Improving Event Coreference Resolution by Modeling Correlations between Event Coreference Chains and Document Topic Structures

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Introduction

We propose a holistic approach to identify coreference relations between event mentions by modeling:

- Correlations between the main event chains of a document with topic transition sentences.
- Inter-coreference chain correlations.
- Genre-specific distributional characteristics.
- Sub-event structure.

Key Observations

- Event mentions make the backbone of a document.
- Same events are repeated for:
  - describing a new aspect or further information of the event.
  - content organization purposes.
- Coreferent Event mentions are thus scarce and play a key role in achieving a coherent content structure.
- Coreferent Entity mentions, on the other hand, are often characterized by nearness.

Modeling Correlations

We model discourse level event-topic correlation structures by formulating ILP to:

- Encourage coreference links between event mentions (Main events) appearing in Topic Transition Sentences.
- Encourage linking more event mentions to a chain that has a large stretch (Global Chain).
- Encourage coreference links between event mentions in sentences that contain other known coreferent event mentions.
- Encourage more coreference links in initial sections of documents.
- Discourage initiating new coreference chain in later part of documents.
- Discourage coreference links between Subevents and other event mentions.

Results & Analysis


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Table 1: % of adjacent (event vs. entity) mention pairs based on the number of sentences between two mentions.

Table 2: Results for event coreference resolution systems on the KBP 2016 and 2017 corpus. Joint Learning results correspond to the result files evaluated in Lu and Ng, 2017.

- Discourse structure augmented model achieved superior performance compared to the local classifier based system across all the metrics.
- Specifically, MUC F1 score, evaluating the pairwise coreference link prediction, improved by over 28%.
- Discourse structure helps in linking lexically diverse coreferent event mentions.

Generalizability

- Structures agnostic to document-genre:
  - main event coreference chains have extended presence.
  - semantically correlated events co-occur.
- Distributional characteristics are genre-specific.
  - segment-wise distributional patterns may require alteration based on domain-specific knowledge.

Acknowledgement

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References