

Ontologies & Cyc

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Monopoly



Imagine you were designing software to play this classic real estate game. Describe the structured data you would need to represent, including the following:

- Individuals (e.g., Thimble, Boardwalk, ...)
- Classes (e.g., Property, Player, ...)
- Attributes (e.g., incarcerated, mortgaged, ...)
- Relations (e.g., location, owns, ...)

Definitions

- Ontology: usage in philosophy & CS
- Domain ontology & upper ontology
- Taxonomy



Application

- For what kinds of problems is an ontology useful?
 - Data cleaning & integration
 - Natural Language Processing
 - Search & data mining
 - Gaming
 - Virtual / augmented reality
 - Defense, intelligence, security



The Cyc Project & Cycorp

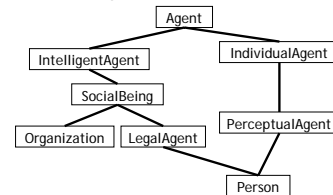
- History
- Goals
- Approach



"Once you have a truly massive amount of information integrated as knowledge, then the human-software system will be superhuman, in the same sense that mankind with writing is superhuman compared to mankind before writing."

What is the Cyc Upper Ontology?

- CycL: KR language
- The Cyc Knowledge Base (KB)
- Specialized Inference Engine



Applications: Data Cleaning

Name	Gender	Address	Spouse	Hire Date
Bill Smith	M	884 Freemont	Mary Smith	10/10/1992
Mary Smith	M	884 Freemont	Bill Smith	7/4/2001
Name	Gender	Address	Spouse	Hire Date
Bill Smith	M	884 Freemont	Mary Smith	10/10/1992
Mary Smith	F	884 Freemont	Bob Johnson	7/4/2001
Name	Gender	Address	Spouse	Hire Date
Bill Smith	M	884 Freemont	Mary Smith	10/10/1992
Mary Smith	F	932 Brook Drive	Bill Smith	7/4/2001
Name	Gender	Address	Spouse	Hire Date
Ed Jones	M	917 Oak St	Pat Jones	6/17/1895
Dana Court	F	Fred Court	872 Smith	1/13/2005

Applications: NLP

- Fred saw the plane flying over Zurich.
- Fred saw the mountains flying over Zurich.



- The police arrested the demonstrators...
 - because they feared violence.
 - because they advocated violence.



- Maggie saw a puppy in the pet shop window...
 - and she wanted to buy it.
 - and she pressed her nose up against it.



Applications: Search & Data Mining

- What planet has the smallest surface area?
- How many planets are in our solar system?
- When did Tony Blair get married?
- When did Napoleon die?
- What is the president's middle name?
- In what countries is Spanish currently spoken?
- Is George Bush currently sitting or standing?
- Which US governors speak a non-Indo-European language?



People in Pictures

- Slide 2: Mr. Monopoly
- Slide 3: Descartes, Turing, Linnaeus
- Slide 6: Lenat, Einstein
- Slide 8: (Demonstrators 1-7)
- Slide 9: Napoleon, (Teddy Bear)

What were your ontological commitments?
 How can ontology play a role in developing hybrid symbolic / stochastic AI systems?