

Lecture 9: Applications of Prolog

2-AIN-108 Computational Logic

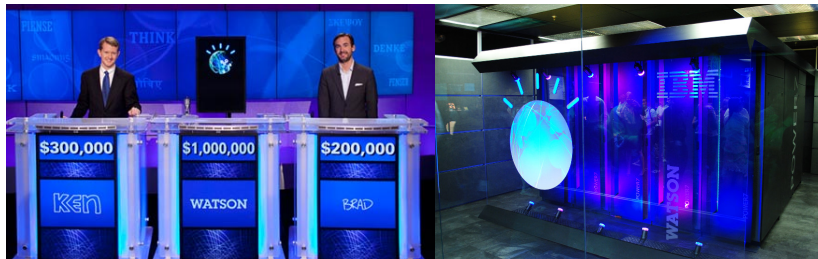
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- Jeopardy's man vs. machine challenge
- Complex natural language questions over an extremely broad domain of knowledge
- Natural language processing with Prolog was used to analyze the vast amounts of unstructured text and to interpret the question.



Poets & Poetry: He was a blank clerk in the Yukon before he published "Songs of a Sourdough" in 1907

```
lemma(1, "he").  
partOfSpeech(1, pronoun).  
lemma(2, "publish").  
partOfSpeech(2, verb).  
lemma(3, "Songs of a Sourdough").  
partOfSpeech(3, noun).  
subject(2,1). object(2,3).
```

```
authorOf(Author, Composition) :-  
    createVerb(Verb),  
    subject(Verb, Author),  
    author(Author),  
    object(Verb, Composition),  
    composition(Composition).
```

Songs of a Sourdough by Robert W. Service

```
lemma(1, "Songs of a Sourdough").  
partOfSpeech(1, noun).  
lemma(2, "by").  
partOfSpeech(2, preposition).  
lemma(3, "Robert W. Service").  
partOfSpeech(3, noun).  
argument(1,2). objectOfPreposition(2,3).
```

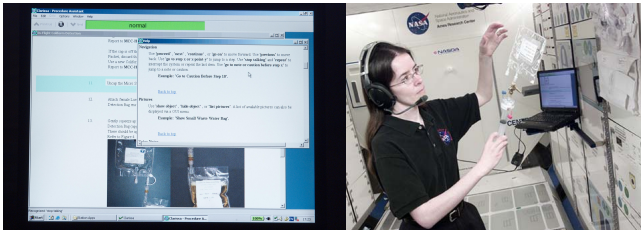
```
authorOf(Author, Composition) :-  
    composition(Composition),  
    argument(Composition, Preposition),  
    lemma(Preposition, "by"),  
    objectOfPreposition(Preposition, Author),  
    author(Author).
```

Prolog was used because of

- pattern matching (unification)
- depth first search with backtracking
- recursive rules expressing reachability in parse trees
- negation of failure to check the absence of annotations
- weakly typed language (wrong type would cause not matching the pattern)

Adam Lally, Paul Fodor: Natural Language Processing With Prolog in the IBM Watson System. The Association for Logic Programming (ALP) Newsletter, March 2011.

- fully voice-operated procedure browser
- enables astronauts to be more efficient with their hands and eyes and to give full attention to the task while they navigate through the procedure using spoken commands
- used on the International Space Station (from 2005)



Manny Rayner, Beth A. Hockey, Jean-Michel Renders, Nikos Chatzichrisafis, and Kim Farrell: Spoken language processing in the clarissa procedure browser. Technical report, International Computer Science Institute, Berkeley, California, April 2005.

- <http://www.nasa.gov/centers/ames/multimedia/images/2005/Clarissa.html>
- <http://www.theguardian.com/technology/shortcuts/2013/jan/11/ibm-watson-supercomputer-cant-talk-slang>
- [http://fr.wikipedia.org/wiki/Watson_\(intelligence_artificielle\)](http://fr.wikipedia.org/wiki/Watson_(intelligence_artificielle))