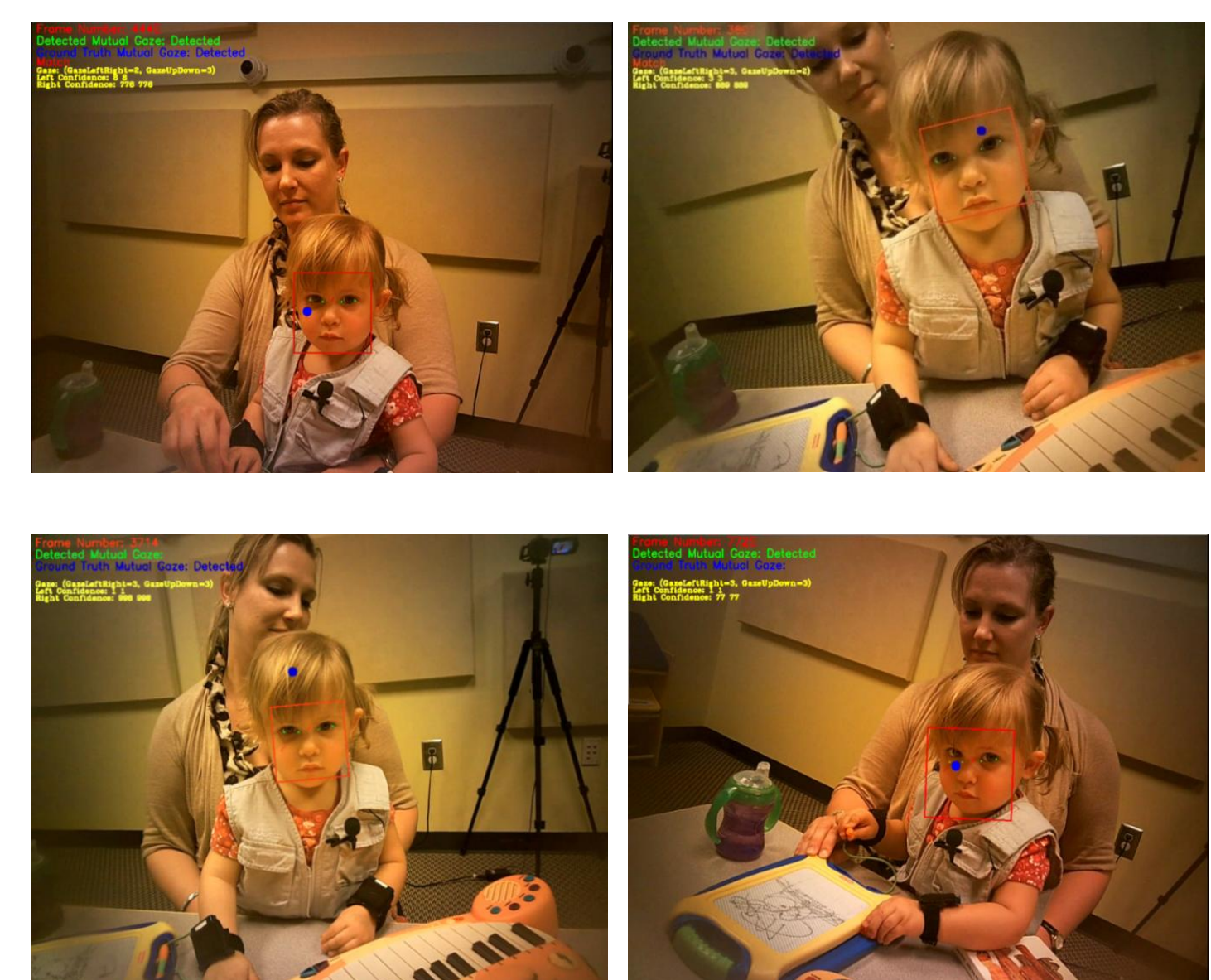


Fig4. Examples of successful (first row) and failure (second row) cases.

