DISCOURSE

From Modeling *of* Discourse to Modeling *with* Discourse
and the First Visit to Argument Mining

CS 3730 Class discussion

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Discourse analysis

- "*not only study language use **'beyond the sentence boundary'**, but also prefer to analyze **'naturally occurring'** language use, and not invented examples*" [Wikipedia]

- Not only linguistics
  - Applied linguistics, pragmatics, rhetoric

- But also sociolinguistics
  - Interactional sociolinguistics, code-switching, variation analysis
  - From the course I took: *how your language use reveals your identity*

Today's discussion

- Modeling of Discourse
  - A Weakly-supervised Approach to AZ (2011)

- Modeling with Discourse
  - Predicting the Presence of Discourse Connectives (2013)
  - Exploiting DA for Article-Wide Temporal Classification (2013)

- Argument Mining
  - Classifying Arguments by Scheme (2011)

- Link them all

A WEAKLY-SUPERVISED APPROACH TO ARGUMENTATIVE ZONING OF SCIENTIFIC DOCUMENTS

Guo et al. EMNLP 2011

Classified

- Measurement paper
  - Following work of Guo et al. (2010)
  - Weakly supervised to address limited labeled data, model porting

- Data dom   ng to AZ
  - Guo et a

- Contribut

Our experiments show that weakly-supervised learning can be used to identify AZ in scientific documents with good accuracy when only a limited amount of labeled data is available. This is helpful thinking of the real-world application and porting of the approach to different tasks and domains. To the best of our knowledge, no previous work has been done on weakly-supervised learning of information structure according to schemes of the type we have focused on (Teufel and Moens, 2002; Mizuta et al., 2006; Lin et al., 2006; Hirohata et al., 2008; Shatkay et al., 2008; Liakata et al., 2010).

Which is more interesting

more similar to text segmentation. [Lingjia]

- The task
  - Identifying the Information Structure of Scientific Abstracts
  - According to AZ

borrowed from other researches. [Huichao]

[Need] a comprehensive study analysis. [Phuong]

- The techniques
  - Active SVM (2), Transductive SVM, Semi-supervised CRF
  - Future work

used only 10% of the [labeled] data [Wecan]

- The task is what matters and earns them publications

PREDICTING THE PRESENCE OF DISCOURSE CONNECTIVES

Patterson and Kehler EMNLP 2013

Classified

- Idea paper
  - Predicts the presence or omission of a lexical connective between two clauses
  - To yield fluid transitions between clauses

- Data domain
  - Penn Discourse Treebank

- Application domain
  - Natural language generation, summarization

PDTB (Super brief snapshot)

- ## Connectives and arguments
  - ### Explicit vs. implicit

- ## Senses
  - ### Organized hierarchically
  - ### 4-tag top level: temporal, contingency, comparison, expansion
  - ### Up to 3-level depth

TEMPORAL
- Asynchronous
- Synchronous
  - precedence
  - succession

CONTINGENCY
- Cause
  - reason
  - result
- *Pragmatic Cause*
  - *justification*
- Condition
  - hypothetical
  - general
  - unreal present
  - unreal past
  - factual present
  - factual past
- *Pragmatic Condition*
  - *relevance*
  - *implicit assertion*

COMPARISON
- Contrast
  - juxtaposition
  - opposition
- *Pragmatic Contrast*
- Concession
  - expectation
  - contra-expectation
- *Pragmatic Concession*

