

Machine Reasoning to Identify Inconsistent Knowledge

Dr. Christopher Myers, AFRL/RHAC
AFRL/RHA Bldg 852
2620 Q Street
WPAFB, OH 45433-7333
christopher.myers.29@us.af.mil

1. Academic Area/Field and Education Level

Electrical Engineering and Computer Science/Artificial Intelligence/Formal Logic (BA/BS, MS or PhD level)

2. Objectives: The Cognitive Science, Models, & Agents branch of the 711th Human Performance Wing have been working toward artificially intelligent agents capable of interacting with humans across several different tasks. A limitation within these systems is their capability to determine if newly provided information, be it through written instruction or communication, is consistent with previously acquired knowledge. The goal of the research is to develop a computational system capable of reasoning about information provided and whether the new information is consistent with previously stored information.

3. Description: The ability for a cognitive agent to adapt its domain knowledge through additions, deletions, and/or changes is critical for helping to ground new information within an evolving situation as well as identify information missing from its task representation. In order for the agent to identify gaps in comprehension, it has to have a conception of what it knows about tasks, about the environment, about situations, and about possible actions in certain situations. For stable and effective autonomy, autonomous agents must be capable of building world knowledge on the fly, from instructions, experience, and interaction with a human if gaps in comprehension have been identified. Central to the agent's knowledge base building and comprehension checks is the integration of old knowledge with new knowledge. This integration will require a mapping of new to old information, in possibly complex ways. Insights and methods from the ontology alignment community provides a guide within this aspect of the research. Further, the ability to reason over misalignments and act accordingly is a current gap in the scientific literature and filling this gap will facilitate stable and fault-tolerant autonomous cognitive agents

4. Research Classification/Restrictions: All research performed will be at the unclassified level.

5. Eligible Research Institutions: Wright-State University, University of Dayton, Ohio State University, University of Ohio, Miami University

NOTE: Topics submitted to DAGSI must be approved for public release. Need PA Approval #