Part I

Frame Identification

FrameNet

- A frame describes prototypical events
- The participants are attached as frame elements, describing semantic roles
- Annotated data exists for English and German
- The lexical units of a frame describe how a frame can be realized in text

Frame Identification

The Task

1. Select appropriate candidate frames from a frame repository (i.e., FrameNet)
2. Disambiguate between them

Frame Identification

The Task

1. Select appropriate candidate frames from a frame repository (i.e., FrameNet)
2. Disambiguate between them

Example

- *[Up to 65 protesters] were reported to have been burned [to death] [. . .].* CAUSE_HARM
- *[Her flesh] burned [where he touched it].* PERCEPTION_BODY

How to . . . ?

- Take it as a classification task:
  classify candidates (e.g., verbs and nouns) into classes (Frames)

How to . . . ?

- Take it as a classification task:
  classify candidates (e.g., verbs and nouns) into classes (Frames)

Features

- Following Erk and Pado (2006)
  - Shallow: Word, POS, Lemma of a bag of words and/or window
  - Deeper: Object, Preposition of target verb
- Trying to take the detour (Burchardt et al. 2005)
  - Deep: Using WSD to identify the frame

Resources

- FrameNet (data and corpus), WordNet
- Detour
- UKB (for WSD)
- Weka

References

Collin F. Baker, Charles J. Fillmore, and John B. Lowe. The Berkeley FrameNet Project. In *Proceedings of the conference of the Association of Computational Linguistics (ACL)*, pages 86–90, Montreal, Canada, 1998.

Aljoscha Burchardt, Katrin Erk, and Anette Frank. A WordNet Detour to FrameNet. In B. Fisseni, H.-C. Schmitz, B. Schröder, and P. Wagner, editors, *Sprachtechnologie, mobile Kommunikation und linguistische Resourcen*, volume 8 of *Computer Studies in Language and Speech*, pages 408–421. Peter Lang, Frankfurt am Main, 2005.

Aljoscha Burchardt, Katrin Erk, Anette Frank, Andrea Kowalski, Sebastian Pado, and Manfred Pinkal. The SALSA Corpus: a German Corpus Resource for Lexical Semantics. In *Proceedings of LREC*, Genoa, Italy, 2006.

Katrin Erk and Sebastian Pado. Shalmaneser - a flexible toolbox for semantic role assignment. In *Proceedings of the Language Resources and Evaluation Conference (LREC)*, Genoa, Italy, 2006.

Part II

Semantic roles in discourse

FrameNet – again, but . . .

. . . focussing on semantic roles

- Frame elements represent semantic roles (e.g., *Agent*, *Buyer*, . . .)
- Sometimes, core (conceptually necessary) frame elements (like a *Buyer* in a *Commerce_buy*-frame) are not present in a sentence
- In FrameNet, they are marked as `Null Instantiated`, but . . .

FrameNet – again, but . . .

. . . focussing on semantic roles

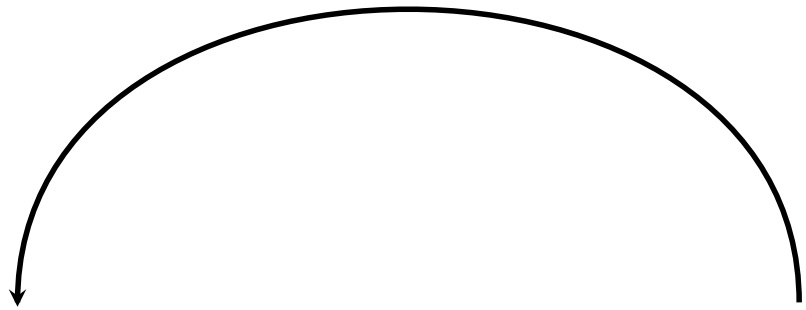
- Frame elements represent semantic roles (e.g., *Agent*, *Buyer*, . . .)
- Sometimes, core (conceptually necessary) frame elements (like a *Buyer* in a *Commerce_buy*-frame) are not present in a sentence
- In FrameNet, they are marked as `Null Instantiated`, but . . .
- . . . it seems reasonable, that they are present in the discourse

Roles in Discourse

Example

- *Our train to Oxford*$_{Goal}$ *departed at 2pm. We* <u>*arrived*</u> *at 8pm.* ARRIVING

Roles in Discourse



Example

- *Our train to Oxford$_{Goal}$ departed at 2pm. We arrived at 8pm.*
  ARRIVING

SemEval 2010 - Task 10

Task description (Ruppenhofer et al. 2009)

1. Recognize that a core role is missing
2. Ascertain that it should have a definite filler (Identify Definite Null Instantiations)
3. Find an antecedent for it (in the discourse)

The datasets

- Trial: 10 sentences in SalsaTigerXML (Erk and Pado 2004) for the development of the system
- Training: Will be released in October
- Test: Released in April
  (too late for the SWP; We need to split the training set)

How to . . . ?