EXPANSION
- Conjunction
- Instantiation
- Restatement
  - specification
  - equivalence
  - generalization
- Alternative
  - conjunctive
  - disjunctive
  - chosen alternative
- Exception
- List
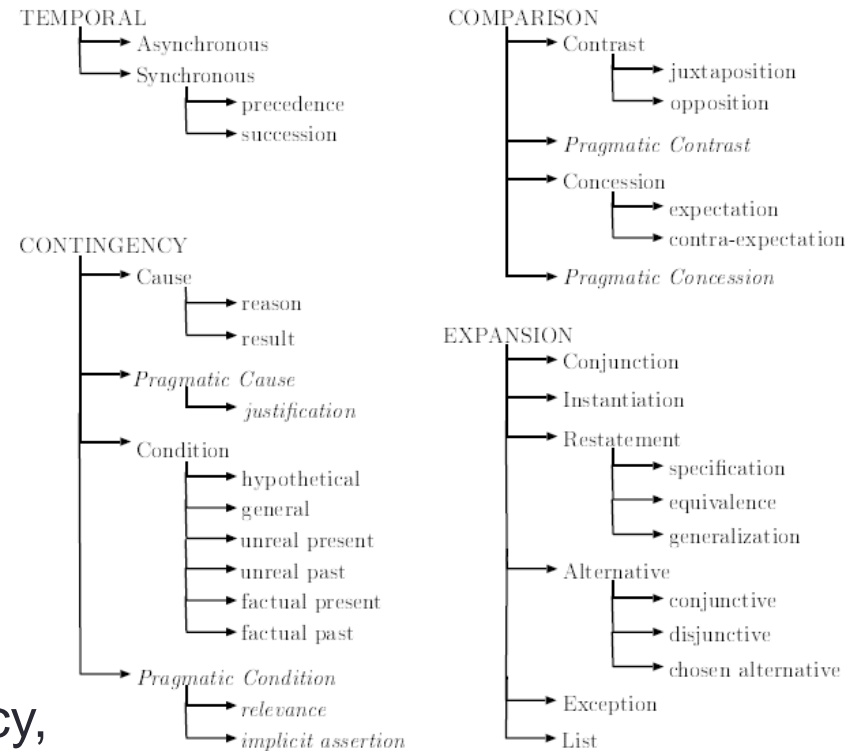
Figure 1: Hierarchy of sense tags

(7) *Use of dispersants was approved* <u>when</u> a test on the third day showed some positive results, officials said. (CONTINGENCY:Cause:reason) (1347)

(123) A Lorillard spokewoman said, "*This is an old story.* <u>Implicit = IN FACT</u> We're talking about years ago before anyone heard of asbestos having any questionable properties." (EXPANSION:Restatement:specification) (0003)

Difficulty of the problem

Your
Opinion
matters

- Presence or omission of connectives
  - Binary classification

just [considered] two adjacent arguments [Zahra]

- More challenging problems

multi-class classification [Fan]

detect the relation type between two clauses [Changsheng]

- Error analysis

interesting [Fataneh, Zahra]

cases where connectives are optional [Phuong]

Feasibility of the features

- Relation-level
  - *Connect*, *AttMismatch*, *Financial*

  How [Connect] was constructed? [Phuong]

- Argument-level
  - Supplementary, length, #clauses, content-word ratio, pronoun ratio, *FirstA2Pron*

- Discourse-level
  - Prior semantic type, relation dependency (shared/embedded),

  know the relation between two arguments and also the correct connectives [Zahra]

# EXPLOITING DISCOURSE ANALYSIS FOR ARTICLE-WIDE TEMPORAL CLASSIFICATION

Ng et al. EMNLP 2013

Classified

- Idea paper
  - Temporal relations between pairs of events beyond the sentence level
  - Exploit discourse structure and topic segmentation

- Data domain
  - Newswire articles from ACE 2005 corpus (cf. Do et al. 2012)

- Application domain
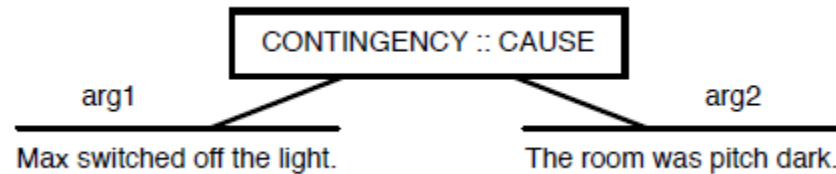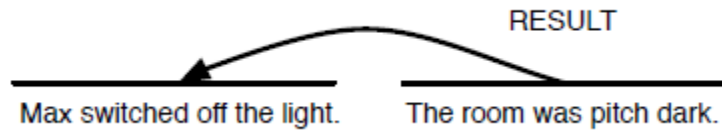 - Information extraction and text summarization, e.g. event timeline

