

Parental Signal Indicating Significant State Change in Action Demonstration

Yukie Nagai and Katharina J. Rohlfing
Faculty of Technology, Bielefeld University, Germany
{yukie, rohlfig}@techfak.uni-bielefeld.de

Introduction

Difficulty in Robot Action Learning

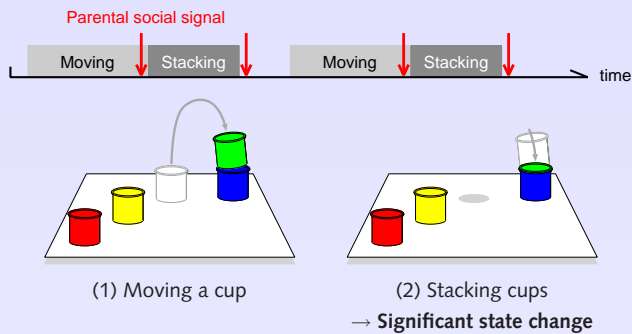
Robots do not know what aspects of a demonstrated action to attend to although exposed to a huge amount of sensory signals.

Our Suggestion

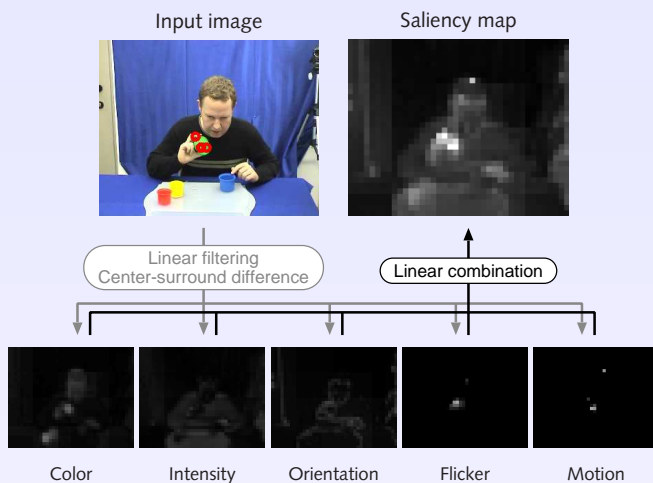
Parental social signals observed in infant-directed interactions can help robots to detect significant state changes in their actions.

Ex) Stacking-Cups Task

Parental signals *frame* significant events.



Analysis of Parental Actions Using Saliency Model

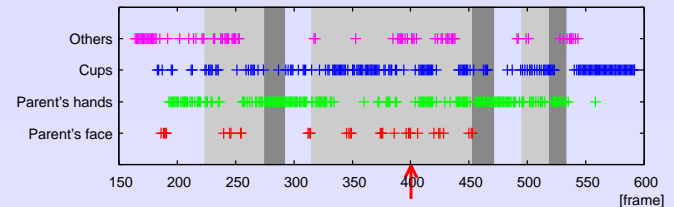


Proceeding

1. To extract five features: color, intensity, orientation, flicker, and motion, by linearly filtering the input image
 2. To calculate the center-surround difference
 3. To linearly combine the difference maps
 4. To attend to the locations with higher saliency
- The parent's face attracts the model's attention when he/she is talking to and/or smiling at the infant.
- The model enables a robot to detect such social signals without any specific knowledge.

Analytical Results

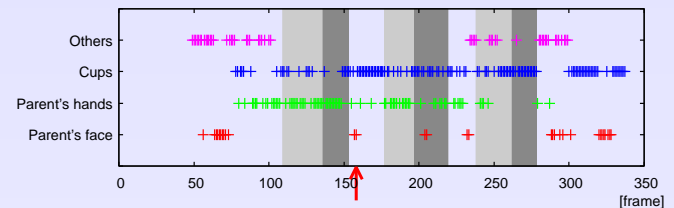
(a) Social signals indicating the following event



- The mother's face attracted more attention *shortly before* she stacked the cups.
- She suppressed her cup-handling movement & talked to her infant.



(b) Social signals indicating the preceding event



- The mother's face attracted more attention *just after* she stacked the cups.
- She took a long pause & addressed her infant.



Conclusion

- Parents tend to give infants social signals shortly before and/or after demonstrating actions causing significant state changes.
- The highlighted parent's face enables a robot to detect such important events.

Future Issues

- Statistical analysis on this finding
- Study of parental demonstration of other tasks

References

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