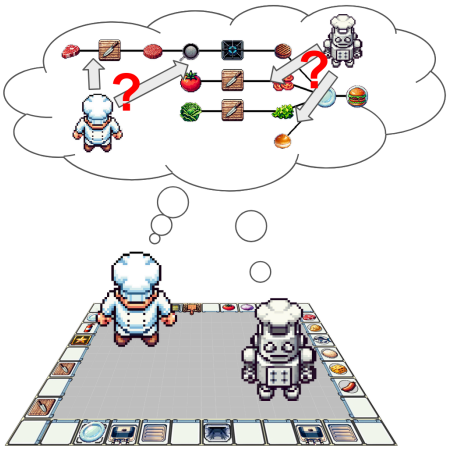
UNIVERSITÄT BIELEFELD
Faculty of Technology

SOCIAL COGNITIVE SYSTEMS
AG Kognitive Systeme und soziale Interaktion

Probabilistic Programming for Theory of Mind and Human-Agent Collaboration

Bachelor/Master – This thesis explores the use of probabilistic programming to model Theory of Mind (ToM) and support human-agent collaboration. The goal is to implement and evaluate probabilistic models that allow artificial agents to infer and reason about the beliefs, intentions, and goals of human collaborators. The project involves developing probabilistic programs (e.g., using Pyro, PyMC, memo or similar frameworks), applying them to collaborative scenarios, and analyzing their effectiveness in improving agent behavior and interaction quality.

Links: pyro.ai, pymc.io, memo on github



Tasks

- Review relevant literature on probabilistic programming and ToM in human-agent interaction.
- Implement probabilistic models for inferring human mental states and intentions in CoCu.
- Evaluate the models in different scenarios and analyze their impact on agent performance.

Your Profil

- Programming experience in Python.
- Interest in AI, cognitive modeling, or human-agent interaction.
- Motivation to learn about probabilistic programming frameworks (e.g., Pyro, PyMC).

Interested?

If you are interested or have further questions, please send an email to `fschroeder@techfak.uni-bielefeld.de`.

CITEC

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