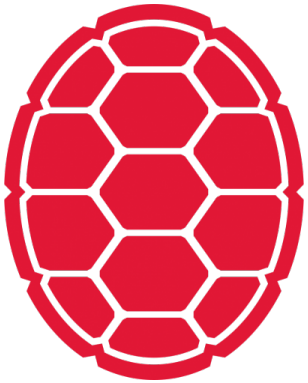

Entity-Driven Desiderata

Computational Linguistics: Jordan Boyd-Graber
University of Maryland
COREFERENCE

Adapted from slides by Vincent Ng

What is Coref?

Identify the noun phrases (or entity mentions) that refer to the same real-world entity

Example

Queen Elizabeth set about transforming her husband, King George VI, into a viable monarch. A renowned speech therapist was summoned to help the King overcome his speech impediment . . .

- Inherently a transitive clustering task
- Typical reframing: selecting antecedent for each mention m_j

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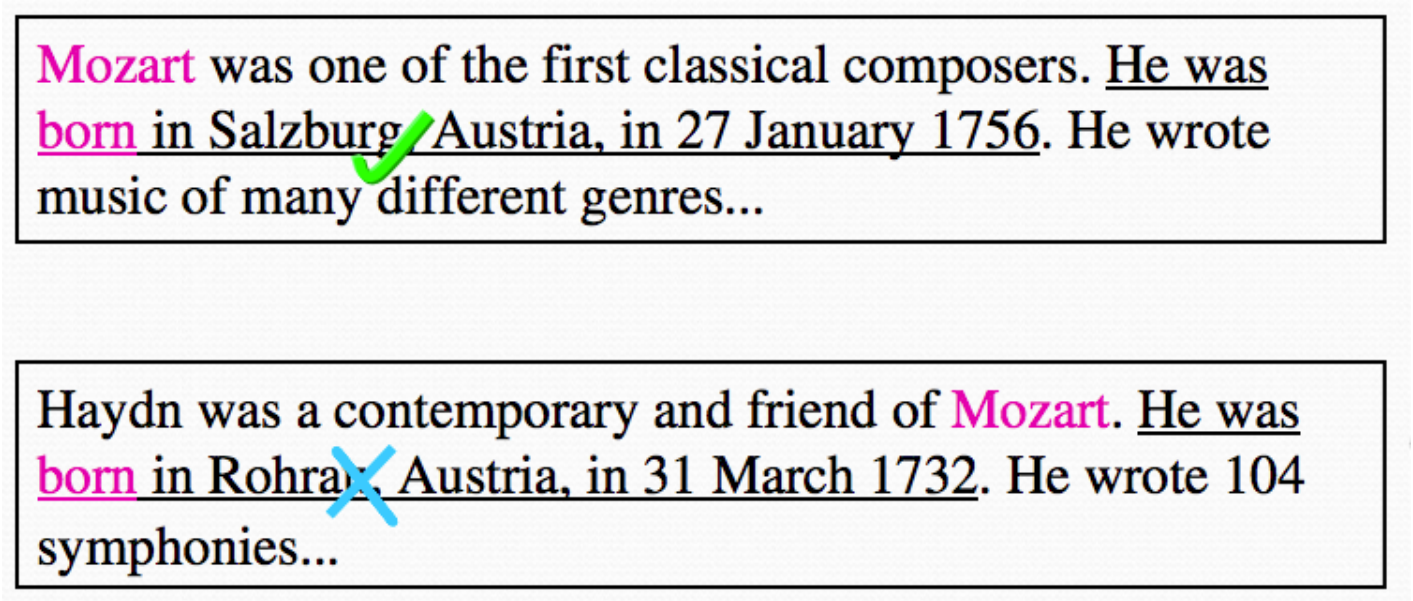
Why it's hard

- Many sources of information play a role
  - lexical / word: head noun matches President Clinton = Clinton =? Hillary Clinton
  - grammatical: number/gender agreement, . . .
  - syntactic: syntactic parallelism, binding constraints John helped himself to... vs. John helped him to. . .
  - discourse: discourse focus, salience, recency, . . .
  - semantic: semantic class agreement, . . .
  - world knowledge
- Not all knowledge sources can be computed easily

Application: Question Answering

Where was Mozart born?



