Lecture 9: Applications of Prolog
## 2-AIN-108 Computational Logic

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25 Nov 2014

IBM Watson

- 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.

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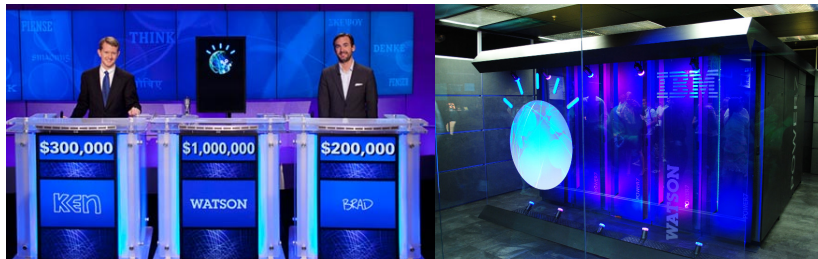
Poets & Poetry: He was a blank clerk in the Yukon before he published "Songs of a Sourdough" in 1907

```
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).
```

IBM Watson

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.

NASA Clarissa

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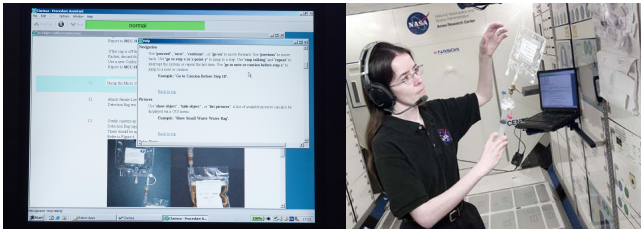
Manny Rayner, Beth A. Hockey, Jean-Michel Renders, Nikos Chatzichrisafis, and Kim Farrell: Spoken language processing in the clarissa procedure browser. Technical report, International Computer Science Institute, Berkeley, California, April 2005.

- 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)