Ontology Summit 2019
Launch Session

Commonsense Track

Co-champions:
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We seem close to AI systems that will do common tasks (drive or give advice on common tasks like eating) and they need to exhibit robust commonsense knowledge and reasoning to be trusted.

As intelligent agents become more autonomous, sophisticated, and prevalent, it becomes increasingly important that humans interact with them effectively.

- Why did my self-driving vehicle take an unfamiliar turn?
DARPA's Machine Common Sense Program:

**DARPA** What are we trying to do?

**TODAY**
Narrow Artificial Intelligence

- AI Application (Robot, Assistant, Analytic)

- Where should I sit to saw off the limb of this tree?

- Narrow AI Carefully train or program the system for every possible situation

**TOMORROW**
Machine Common Sense

- The elephant in the room

**FUTURE**
General Artificial Intelligence

- Human-Level AI

Torsten Hahmann (U of Maine)
Recap from Introductory Session

- Commonsense Knowledge & Reasoning along with NL understanding & explanation ability are necessary to achieve human-level performance as recognized early in AI research
  - For fluidity explanations require knowledge about the world & have an intimate connection to both commonsense (AI) and Ontologies
  - These goals support one another since any general NLP must possess the commonsense that is assumed in text.
Recap from Introductory Session (contd.)

- Although some progress has been made with taxonomic & temporal reasoning there remain many challenges to achieving diverse commonsense reasoning in AI systems such as to understand new situations, monitor the reasonableness of actions, communicate effectively with people, and transfer learning to new domains.

- None of the many approaches to building Commonsense KBs like handcrafting, web extraction, & crowdsourcing have yet proven to be viable, large-scale solutions.

- Better understanding of Commonsense remains a place to start.
“To make real progress in A.I., we have to overcome the big challenges in the area of common sense,”
Paul Allen, 2018

• Issues also captured by the Winograd schema challenge (Hector Levesque, Toronto, 2011)
  • Terry Winograd: “The town councilors refused to give the demonstrators a permit because they feared (advocated) violence. Who feared (advocated) violence?”
  • The trophy would not fit in the brown suitcase because it was too big (small). What was too big (small)?
• Requires a mix of NL parsing and understanding but also suitable commonsense knowledge:
  • E.g. town councilors are typically not advocating violence,
  • Things can be put into suitcases, but must be smaller
Some Frequently Recurring Questions

1. How can we leverage the best of various approaches to achieving commonsense?
   - formal representations of commonsense knowledge (e.g. encoded in an ontology's content as in Cyc or Pat Hayes’ Ontology of Liquids) vs.
   - strategies for commonsense reasoning (e.g. default reasoning, prototypes, uncertainty quantification, etc.)

2. How to best inject commonsense knowledge into machine learning approaches?
   - Some progress on learning using taxonomic labels, but just scratches the surface

3. How to bridge formal knowledge representations (formal concepts and relations as axiomatized in logic) and NLP techniques and language disambiguation (e.g. Wordnet)
Sessions and Speakers

Session 1 (January 23\textsuperscript{rd}):

1. Michael Gruninger (University of Toronto)
   • Ontologies for the Physical Turing Test

2. Benjamin Grosof (Chief Scientist, Kyndi; Founder and board member, Coherent Knowledge)
   • Rule-based commonsense knowledge, their acquisition and combinations of ML with logical AI

Session 2 (March 6\textsuperscript{th}):

1. Pascal Hitzler (Wright State University)
   • Commonsense and the symbolic-subsymbolic gap

2. Niket Tandon (Allen Institute for AI)
   • Automatic acquisition of commonsense knowledge