RST discourse

- Originally developed as part of studies of computer-based text generation
- RST offers an explanation of the coherence of texts
  - An evident role for every part
- Nucleus::Satellite Relations
- Multinuclear Relations
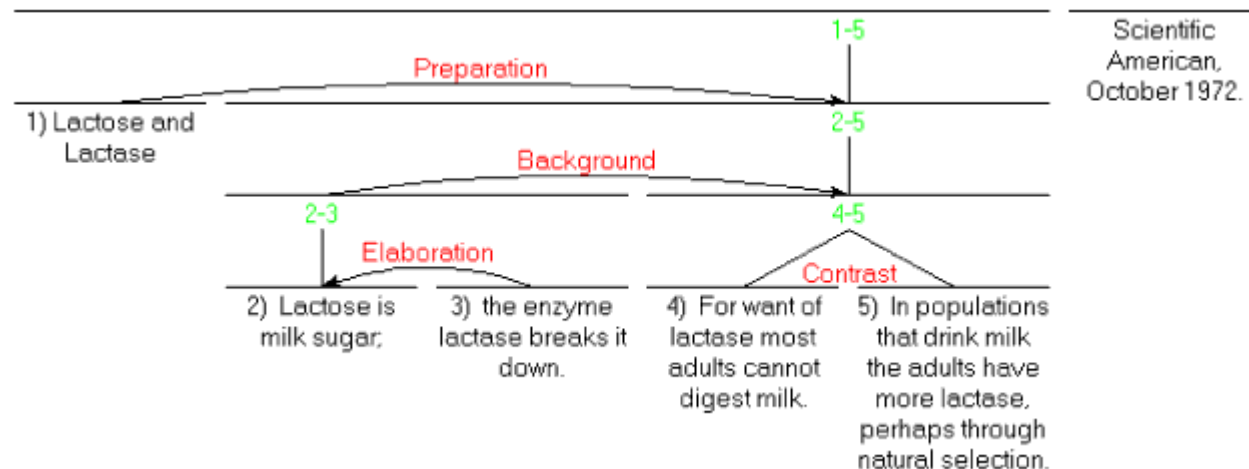
RST v. PDTB

learned a lot about discourse [Huma]

Making use of discourse

- RST discourse framework (by Feng and Hirst 2012)
- PDTB discourse relation (by Lin et al. 2013)
  - Path of relations connecting two events

transitivity property of temporal relationships [Changsheng]

Problem [of] the sparsity of temporal relations [Huichao]

Your Opinion matters

RST | PDTB

RST and PDTB Relations

■ AFTER ■ BEFORE ■ OVERLAP
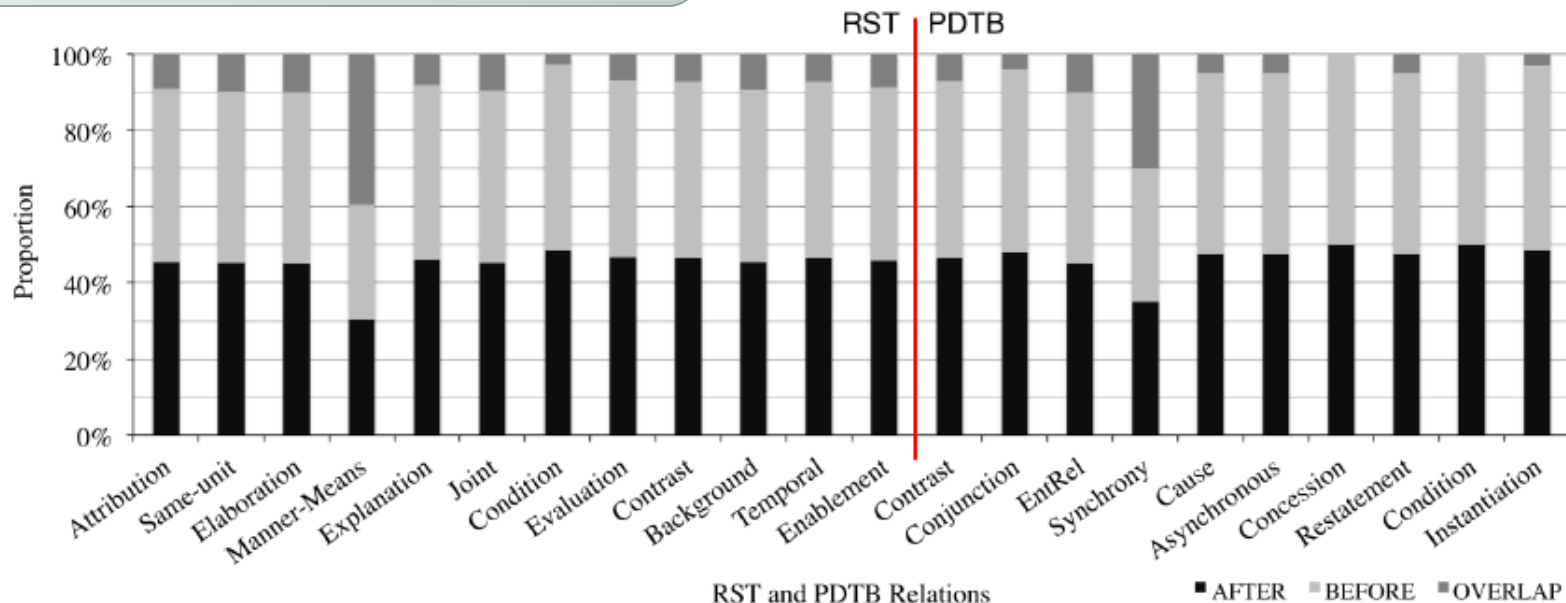
Making use of discourse(cont.)

