

Temporal Relation Extraction from Medical Discharge Summaries

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Task Overview

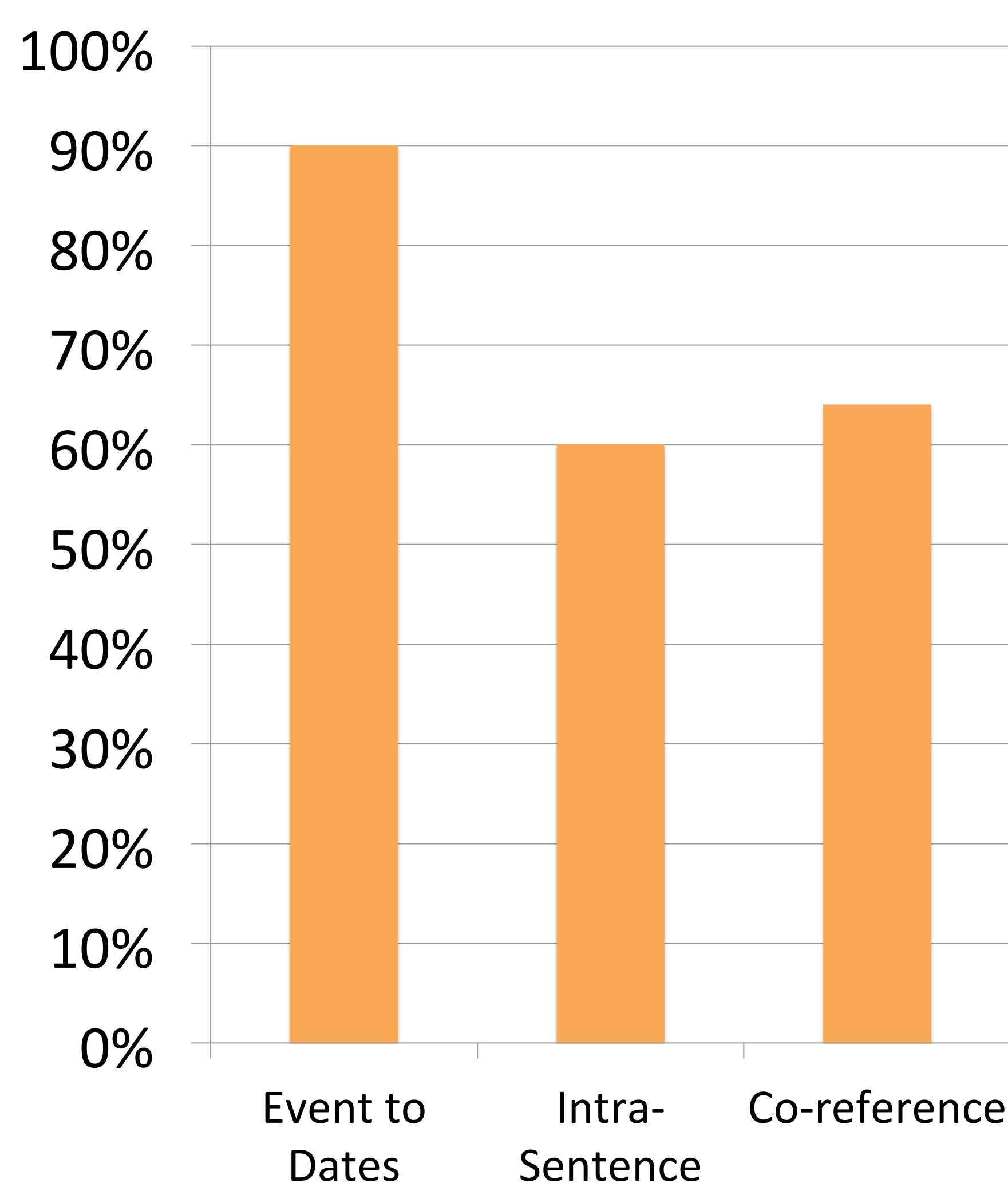
Problem description: In this work, we discover temporal relations in 190 patient discharge summaries. We use pre-specified temporal events (such as medications, diagnosis and symptoms) and temporal markers (such as admission date and discharge date) for discovering these relations. For any two given events, we provided a relation marker for “**before**”, “**after**”, “**overlap**” or “**none**”.

