Welcome!

Intro:

- Name
- Research/industry interest — why?
- NLP problem
NLP:

Goal: Understanding

Not just string proc.

Simple

- Spell
- Adversity
- Detecting speech
- Primitive
- Dialog
- Plagiarism

Complex

- POS tagging
- Speech
- MT
- NLP

Human level understanding
Calendar

in Gates

LOC

end of the table.

Meeting tomorrow with Anne tomorrow

Schedule open

Adj

A1200 is sitting at the
0) Semantic Parsing

\[ f : X \rightarrow \Lambda \]

Show me flights from nyc

\[ \text{dx. flight}(x) \equiv \text{tr}(x, \text{nyc}) \]
**Rhetorical structure theory**

In RST, discourse relations compose elementary units into a tree [MT88].

- **s1**: Montreal is a bilingual city.
- **s2**: They speak French and English.
- **s3a**: This makes it an interesting place to visit.
2. LM → Generation

God! give a prob. to every sentence

p (Colorless ideas sleep turionly) = ?

→ the boy is standing in the sun
3. MT →

SRL →

TE →

Text: Some men are playing a # sport.

H: Some men are playing a # sport.

Entail

soccer game with multiple males playing
Embodiment $\rightarrow$ Dist. Semantics

$w \rightarrow (s) \in \mathbb{R}^n$

$w \rightarrow s_1$
$w \rightarrow s_2$
$w \rightarrow s_3$

$\mathbf{QA} : g \rightarrow A$
Topics

- Tagging
  - Label segments of sentence
  - NER, linguistic structure, cooking ingredients
  - POS: http://cogcomp.cs.illinois.edu/page/demo_view/pos
  - NER: http://cogcomp.cs.illinois.edu/page/demo_view/NERextended

- Dependency parsing
  - Hierarchical structure of single words
  - http://nlp.stanford.edu:8080/corenlp/
  - EXAMPLE: Summer is ending soon
  - EXAMPLE: The F.B.I. disclosed that it had collected nearly 15,000 new emails in its investigation of Hillary Clinton.

- Constituency parsing
  - Hierarchical structure of constituencies
  - Tree structured over a sentence

- Semantic parsing (i.e., compositional semantics)
  - EXAMPLE: show me flights
  - EXAMPLE: show me flights from new york city
  - EXAMPLE: show me flights from new york city to ithaca
  - https://lil.cs.washington.edu/uwtime/

- Discourse parsing

- Language modeling
  - Give every sentence a probability
  - When is it useful? Generation

- Machine translation
  - https://translate.google.com/

- Semantic role labeling
  - Pre-defined lexicon of frames or propositions
  - Goal: identify and fill values
  - http://cogcomp.cs.illinois.edu/page/demo_view/SRL
• Textual entailment
  o EXAMPLE: A soccer game with multiple males playing. --> entail --> Some men are playing a sport.
  o EXAMPLE: An older and younger man smiling. --> neutral --> Two men are smiling and laughing at the cats playing on the floor.

• Question answering
  o When was Obama born? 1961

• Reading comprehension

• Sentiment analysis
  o http://nlp.stanford.edu:8080/sentiment/rtnDemo.html

• Co-reference resolution (including Winograd Schemas)
  o http://cogcomp.cs.illinois.edu/page/demo_view/Coref

• Word embeddings and distributional semantics
  o Represent word meaning as a point in a multi dimensional continuous space
  o http://www.ghostweather.com/files/word2vecpride/

• Lexical semantics
  o Word senses, representing meaning in discrete space
  o http://demo.patrickpantel.com/demos/lexsem/cbc.htm

• Vision+language (e.g., VQA, caption generation)
  o https://www.captionbot.ai/
  o http://www.visualqa.org/

• Information extraction
  o Identify pre-specified relations between entities
  o OpenIE: http://openie.allenai.org/

• Time and event extraction
  o https://lil.cs.washington.edu/uwtime/

• Math word problems

• Chat bots
  o Historically: bots that can have freeform conversation
    o http://www.manifestation.com/neurotoys/eliza.php3
  o Today: focused on micro tasks, e.g., buying flowers
    o https://www.messenger.com/t/48386889767