

Automatic Textprocessing

Michael Strube

michael.strube at h-its.org

January 23, 2019

Description

A text is more than a sequence of sentences. To understand a text, one needs to recognize how sentences are connected with each other and why they appear in a particular order. To capture the particular characteristics of text, we developed a range of methods in computational linguistics: local and global coherence models, anaphora and coreference resolution algorithms, methods for recognizing the rhetorical, the temporal, the causal and the argumentative structure of texts. In the module we first talk about linguistically well-founded classical models. Then we continue with more recent machine learning and graph based models before we turn to current neural models for text processing and understanding. The usefulness of such models can only be determined when they are integrated into applications. Hence the module will also deal with evaluating text processing algorithms within applications such as information extraction, machine translation, question answering, readability prediction, essay scoring, etc.

References

- Stede, Manfred (2012). *Discourse Processing*, Morgan & Claypool Publishers.

selected chapters from:

- Jurafsky, Daniel & James H. Martin (2008). *Speech and Language Processing*, 2nd ed. Upper Saddle River, N.J.: Prentice Hall.
- Bird, Steven, Ewan Klein & Edward Loper (2009). *Natural Language Processing with Python – Analyzing Text with the Natural Language Toolkit*. O’Reilly.

Journal Papers

- Webber, Bonnie, Markus Egg & Valia Kordoni (2012). Discourse structure and language technology. In *Natural Language Engineering*, 18(4), pp.437-490. (http://journals.cambridge.org/repo_A86UtBSJ)
- Kehler, Andrew, Laura Kertz, Hannah Rohde, & Jeffrey Elman (2008). Coherence and coreference revisited. *Journal of Semantics*, 25:1, pp. 1-44, 2008.

Dates, Topics

23.10.2018

Introduction, historical overview ...

(Stede, 2012; Webber et al., 2012; Webber & Joshi, 2012)

Introduction into discourse structure

(Grosz & Sidner, 1986; Morris & Hirst, 1991; Passonneau & Litman, 1997)

Introduction into local coherence analysis: Information status, coreference

(Hobbs, 1978; Prince, 1981; 1992; Lappin & Leass, 1994; Kennedy & Boguraev, 1996)

Introduction into centering

(Brennan et al., 1987; Grosz et al., 1995; Tetreault, 2001; Poesio et al., 2004)

30.10.2018

Cancelled, MS @ EMNLP

06.11.2018

Cancelled, MS @ AIPHES Retreat

13.11.2018

Local coherence: Information status

(Nissim et al., 2004; Nissim, 2006; Cahill & Riester, 2009; Riester et al., 2010; Riester & Baumann, 2011; Rahman & Ng, 2011a; Cahill & Riester, 2012; Markert et al., 2012; Eckart et al., 2012; Baumann & Riester, 2013; Hou, 2016)

The structure of documents in different genres

(Teufel & Moens, 2002; Power et al., 2003; Sporleder & Lapata, 2004; Graham et al., 2005; Filippova & Strube, 2006; Chung, 2009; Teufel et al., 2009; Liakata et al., 2010; 2012)

Document structure: Automatic summarization

(Liakata et al., 2012; Contractor et al., 2012; Liakata et al., 2013)

to be prepared: info status (Markert et al., 2012) or (Teufel & Moens, 2002, pp.409-424) or (Teufel et al., 2009)

20.11.2018

Cancelled, MS @ HITS GL Retreat

27.11.2018

Topic segmentation: Lexical chains – (Morris & Hirst, 1991; Barzilay & Elhadad, 1997; Hirst & St-Onge, 1998; Barzilay & Elhadad, 1999; Silber & McCoy, 2002; Galley et al., 2003; Stokes et al., 2004; Ye & Chua, 2006; Ye et al., 2007; Medelyan,

2007)

Topic-Segmentation: Distributional approaches

(Hearst, 1997; Beeferman et al., 1999; Reynar, 1999; Choi, 2000; Pevzner & Hearst, 2002)

Probabilistic models for topic segmentation

(Utiyama & Isahara, 2001; Eisenstein & Barzilay, 2008; Shafiei & Milios, 2008; Chen et al., 2009; Purver, 2011; Du et al., 2013; Simon et al., 2013)

to be prepared: (Barzilay & Elhadad, 1997) and (Galley et al., 2003) or (Du et al., 2013)

4.12.2018

Cancelled, MS @ HITS SAB Meeting

11.12.2018

Attention: MS @ HITS Shareholders Meeting

Modeling local coherence: Entity Grid with applications (information ordering, evaluating the quality of summaries)

