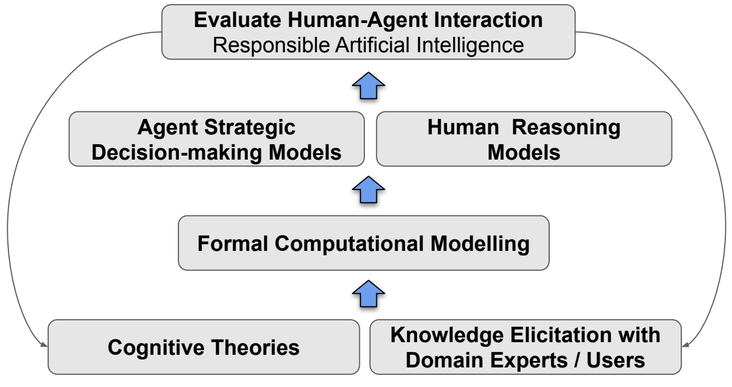
Strategic Argumentation to deal with Interactions between Intelligent Systems and Humans

Collaborative intelligence

Collaborative intelligence between humans and intelligent systems relies heavily on the skills of humans and intelligent systems for reaching agreements. This requires complex dialogue processes, which include human reasoning based on common sense and goal-oriented decision-making performed by the intelligent systems.

This project explores these challenges for human-aware strategic decision-making in interaction between intelligent systems and humans, with a particular focus on applications for mental-health and wellbeing. In order to model human reasoning, cognitive theories are formalized in logic-based computational architectures using non-monotonic reasoning techniques such as abstract argumentation and answer set programming.

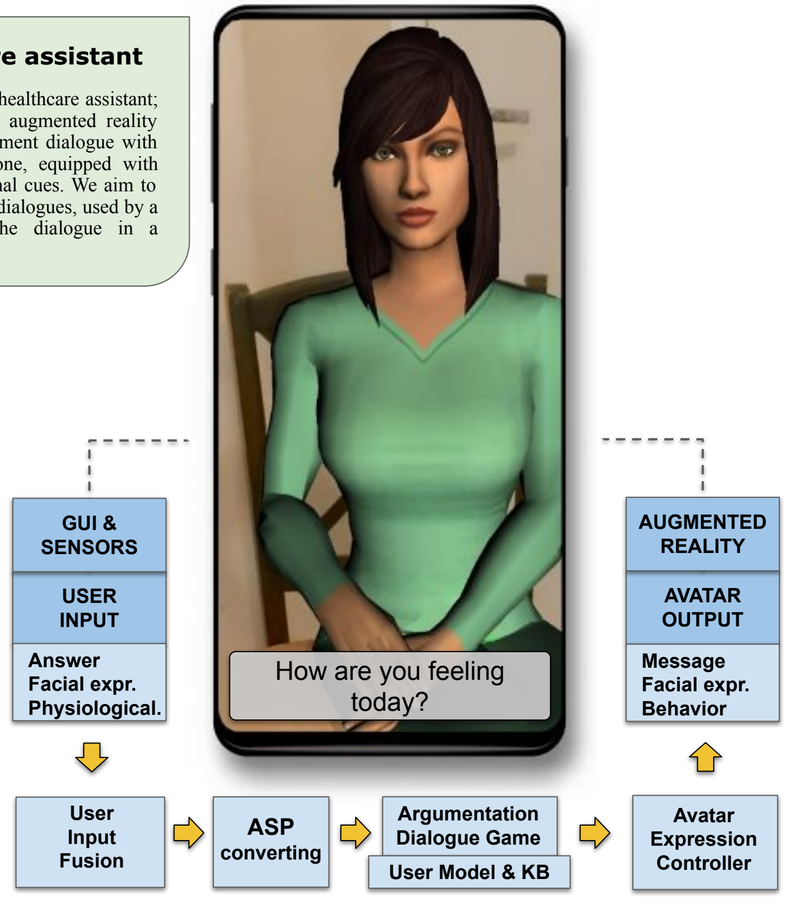
We implement proof-of-concept prototypes of the systems aiming to validate and verify our approach in real use-cases, by considering ethics guidelines for responsible artificial intelligence.



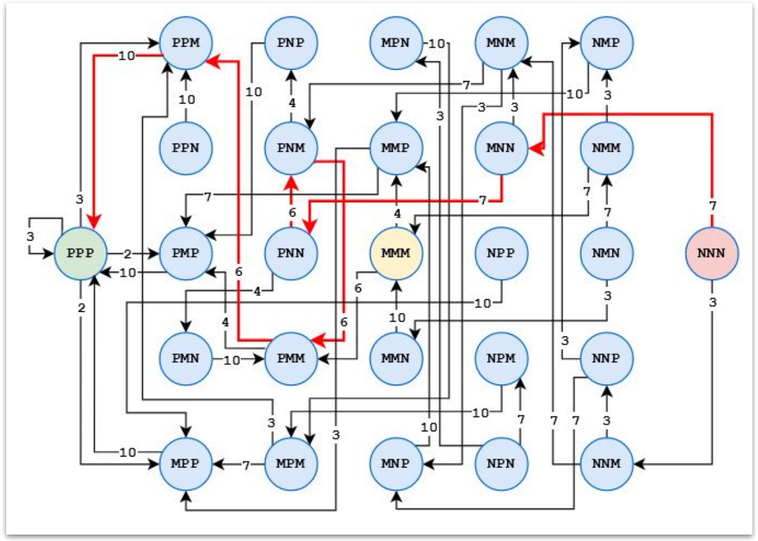
Methodology

Case study: Healthcare assistant

In an ongoing work, we develop a healthcare assistant; A rational agent, embodied as an augmented reality avatar, which joins a health assessment dialogue with an individual through a smartphone, equipped with sensors to elicit social and emotional cues. We aim to develop a framework for empathic dialogues, used by a rational agent for conducting the dialogue in a personalized and sensitive manner.



Empathic Healthcare Assistant in Augmented Reality



Motivation decision-graph

Variables: Expectations | Subjective Norm | Perceived Behavioral Control.
Values: Inhibiting behavior (N), Indifferent to behavior (M), Positive to behavior (P).

Different motivation models are explored. For instance, a behavior-change heuristics model is proposed that constrains an agent's plan for motivating behavior. The constraints follow suggestions from experts in, e.g., psychology and occupational therapy. A decision-graph is comprised of 27 mental states defined by the individual's expectations, the individual's motivation to comply with norms, and the individual's perceived behavioral control. We aim to formalize a computational *Theory of Mind* that captures particular human beliefs, utilized in an agents empathic interaction.

Ongoing work

Brännström, A., Kampik, T., & Nieves, J. C. (2020). Towards Human-Aware Epistemic Planning For Promoting Behavior-Change. In *Workshop on Epistemic Planning (EpiP)@ ICAPS, Online, October 26-30, 2020*.

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