Quantitative Results

- One session from one subject
- Over 12K frames, 60% for training

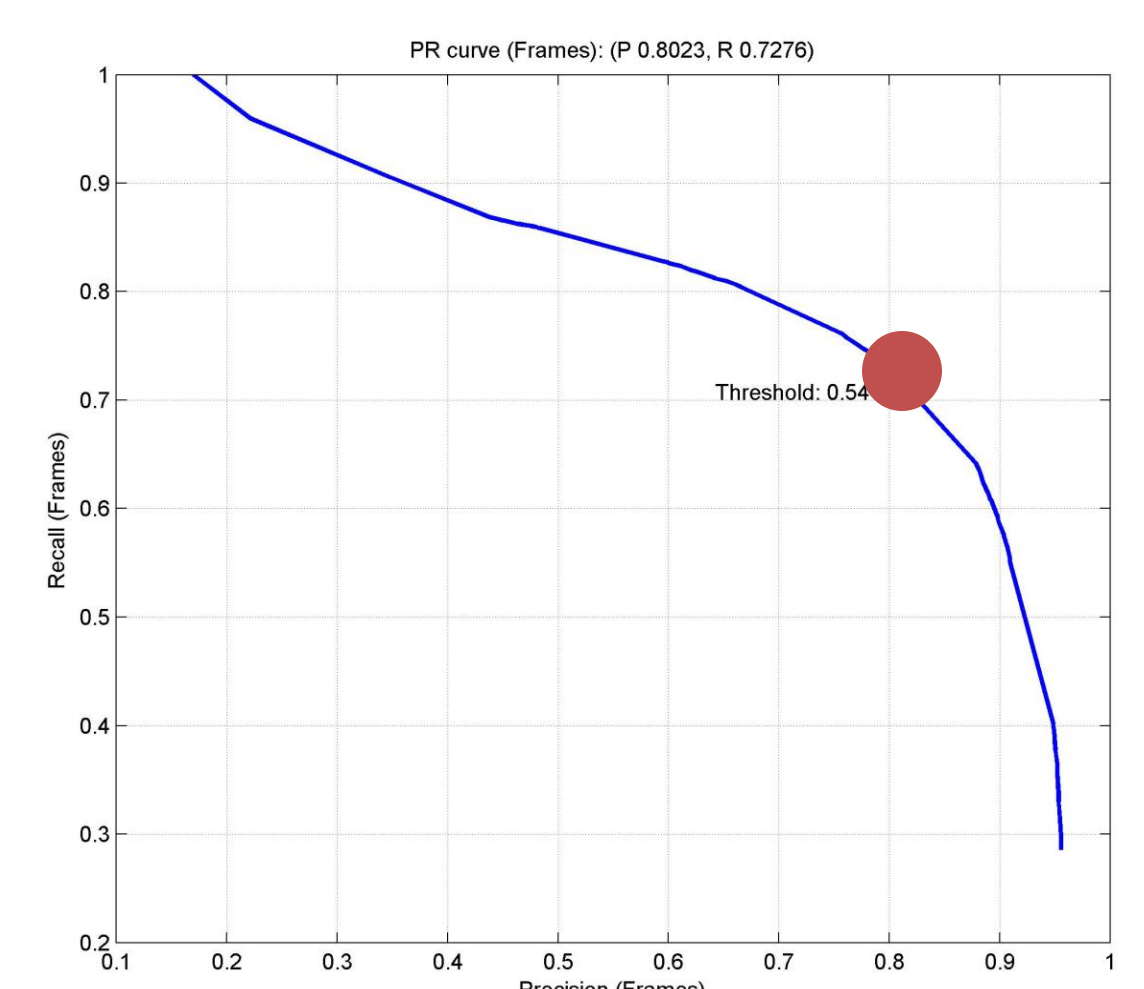


Fig. 5 Precision recall curve of our eye contact detection algorithm.

Algorithm \ Ground Truth	True	False
	True	1277(72.8%)
False	478(27.2%)	8225(95.6%)

Table 1 Confusion matrix of eye contact detection in each frame