

cort: Analyzing and Visualizing Coreference Resolution Errors

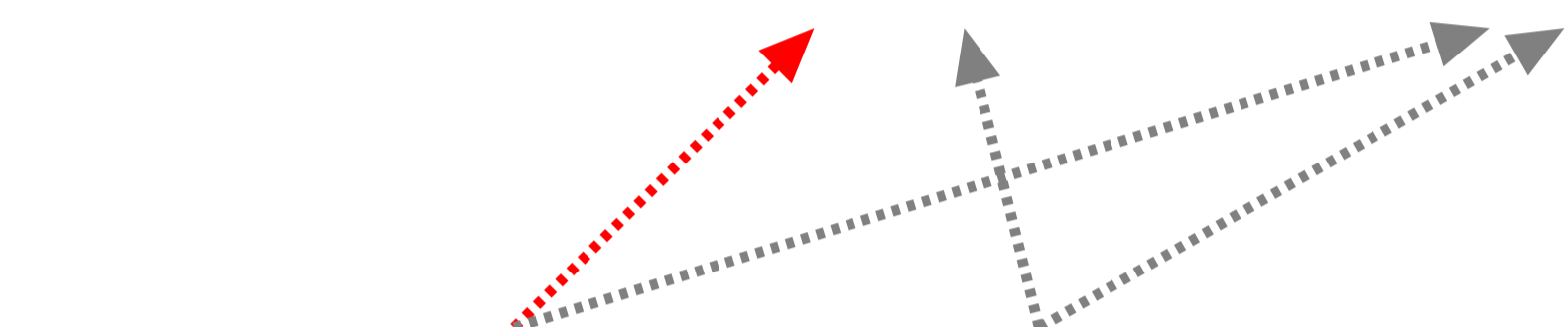
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Aim and Motivation

- ▶ coreference resolution is an important and complex task
- ▶ provide toolkit for error analysis and visualization: facilitates research and system engineering

After the discussion, **Obama** confirmed **he** will return.