Application: Question Answering

Where was Mozart born?

> Mozart was one of the first classical composers. He was born in Salzburg, Austria, in 27 January 1756. He wrote music of many different genres...

> Haydn was a contemporary and friend of Mozart. He was born in Rohrau, Austria, in 31 March 1732. He wrote 104 symphonies...

Why it's hard

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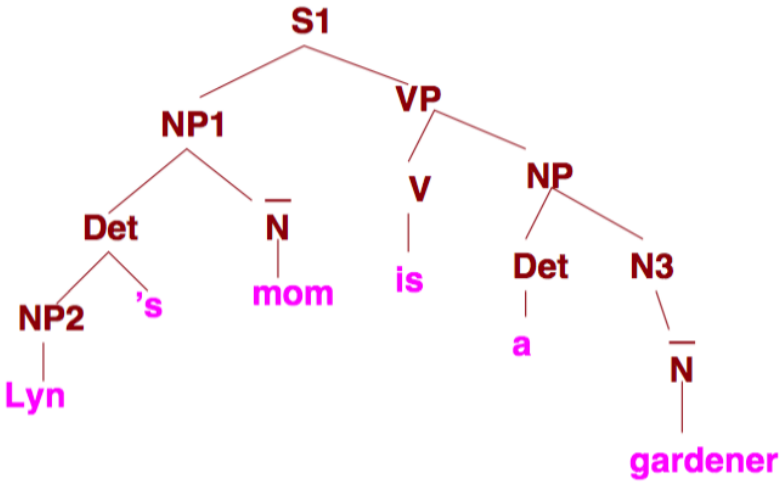
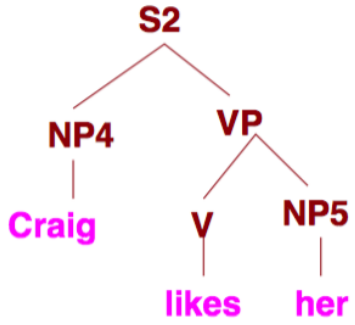
Hobb's Algorithm

Intuition:

- Start with target pronoun
- Climb parse tree to S root
- For each NP or S
  - Do breadth-first, left-to-right search of children
  - Restricted to left of target
  - For each NP, check agreement with target
- Repeat on earlier sentences until matching NP found

Hobb's Algorithm Example





Machine Learning Approach

- Preprocessing
- Mention Detection
- Coreference

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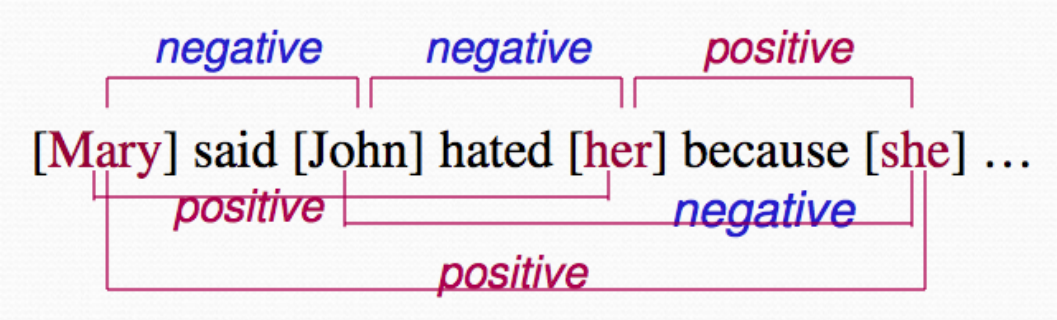
Not-so-trivial: extract the mentions (pronouns, names, nominals, nested NPs): Some researchers reported results on gold mentions, not system mentions