(Barzilay & Lapata, 2008)

Modeling local coherence: Entity graph with applications (information ordering, evaluating the quality of summaries)

(Guinaudeau & Strube, 2013; Petersen et al., 2015)

Modeling local coherence: Neural models with applications

(Li & Hovy, 2014; Tien Nguyen & Joty, 2017; Li & Jurafsky, 2017; Joty et al., 2018; Mesgar & Strube, 2018)

Applications of local coherence models: Information ordering, evaluating the quality of summaries

(Karamanis et al., 2004; Barzilay & Lapata, 2005; Karamanis, 2007; Elsner et al., 2007; Filippova & Strube, 2007; Karamanis et al., 2009; Pitler et al., 2010; Elsner & Charniak, 2011; Lin et al., 2012; Li & Hovy, 2014)

Applications of local coherence models: Information retrieval

(Petersen et al., 2015)

Applications of local coherence models: Readability – (Higgins et al., 2004; Pitler & Nenkova, 2008; Feng et al., 2009; Wang et al., 2013; Mesgar & Strube, 2015; 2016; 2018)

Applications of local coherence models: Essay scoring – (Miltsakaki & Kukich, 2004; Burstein et al., 2010; Beigman Klebanov & Flor, 2013; Beigman Klebanov et al.,

2014; Somasundaran et al., 2014; Mesgar & Strube, 2018)

Applications of local coherence models: Coreference and coherence for automatic translation

(Hardmeier et al., 2013; 2015; Born et al., 2017; Jean et al., 2017)

to be prepared: (Barzilay & Lapata, 2008) and ((Tien Nguyen & Joty, 2017) or (Mesgar & Strube, 2018))

18.12.2018

Global coherence: Argumentation structure: *Marinco Möbius* – (Wachsmuth et al., 2017)

optional: (Reed & Long, 1998; Katzav & Reed, 2008; Stab & Gurevych, 2014; Peldszus & Stede, 2015a; 2015b; Habernal & Gurevych, 2017; Stab & Gurevych, 2017)

Global coherence: Rhetorical Structure Theory (RST)

(Marcu & Echihiabi, 2002; Carlson et al., 2003; Soricut & Marcu, 2003; duVerle & Prendinger, 2009; Subba & Di Eugenio, 2009; Hernault et al., 2012; Feng & Hirst, 2012; Ji & Eisenstein, 2014)

Global coherence: *Penn Discourse Treebank*

(Prasad et al., 2008; Pitler & Nenkova, 2009a; 2009b; Lin et al., 2009; 2010; 2011; Ghosh et al., 2012; Lin et al., 2014; Prasad et al., 2014; Ji et al., 2015; Xue et al., 2016; Mihailov & Frank, 2016)

Global coherence: Applications (automatic summarization, sentiment analysis)

(Marcu, 1997; Maslennikov & Chua, 2007; Clarke & Lapata, 2010; Zirn et al., 2011; Bhatia et al., 2015)

to be prepared: Download <http://argumentation.bplaced.net/arguana-data/dagstuhl-15512-argquality-corpus-v2.zip>, unzip, read the annotation manual [dagstuhl-15512-argquality-corpus-guidelines.pdf](#); choose 3 debates from the directory [dagstuhl-15512-argquality-corpus-source](#) and annotate them (or parts of them) according to the guidelines; send me the annotations and your observations during the annotation process

08.01.2019

Local coherence: Rule-based system for coreference resolution: (Raghunathan et al., 2010; Lee et al., 2011; 2013)

Local coherence: Machine learning for coreference resolution: (Soon et al., 2001; Ng & Cardie, 2002; Yang et al., 2008; Ng, 2008; 2010; Fernandes et al., 2012; Durrett & Klein, 2013; Fernandes et al., 2014; Martschat & Strube, 2015)

to be prepared: (Lee et al., 2013) and (Durrett & Klein, 2013) – compare the two approaches; which one might work better in an another genre, in another domain?