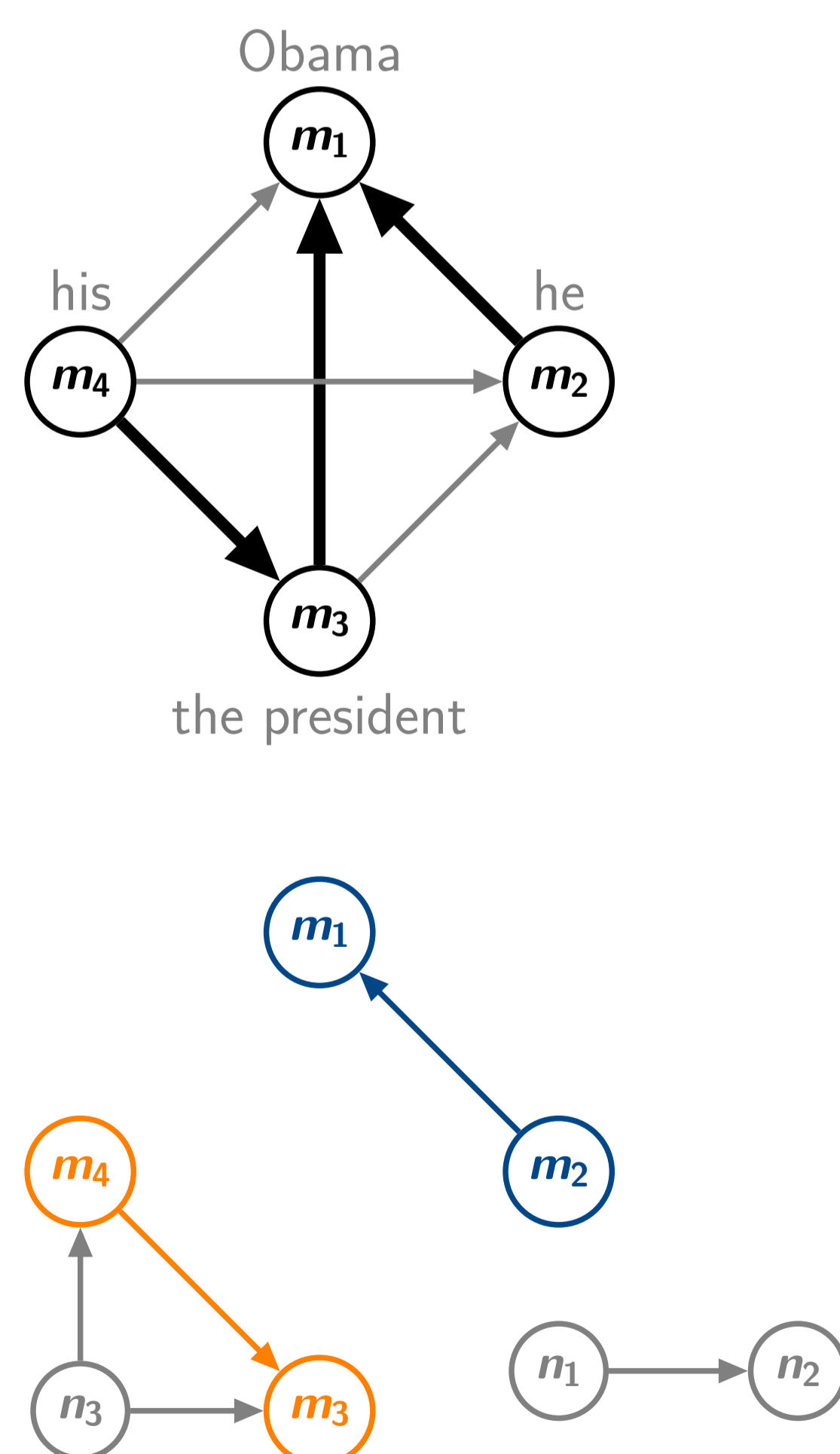


Then **the president** and **his** bodyguards left.



Method

- ▶ implement framework of **Martschat and Strube (2014)**
- ▶ for recall errors, compare **reference entity spanning trees** with partition by system entities
- ▶ for precision errors, switch roles of reference and system



Features

Manage output on data following the CoNLL format:

```
ref = Corpus.from_file("ref", open("ref.conll"))
ex = ErrorExtractor(ref, recall_accessibility,
                   precision_system_output)

pair = Corpus.from_file("pair", open("pair.conll"))
pair.read_antecedents(open("pair.antecedents"))
tree = Corpus.from_file("tree", open("tree.conll"))

ex.add_system(pair)
ex.add_system(tree)
errors = ex.get_errors()
```

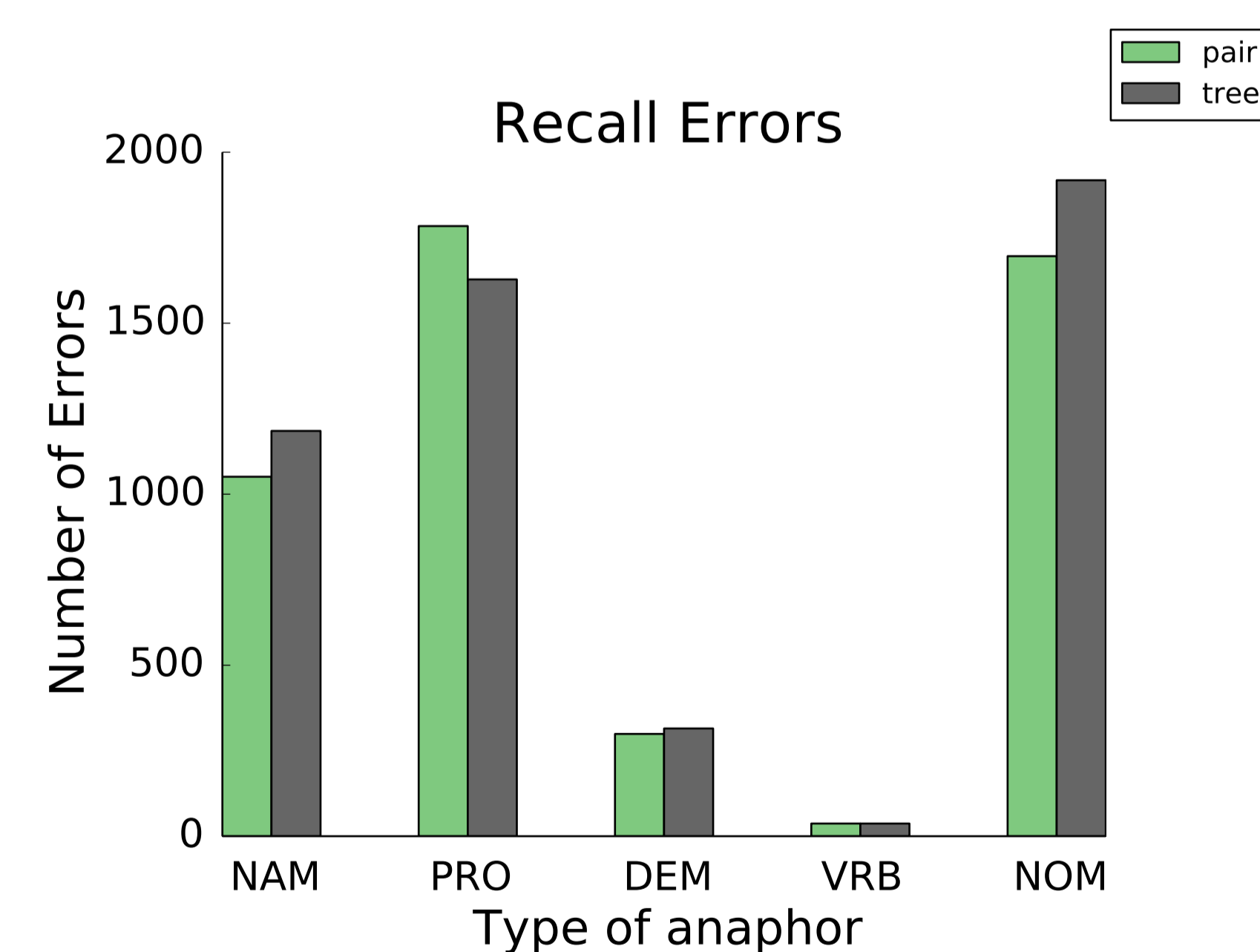
Filter and categorize sets of errors:

```
close = errors.filter(lambda e: e[0].attributes["sentence_id"]
                        - e[1].attributes["sentence_id"] <= 3)

close = close.categorize(lambda e: e[0].attributes["type"])
```