Machine Learning: Pairwise

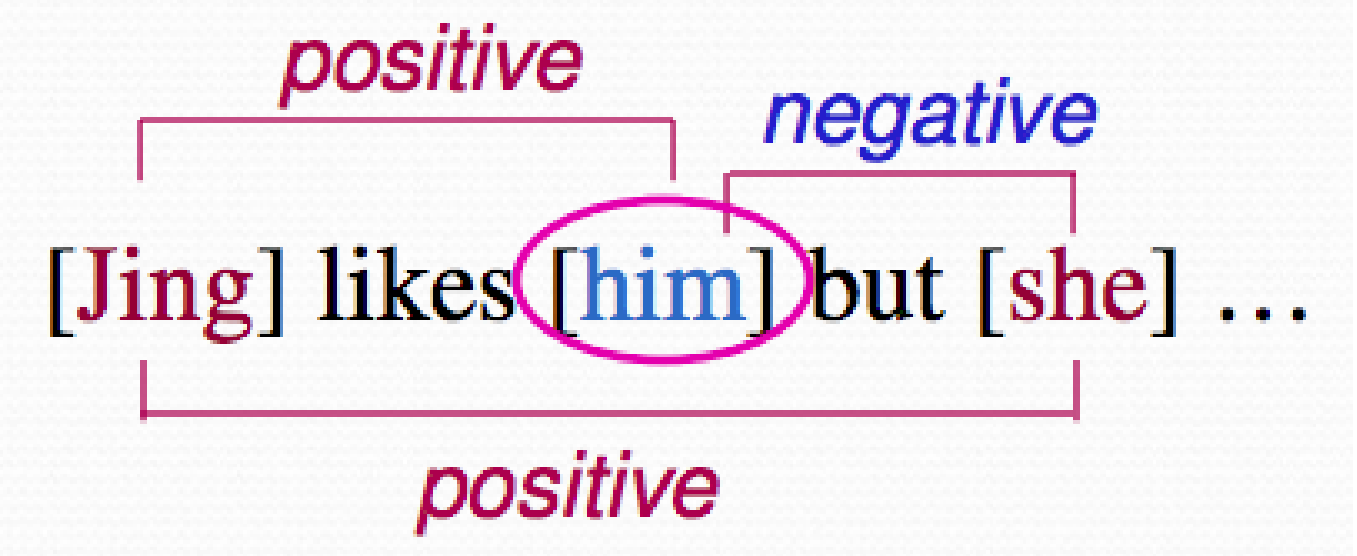


Features:

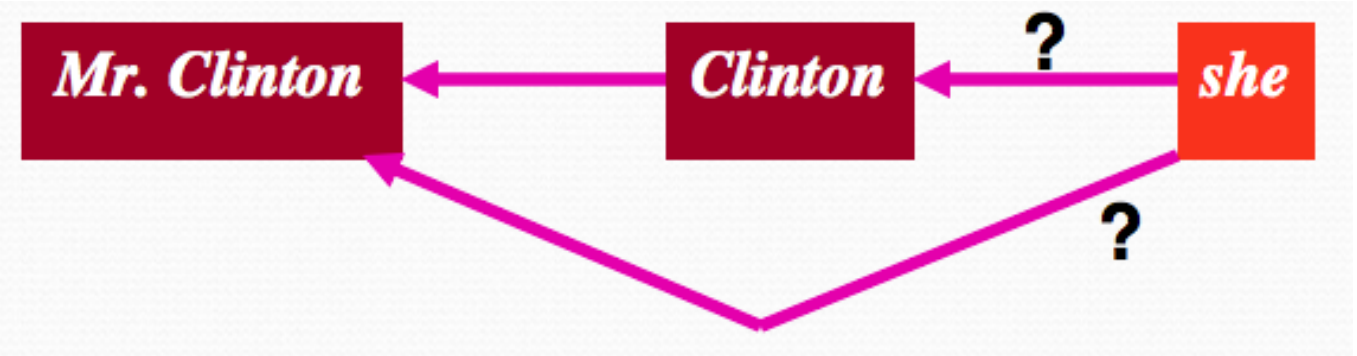
- Exact string: are m_i and m_j same after determiners removed
- Grammatical: gender and number agreement
- Semantic: class agreement (country/company)
- Positional: distance between the two mentions

Problems

- Conflicts



- Constraints



More Advanced Coreference

- Anaphoric classifier
- Rank mentions
- Cluster assignment
- Pipeline approach

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- Pipeline approach (Hand-crafted?)

More Advanced Coreference

- Anaphoric classifier
- Rank mentions
- Cluster assignment
- Pipeline approach

Harder to evaluate!

Possible Projects

- Improve QA (find mentions of candidate answers in Wikipedia)
- Use world knowledge to improve coref
- Better features / representations