



CSCI 544, Lecture 18: Reference, Generation, Summarization

Ron Artstein

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These notes are not comprehensive, and do not cover the entire lecture. They are provided as an aid to students, but are not a replacement for attending class, participating in the discussion, and taking notes. Any distribution, posting or publication of these notes outside of class (for example, on a public web site) requires my prior approval.

Administrative notes



Coding Assignment 3 grading in progress

- 88% auto-graded; working on reaining 12%

Coding Assignment 4 due today

- Will be extended till end-of-day: submit working code!
- Late deadline (with penalty) will be extended

Presentation:

Due Date	Task
October 27	Presentation slides
November 1–10	Presentations

Project:

Due Date	Task
November 3	Project status report
Nov 29/Dec 1	Poster presentations (in class)
December 1	Final report
December 3	Self-evaluation and peer grading

Reference (resolution)



Also known as co-reference, anaphora

Identify which expressions refer to the same things

- **mention:** a referring expression (“markable”)
- **entity:** a set of mentions

Common operationalization

- Identify mentions
- Group them into entities

But there are more complex situations

Also, expressions may refer to events

Anaphoric ambiguity



Poesio and Artstein, ACL workshop 2005

18.1 S:

18.6 it turns out that the boxcar at Elmira

18.7 has a bad wheel

18.8 and they're .. gonna start

fixing that at midnight

18.9 but it won't be ready until 8

19.1 M: oh what a pain in the butt

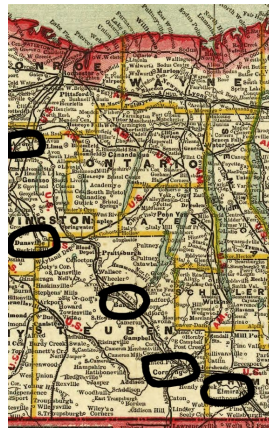
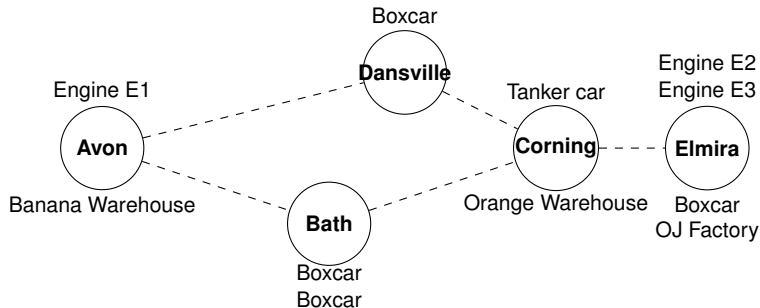
Experiment setup

18 naïve subjects (annotators)

Dialogue 3.2 from the TRAINS 91 corpus

MMAX 2 annotation tool

Map of the “TRAINS world”



Annotation scheme



- Each NP marked with one of four attributes:
 - Place** one of Avon, Bath, Corning, Dansville, Elmira
= nominal attribute
 - Phrase** previously mentioned object
= pointer(s) to previous markable(s)
 - Segment** previously discussed plan, event or action
= pointer(s) to previous turn(s)
 - None** novel object, non-referential NP
= nominal attribute
- Subjects instructed to use multiple pointers for cases of ambiguity

Agreement between annotators



19.10: we need to get the bananas to Corning by 3

19.11: uh

19.12: **maybe** it's gonna be faster if we

19.13: send E1

19.14: E1's boxcar picks up at Dansville

19.15: instead of going back to Avon

19.16: have it go on to Corning

19.17: uh pick up the tanker get the oranges send them to Elmira

19.18: cause that's gonna be the longest thing

Agreement between annotators



19.10: we need to get the bananas to Corning by 3

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19.12: **maybe** it's gonna be faster if we

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Key: Full agreement

Agreement between annotators



19.10: we need to get the bananas to Corning by 3

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Key: Full agreement One outlier

Agreement between annotators



19.10: we need to get the bananas to Corning by 3

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Key: Full agreement One outlier Implicit

Agreement between annotators



19.10: we need to get the bananas to Corning by 3

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Key: Full agreement One outlier Implicit Explicit

Implicit ambiguity



Ambiguity not always noticed by all the coders.

