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Making Up Your Mind:
An Exploration into Analysis and Support in Individual and Social Contexts

Rob Duell

Summary

Several typically human features, that are absent in contemporary machine decision-making, may (directly or indirectly) govern human decision-making processes. For example, humans may:

- experience mental pressure and get exhausted;
- need motivation and confidence;
- unconsciously influence each other;
- employ emotional responses and feelings to make decisions;
- possess the capability to develop empathy.

The research in this thesis is focused on capturing these features in a set of human-like and human-aware models in order to support (groups of) humans with artificial intelligence. This requires a modeling approach that relates to our human biological and neurological basis, and that allows for efficient use of these models in supporting artificial intelligence applications.

Based on literature from the fields of biology, (social) psychology and (social) neuroscience, this thesis develops models that capture human mental states and processes. Subsequently, these models are internally validated by for instance simulation and/or mathematical analysis. Also, the models are subjected to a partial external validation by producing various emerging patterns as described informally in relevant literature. Special attention has been given to the efficient use of these models in artificial intelligence applications. Finally, this thesis demonstrates how the use of these models can provide intelligent support to humans, inspired by domains such as leadership and mediation.

This thesis shows how artificial intelligence applications can monitor and analyze the behavior of humans in their environment, and assess relevant mental states and processes of the humans. Based on the analysis, effective support actions and interventions can be provided to the supported humans; support that otherwise could only be provided by humans.

This explorative research contributes to the goal of improving the cooperation between computers and humans by incorporating an increased form of human awareness in computers (instead of the other way around).