Machine Learning
for
Semantic Parsing
in Review

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We'll talk about:

- NLU, SLU and semantic parsing
- SLU sub tasks
- Machine Learning techniques
- Parsing approaches
- New challenges for SLU

NLU, SLU and semantic parsing - I

- NLU and SLU challenges
  - Variability
  - Ambiguity

- Semantic parsing as an act of translation
  - Natural Language
  - Formal Language

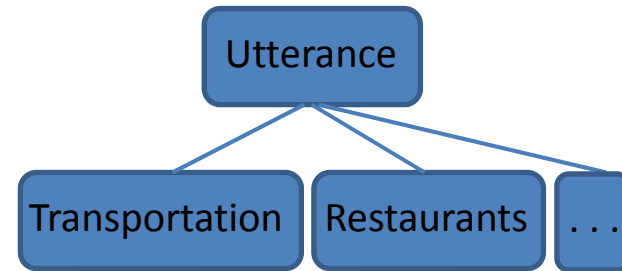|	Natural Language	Formal representation
Lambda Calculus Expressions	He is a dog and he disappeared.	λx.(dog(x) & disappeared(x))
robot controller language	take next available left	turn-left:t
BIO	Marshal Hall was a professor	B-person I-person O O B-role

NLU, SLU and semantic parsing - II

LU at work:

- Dialogue systems
- Machine translation
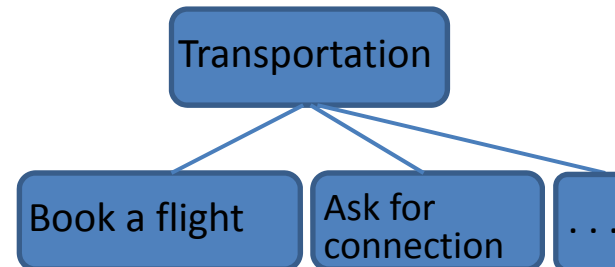- Information retrieval

LU component in dialogue systems

ASR → SLU → DM → NLG → TTS

SLU sub tasks

- ## Domain detection

```
              Utterance
         /        |        \
Transportation  Restaurants  . . .
```

- ## Intent Determination

```
        Transportation
       /       |        \
Book a flight  Ask for   . . .
              connection
```

- ## Slot filling

Departure:	CA
Arrival :	SF
Arr_Time	19:20

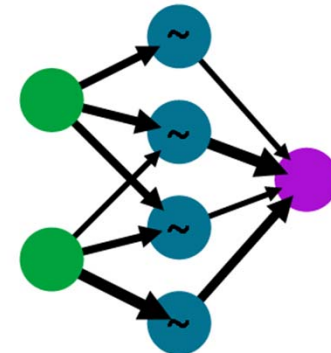# Machine Learning techniques

- ## CRF

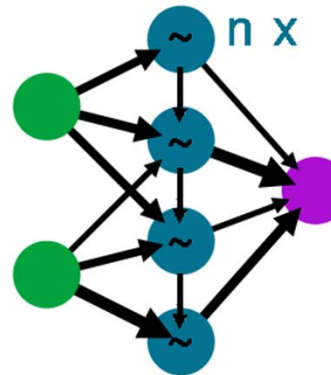Xu and Sarikaya, 2013
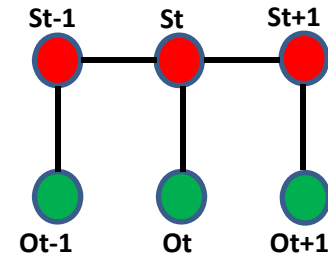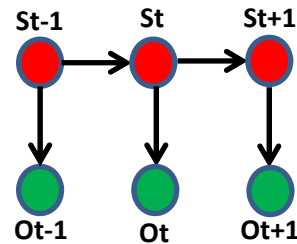
- ## Neural Networks

Collobert et al., 2011

- ## Deep Learning

Mesnil et al., 2013

Parsing approaches

- ## CCG
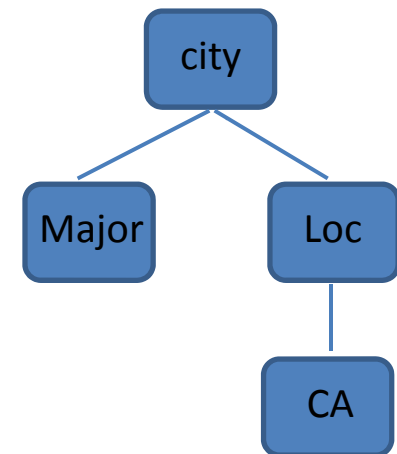
Pennsylvania neighbors New York.

New York NP ⊢ new _york

Pennsylvania NP ⊢ pennsylvania

neighbors ⊢ S\NP/NP

- ## DCS

What is the major city in California?

λx.(x=major city) ∧ Loc(x, CA)

New challenges for SLU

- ✓ Open domain

- ✓ Knowledge graph

- ✓ Deep learning

- ✓ Multi agent conversation

- ✓ Socially aware SLU

- ✓ Multi-modality SLU

Thank you!

Your comments are welcome!

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