Plot error statistics:

```
plot([("pair", [(cat, len(errs)) for cat, errs in
                close["pair"]["recall_errors"]["all"].items()]),
      ("tree", [(cat, len(errs)) for cat, errs in
                close["tree"]["recall_errors"]["all"].items()]),
      "Recall Errors", "Type of anaphor", "Number of Errors")])
```



Visualize and browse errors:

```
close.visualize("pair")
```

cort visualization: wsj_0174_part_000

Documents

wsj_0174_part_000
wsj_2278_part_000
wsj_2400_part_000
wsj_2401_part_000
wsj_2402_part_000
wsj_2403_part_000

Errors (45)

Precision (16)

NAM: 5
NOM: 10
PRO: 1

Recall (29)

NAM: 6
NOM: 21
PRO: 2

Reference Entities

ORTEGA
truce
Contras
elections
suspended
Bush
White House

System Entities

ORTEGA
Contras

- ORTEGA ENDED a truce with **the Contras** and said elections were threatened .
- The Nicaraguan president , citing attacks by **the U.S. - backed rebels** , suspended a 19 - month - old cease - fire and accused Bush of `` promoting death . "
- While he reaffirmed support for the country's Feb. 25 elections , Ortega indicated that renewed U.S. military aid to **the Contras** could thwart the balloting .
- He said U.S. assistance should be used to demobilize **the rebels** .
- A White House spokesman **Recall** the truce suspension as `` deplorable " but brushed off talk of renewing military funding for **the insurgents** .
- The **Contra** military command , in a statement from Honduras , said Sandin **Recall** ops had launched a major offensive against **the rebel forces** .
- East German leader Krenz called the protests in his country a `` good sign , " saying that many of those marching for democratic freedoms were showing support for `` the renovation for socialism . "
- The Communist Party chief , in Moscow for talks with Soviet officials , also said East Germany would follow Gorbachev 's restructuring plans .
- Thousands of East Germans fled to Czechoslovakia after the East Berlin government lifted travel restrictions .

Train and run simple, well-performing coreference resolution systems:

- ▶ mention pair model trained via a perceptron
- ▶ customizable with respect to features, instance extraction, decoding and clustering
- ▶ command-line tools cort-train and cort-predict

Obtaining cort

- ▶ Python 2/3 library, available at PyPi: **pip install cort**
- ▶ source code at <http://github.com/smartschat/cort>

Conclusions and Future Work

- ▶ toolkit with rich analysis and visualization components
- ▶ ACL'15 demo: structured prediction for coreference resolution