15.01.2019

Local coherence: Deep learning for coreference resolution: (Clark & Manning, 2015; Wiseman et al., 2015; 2016; Clark & Manning, 2016b; 2016a; Lee et al., 2017; Kundu et al., 2018; Zhang et al., 2018)

Local coherence: Critique on coreference resolution systems – (Moosavi & Strube, 2017; 2018)

Local coherence: Coreference resolution in other languages, multilingual coreference resolution – (Luo & Zitouni, 2005; Recasens & Martí, 2009; Chen & Ng, 2013; Kong & Ng, 2013; Martins, 2015)

Local coherence: Error analysis for coreference resolution – (Uryupina, 2008; Kummerfeld & Klein, 2013; Martschat & Strube, 2014)

Local coherence: Evaluating coreference resolution algorithms
(Vilain et al., 1995; Bagga & Baldwin, 1998; Popescu-Belis, 2003; Luo & Zitouni, 2005; Recasens & Hovy, 2011; Pradhan et al., 2014; Tuggener, 2014; Moosavi & Strube, 2016)

to be prepared: ((Clark & Manning, 2016b) or (Lee et al., 2017)) and (Moosavi & Strube, 2017)

22.01.2019

Change of Plans!

Local coherence: Coreference resolution in other languages, multilingual coreference resolution: *Tommy S. Kroh* – (Recasens & Martí, 2009)
optional: (Luo & Zitouni, 2005; Chen & Ng, 2013; Kong & Ng, 2013; Martins, 2015)

Bias in coreference resolution: *Rebecca Wilm* – (Zhao et al., 2018)
optional: (Rudinger et al., 2018; Webster et al., 2018)

Local coherence: Bridging
(Clark, 1975; Hahn et al., 1996; Poesio et al., 1997; Vieira & Teufel, 1997; Vieira & Poesio, 2000; Bunescu, 2003; Fan et al., 2005; Lassalle & Denis, 2011; Hou et al., 2013b; 2013a; Rösiger & Teufel, 2014; Hou et al., 2014; 2018; Hou, 2018b; 2018a)

Local coherence: Event coreference resolution
(Bejan & Harabagiu, 2010; Chen & Ji, 2009; Chen et al., 2010b; 2010a; Goyal et al., 2013)

29.01.2019

Cancelled, MS @ FAT*/AAAI

05.02.2019

Cancelled, MS @ AIPHES Review

12.02.2019

Extra Session: Meeting Room at HITS/Mathematikon

Discussion about the whole term on different aspects of discourse

Optional:

Hierarchical topic segmentation

(Grosz & Sidner, 1986; Hsueh et al., 2006; Eisenstein, 2009; Carroll, 2010)

Applications of topic segmentation: Automatic summarization

(Goldstein et al., 2000; Teufel & Moens, 2002; Narayanan & Harabagiu, 2004; Stokes et al., 2004)

Global coherence: Temporal structure

(Lapata & Lascarides, 2004; 2006; Ng et al., 2013)

Introduction into global coherence analysis

(Hobbs, 1979; 1985; Mann & Thompson, 1988; Knott & Dale, 1994; Webber & Joshi, 1998; Kehler et al., 2008; Webber et al., 2012)

Further Remarks:

Assessment:

1. For each class read the material marked in the schedule as *to be prepared*. Formulate two questions about the material and send them to me via email until the Monday before the class, 1pm at the latest. Participate actively in the class (important!).
2. After each class write a review (approx. one page) about one of the papers presented. A review consists of a concise summary, a critique of the research being presented, and, if possible, remarks for improvement.
3. Choose a topic in the schedule you want to present in class. Select one or more papers from the reading list. Present this work in the class (30 minutes presentation, 15 minutes discussion).
4. Write a report/an essay towards the end of the term either about the topic you presented in class or about a new topic (6LP: 8-10 pages; 8LP: 12-15 pages)). Or: Implement a discourse processing algorithm, evaluate it in comparison to a baseline, and write a very short report (3-4 pages) about it.

Literature: Most papers can be downloaded from the *ACL Anthology* (<http://acl.ldc.upenn.edu/>), in particular all papers presented at (*E/NA*)*ACL*, *Coling* and *EMNLP* conferences, all workshops organized during these conferences and the journals *TACL* and *Computational Linguistics*. Papers published through *AAAI* (*AAAI* conference, *AAAI* workshops, *AAAI* symposia, etc.) are available through the *AAAI Digital Library* verfügbar (<http://www.aaai.org/Library>). – Other journals are available electronically at the university library (<https://www.ub.uni-heidelberg.de/>, <http://rzblx1.uni-regensburg.de/ezeit/search.phtml?bibid=UBHE&colors=3&lang=de>).

Office hours: Right after class or in my office at HITS (<https://www.h-its.org/en/>).

References

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- Baumann, Stefan & Arndt Riester (2013). Coreference, lexical givenness and prosody in German. *Lingua*, 136:16–37.
- Beeferman, Doug, Adam L. Berger & John Lafferty (1999). Statistical models for text segmentation. *Machine Learning*, 34:177–210.
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