Approach: We developed three independent systems to capture different types of temporal relations expressed in text. These relations were:

- Linking events to dates
- Linking events within a sentence
- Linking events co-referential with each other across sentences

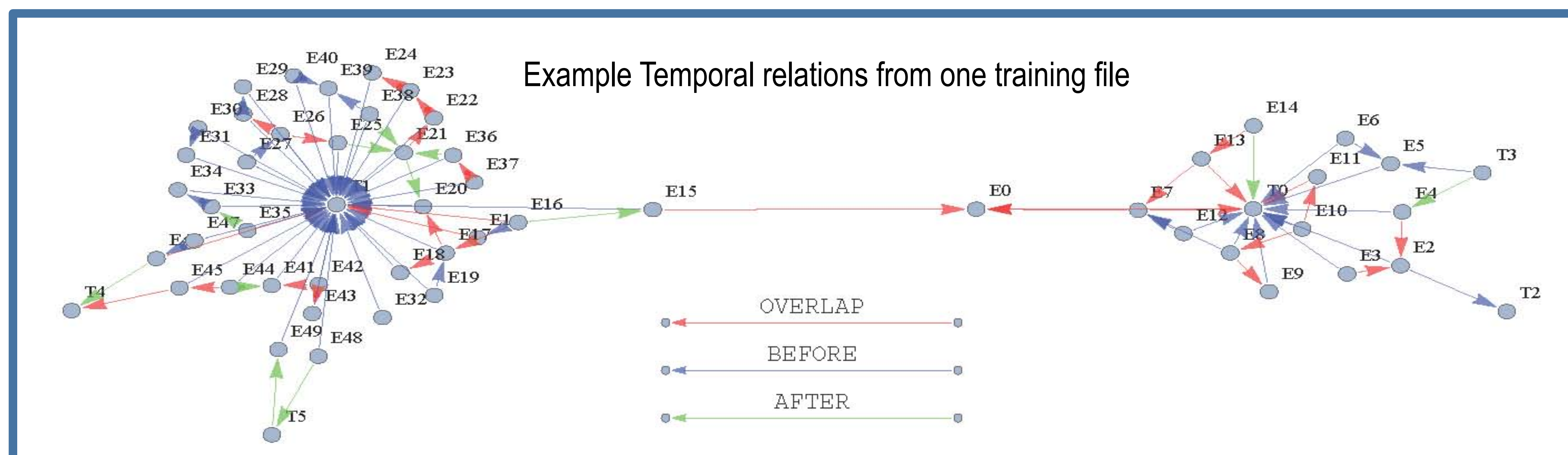
Details of each component are provided in the column on the right.

Results: Each of the three parts of our system classified a subset of the potential temporal relations in the document. The precision for each system on the test set of 15 documents is shown in the accompanying table.



Approach and description of individual components

Temporal Graph



Event to Dates

- Linked events to admission and discharge date
- Events in the section **History of Present Illness** were usually before admission date
- Events in the section **Hospital Course** were usually before the discharge date
- Exceptions occurred if there were trigger words, such as “follow-up”, which mostly likely signaled a future event.
- Simple *rule based approach* was used

Admission Date : 02/10/1998
Discharge Date : 02/26/1998
HISTORY OF PRESENT ILLNESS :
The patient is a 69 year-old white gentleman who is status post a coronary artery bypass graft in 1985 with a large anterior septal myocardial infarction intraoperatively
HOSPITAL COURSE :
The patient was admitted to the Verg Medical Center.
Subsequent exercise treadmill test demonstrated no evidence of ischemia by EKG

Before

Intra-Sentence

- Linked events within the same sentence
- *Machine Learning* component was developed
- Features used:
 - polarity (positive or negative)
 - modality (factual or proposed)
 - POS tags
 - lexical items in the sentence
- Naïve Bayes Model (with delta=.1 smoothing) was used, which considered each feature occurrence as independent

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Overlap

Co-reference

- Linked co-referenced events between sentences
- Partial string matches were performed between events, and they were co-referenced based on degree of overlap
- Exceptions occurred where there were words such as “prior”, “another” and where the event referred to a different hospital or department
- *Rule-based system* was used

The patient had a CT scan when...
A follow up CT scan was scheduled after ...

No coreference

The patient had a CT scan when...
The CT scan showed...

Co-reference detected

References

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3. Zhou, L.; C. Friedman, C.; Parsons, S.; Hripcsak, G.; 2005, “System Architecture for Temporal Information Extraction, Representation and Reasoning in Clinical Narrative Reports” AMIA Annu Symp Proc. V.2005; 2005. PMC1560