Your Opinion matters

- Topical text segmentation (by Kazantseva and Szpakowicz 2011)
  - Index of segments

motivation behind using text segmentation [Zahra]

not that intuitive but effective [Fan]

CLASSIFYING ARGUMENTS BY SCHEME

Feng and Hirst ACL HLT 2011

Classified

- Idea/Measurement paper
  - Identify argumentation schemes to reconstruct the enthymemes in an argument (unstated/implicitly stated premises)

- Data domain
  - Araucaria dataset: annotated for conclusion, premises, scheme

- Application domain
  - Argument understanding, argument supporting/attacking

Sample annotated text in Araucaria

```xml
<SCHEME>
    <NAME> Argument from Consequences </NAME>
    <FORM>
        <PREMISE> If A is brought about, then good (bad) consequences will (may plausibly) occur </PREMISE>
        <CONCLUSION> A should (not) be brought about </CONCLUSION>
    </FORM>
    <CQ> How strong is the likelihood that these cited consequences will (may, must, etc.) occur? </CQ>
    <CQ> If A is brought about, will (or might) these consequences occur, and what evidence supports this claim? </
    <CQ> Are there consequences of the opposite value that should be taken into account? </CQ>
</SCHEME>

<TEXT>If we stop the free creation of art, we will stop the free viewing of art.</TEXT>
<AU>
    <PROP identifier="C" missing="yes">
        <PROPTEXT offset="-1"> The prohibition of the free creation of art should not be brought about.</PROPTEXT>
        <INSCHEME scheme="Argument from Consequences" schid="0" />
    </PROP>
    <LA>
        <AU>
            <PROP identifier="A" missing="no">
                <PROPTEXT offset="0"> If we stop the free creation of art, we will stop the free viewing of art.</
                <INSCHEME scheme="Argument from Consequences" schid="0" />
            </PROP>
        </AU>
        <AU>
            <PROP identifier="B" missing="yes">
                <PROPTEXT offset="-1"> The prohibition of free viewing of art is not acceptable.</PROPTEXT>
                <INSCHEME scheme="Argument from Consequences" schid="0" />
            </PROP>
        </AU>
    </LA>
</AU>
```

The three problems

- Premise/conclusion classifier

- Scheme classifier

  Not all schemes [Fataneh, Wecan]

- Infer enthymeme

  contracy type feature can be derived when all the premises are present [Huichao]

Discourse features

- Location-based features of conclusion/premises

- Type of argumentation structure: linked/convergent

- Cue words/phrases of different argument schemes

using words and/or rules would work well
[Phuong]

CONCLUSION

Link them all

- What we think of DA
  - Role of text blocks
    - Overall text for global roles (Guo et al. 2010, 2011)

  - Relation between text blocks
    - Adjacent segments for local relations
    - Semantic types (Feng and Hirst 2011)
    - Cue words/phrase (Madnani et al. 2012)

  - Layering discourse frameworks
    - Argumentative discourse (Feng and Hirst 2011)
    - Scientific discourse (Guo et al. 2010, 2011)

[Huichao]

Link them all (cont.)

- Where we see DA
  - Fluid transition in NLG (Patterson and Kehler 2013)
  - Temporal relation in article-wide (Ng et al. 2013)
  - Argument schemes (Feng and Hirst 2011)

- How we do DA
  - Pure likes RST, PDTB
    - Supervised, weakly supervised, rule-based
    - Lexical, syntactic, statistic features
    - In future: advanced ML techniques, sophisticate feature

  - Layered likes Argumentation schemes, Scientific discourse

[Lingjia]

Think of your research

How DA benefits your research? [Huy, Phuong]

Thank you!

- For all of your comments, participation

Recognition

Summary

Critique

Insight

Improvement

Problem