Emotion Perception Time Analysis for Variable Facial Expression

Shakuntala Gupta, Ramakrishna Biswal, Supratim Gupta

National Institute of Technology Rourkela

December 2018

NAOP 2018

Objectives

❖ To study the process of emotion perception from facial expression through appraisal variables

❖ To analyse Emotion Perception Response Time (EPRT) for collective decision with stimuli from different cultural background

❖ To analyse EPRT with respect to valence of the emotion stimuli

Experiment Design

Experiment Design Specification:

1. **Stimuli**
   - **Japanese Female Facial Expression (JAFFE)**
   - **Cohn-Kanade (CK)**
2. **Sample characteristic**
   Sample size: 70 subjects,   **Geographical location:** India,   **Age Group:** 18 - 35 Year
3. **Subjective Rating and EPRT Collection Tools:**
   MATLAB Graphical User Interface (shown in Fig. 1)
4. **Variables**
   - **Independent variable – appraisal variable   (cultural background)**
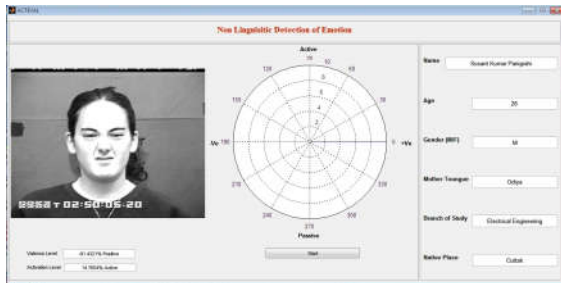   - **Depended variable – Emotion-type, emotion intensity, emotion identification correctness**

Fig. 1: MATLAB GUI for Collection of Appraisal Scores on Activation-Evaluation Space and Response Time for Emotion Perception

Kernel Density Estimation for Collective Decision (S. Gupta et al. 2018)

Emotion mapping: The subjective perception is mapped into arousal based multi dimensional continuous domains
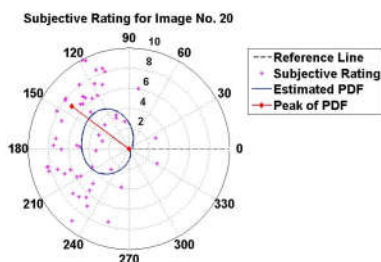

Fig. 2: Sample estimated PDF (scaled for visualisation) of emotion in 'Multi-Dimensional Domain' for JAFFE Database

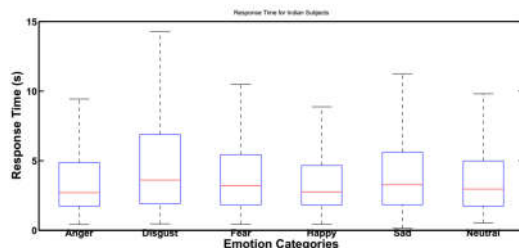### Emotion Perception Response Time

Fig. 3: Response Time of Indian Subjects for JAFFE Database
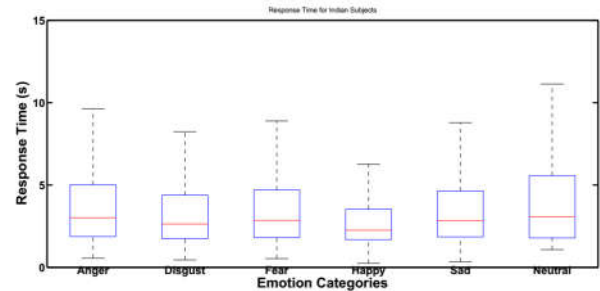

Fig. 4: Response Time of Indian Subjects for CK Database

Challenges:

- Conducting experiment in controlled environment, getting subjects, bringing the scores to a common platform to compare.

Conclusion

❑ **The EPRT indicates emotion like 'Happy' (+ve valence) are perceived faster than other emotions (-ve valence) with higher accuracy.**
❑ **ERT is independent of the cultural background of the displayed facial expression**

Future implication and Limitation

❑ The study can be extended to understand cultural-invariant aspects of emotion perception with **subject groups from different cultural background.**

❑ More **variation in displayed stimuli** can be added.

❑ The ERT can be studied for **individual perception performance** tasks.

Limitations:

❑ Further generalization can be done with wider variation in cultural background of subjects.

❑ Funding and organised project which is not available to the researcher were necessary.

CK: Happy
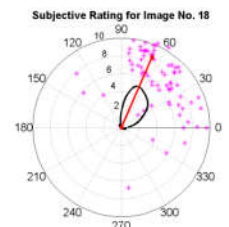
Happy AE Plot

Acknowledgements

- All subjects participated in the experiment
- Lab facility provided by NIT, Rourkela

Selected References

Gupta S., Biswal R., and Gupta S., (2018). **Toward Computational Model of Emotion from Individual Difference in Perceiving Facial Expressions. Psychological Studies,Springer, 16(3), 266-275,   DOI: 10.1007/s12646-018-0459-5**

Lucey, P., Cohn, J. F., Kanade, T., Saragih, J., Ambadar, Z., & Matthews, I. (2010). The extended cohnkanade dataset (ck+): A complete dataset for action unit and emotion-specified expression. In *2010 ieee computer society conference on computer vision and pattern recognition-workshops* (p. 94-101).

Elfenbein, H. A., Beaupr, M. G., Lvesque, M., & Hess, U. (2007). Toward a dialect theory: Cultural differences in the expression and recognition of posed facial expressions. *Emotion*, *7*, 131-146. doi: 10.1037/15283542.7.1.131

Engelmann, J. B., & Pogosyan, M. (2013, Mar.). Emotion perception across culture: The role of cognitive mechanisms. *Front. Psychol.*, *4*. doi: 10.3389/fpsyq.2013.00118