1.4 M: first thing I'd like you to do

1.5 is send engine E2 off with a boxcar to Corning
to pick up oranges

1.6 uh as soon as possible

2.1 S: okay [6 sec]

3.1 M: and while it's there it should pick up the tanker

Reference of it: a boxcar	3 coders
engine E2	6 coders
ambiguous	9 coders

Marking segment antecedents



Artstein and Poesio, Semdial 2006

All non-temporal NPs are markables on the **phrase** level.

Antecedents of discourse deixis are markables on the **segment** level.

S: if we took [the engine from Avon]
M: +to Bath+ apparently
S: if we took [it] to Bath
[that] would take 8 hours

Segments are arbitrary regions of text defined by the annotators.

Fine-grained marking



M: so
essentially we have to
... again get [the boxcar]
and [engine]
to Corning
so [the fastest way to do [that]] is from Elmira
so we 'll do [that]

M: so
essentially we have to
... again get [the boxcar]
and [engine]
to Corning
so [the fastest way to do [that]] is from Elmira
so we 'll do [that]

Variability in annotation (noise)



70.1 S: okay which
70.2 : ah well at the moment
70.3 : the plan is to have the .. engine E1
70.4 : is gonna take the boxcar from Dansville
71.1 M: right
72.2 S: so
72.3 : if we wanna keep **that** then we'd have to have
72.4 : engine E2 pick up the boxcar from Bath

that → 2 1 1 9 2 new:1 non-referential:3

Overlapping segments



3.3–3.5 : ... again get the boxcar and engine to Corning

3.6 : so the fastest way to do that is from Elmira

3.7 : so we'll do that

:

7.3 : so we ship one

7.4 : boxcar

7.5 : of oranges to Elmira

7.6 : and **that** takes another 2 hours

that → 1 3 2 3 1



Creation of new texts

- Examples: translation; image captioning
- Typically based on some input
- Somewhat removed from input

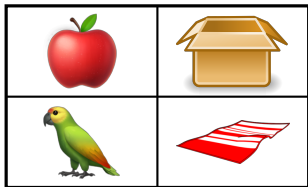
Common paradigm: neural language model decoding

Other approaches: template, syntax-based, etc.

Generating the best referring expression



Visual world paradigm

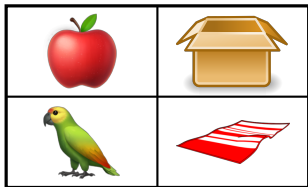


put the apple on the towel
put the apple in the box

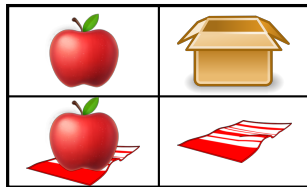
Generating the best referring expression



Visual world paradigm



put the apple on the towel
put the apple in the box



put the apple on the towel in the box



Extractive

- Most important sentences in a document
- Most important words/phrases in a sentence

Abstractive

- Generate new paragraph/sentence based on existing document/sentence

Unsupervised extractive document summarization:

- Yihong Gong and Xin Liu. Generic Text Summarization Using Relevance Measure and Latent Semantic Analysis. SIGIR Proceedings, September 2001
- Josef Steinberger and Karel Ježek. Text Summarization and Singular Value Decomposition. Advances in Information Systems, 2004



ROUGE: Recall-Oriented Understudy for Gisting Evaluation

- N-gram based similarity to reference summaries
- Inspired by BLEU (Machine Translation)
- Oriented towards recall rather than precision

Why is recall more important for summarization?



What is NLP?

- **Computational modeling of human language**
- Learn to think about the language in the problem
 - Learn from related fields
- Think about insights to achieve the goal
- Critically examine the evaluation methods
- More than chasing performance metrics