

An Explainable Affective Recommender based on the Commonsense Reasoning Framework TCL

Antonio Lieto, Gian Luca Pozzato, Manuel Striani, Stefano Zoia, Rossana Damiano
University of Turin

In this work we present an explainable system for emotion attribution and recommendation (called DEGARI (Dynamic Emotion Generator And Reclassifier) relying on a recently introduced probabilistic commonsense reasoning framework (i.e. the TCL logic, see Lieto & Pozzato 2020) which is based on a human-like procedure for the automatic generation of novel concepts in a Description Logics knowledge base (see also Lieto et al. 2019, Chiodino et al. 2020 for other applications). In particular, in order to model human-like forms of concept combinations, the TCL logic combines a probabilistic description logics of typicality with the HEAD-MODIFIER heuristics coming from cognitive semantics.

In the context of our application of such framework, our system exploits the logic TCL to automatically generate novel commonsense semantic representations of compound emotions (e.g. Love as derived from the combination of Joy and Trust according to Plutchik's theory of emotions, see Plutchik 2001). The generated emotions corresponds to prototypes, i.e. commonsense representations of given concepts, and have been used to reclassify emotion-related contents in a variety of artistic domains. We have tested our system in the context of the H2020 EU project SPICE for providing artistic recommendations of museum items in the Galleria di Arte Moderna (GAM) of Turin. The obtained results (reported in Lieto et al, 2021 and Lieto et al., to appear) show promising results for what concerns both the acceptance of the provided affective recommendation and the explainability associated to each suggestion made by the users. Here we discuss, the open problems and the lessons learned.

References

- Lieto, A. and Pozzato, G. L. (2020). A description logic framework for commonsense conceptual combination integrating typicality, probabilities and cognitive heuristics. *Journal of Experimental & Theoretical Artificial Intelligence*, 32(5):769– 804.
- Plutchik, R. (2001). The nature of emotions. *American scientist*, 89(4):344–350.
- Lieto, A., Pozzato, G. L., Zoia S., Patti V., Damiano R. (2021). A commonsense reasoning framework for explanatory emotion attribution, generation and re-classification. *Knowledge-Based Systems*, 227:107166, 2021.
- Lieto, A. (2021). *Cognitive design for artificial minds*. Routledge.
- Chiodino, E., Di Luccio, D., Lieto, A., Messina, A., Pozzato, G. L., & Rubinetti, D. (2020). A knowledge-based system for the dynamic generation and classification of novel contents in multimedia broadcasting. In *ECAI 2020* (pp. 680-687). IOS Press.
- Lieto, A., Perrone, F., Pozzato, G. L., & Chiodino, E. (2019). Beyond subgoalng: A dynamic knowledge generation framework for creative problem solving in cognitive architectures. *Cognitive Systems Research*, 58, 305-316.
- Lieto, A., Pozzato, G. L., Striani, M., Zoia, S., & Damiano, R. Degari 2.0: A Diversity-Seeking, Knowledge-Based, Explainable, and Affective Art Recommender for Social Inclusion. *Cognitive Systems Research* (to appear).