?

How to . . . ?

?

- It's a shared task performed for the first time, so it's an open question
- If you have a good idea – go ahead!
- Otherwise, we have an idea . . .

One possible approach

- Take it as a classification problem
  1. Identify (definite) null instantiated frame elements (NIs)
  2. Identify candidates for the NIs (possible antecedents)
  3. Extract features, use a classifier

One possible approach

- Take it as a classification problem
  1. Identify (definite) null instantiated frame elements (NIs)
  2. Identify candidates for the NIs (possible antecedents)
  3. Extract features, use a classifier
- Possible features for the classifier
  - NIs: Semantic type, generalizations from FrameNet hierarchy, Syntactic context, coreference information, ...
  - Antecedents: Word sense, Syntactic context, Frame context, Coreference information, ...

Resources

- FrameNet, WordNet, corresponding APIs
- Coreference Resolution: BART
- Word Sense Disambiguation: UKB
- opt. Syntactic Parser: XLE, Stanford Parser or Berkeley Parser
- Shallow linguistic information: TreeTagger (POS, Lemmas)
- FrameNet Parser: Shalmaneser
- Classifier: Weka

References

Katrin Erk and Sebastian Pado. A powerful and versatile XML Format for representing role-semantic annotation. In *Proceedings of the Language Resources and Evaluation Conference (LREC)*, Lisbon, Portugal, 2004.

Simone Paolo Ponzetto and Michael Strube. Exploiting semantic role labeling, WordNet and Wikipedia for coreference resolution. In *Proceedings of the Human Language Technology Conference of the North American Chapter of the Association for Computational Linguistics,* New York, N.Y., 4–9 June 2006, pages 192–199, 2006.

Josef Ruppenhofer, Caroline Sporleder, Roser Morante, Collin Baker, and Martha Palmer. Semeval-2010 task 10: Linking events and their participants in discourse. In *Proceedings of the Workshop on Semantic Evaluations: Recent Achievements and Future Directions (SEW-2009)*, pages 106–111, Boulder, Colorado, June 2009. Association for Computational Linguistics.

Part III

Identifying Relation Patterns in Recipes

Recipes and Event chains

- Recipes describe event chains
- Event chain: Partially ordered set of events (temporally)
- Event: Action and participants ($\simeq$ a frame)
- Fixed set of participants in event chains

Recipes and Event chains

- Recipes describe event chains
- Event chain: Partially ordered set of events (temporally)
- Event: Action and participants ($\simeq$ a frame)
- Fixed set of participants in event chains

- Automatic extraction of event chains from recipe corpora
  $\Rightarrow$ Feed the cooking robot with data ☺

Recipes and Event chains

- Recipes describe event chains
- Event chain: Partially ordered set of events (temporally)
- Event: Action and participants ($\simeq$ a frame)
- Fixed set of participants in event chains

- Automatic extraction of event chains from recipe corpora
  $\Rightarrow$ Feed the cooking robot with data ☺
- Identification of common subsequences, replaceable ingredients and associated procedures

Example

Examples

1. *Sprinkle the meat with salt and pepper.*
   Recipe: Lamb Salad with Roasted Vegetables
2. *sprinkle the meat with a little cayenne.*
   Recipe: Stewed Rump of Beef

Example

Examples

1. *Sprinkle the meat with salt and pepper.*
   Recipe: Lamb Salad with Roasted Vegetables
2. *sprinkle the meat with a little cayenne.*
   Recipe: Stewed Rump of Beef

- `[meat(x1), sprinkle(x2), salt(x3), pepper(x3), event(x2), patient(x2,x1), with(x2,x3)]`
- `[meat(x1), sprinkle(x2), cayenne(x3), event(x2), patient(x2,x1), with(x2,x3)]`

Example

Examples

1. *Sprinkle the meat with salt and pepper.*
   Recipe: Lamb Salad with Roasted Vegetables
2. *sprinkle the meat with a little cayenne.*
   Recipe: Stewed Rump of Beef

- `[meat(x1), sprinkle(x2), salt(x3), pepper(x3), event(x2), patient(x2,x1), with(x2,x3)]`
- `[meat(x1), sprinkle(x2), cayenne(x3), event(x2), patient(x2,x1), with(x2,x3)]`
- `[meat(x1), sprinkle(x2), wn:flavorer(x3), event(x2), patient(x2, x1), with(x2, x3)]`

Semantic Representation

- Boxer (Bos 2008) produces DRSs for plain text
- Predicates need to be disambiguated w.r.t. WordNet
  - Heuristically, based on the domain

Variances and Similarities

- Chambers and Jurafsky (2009) propose a method to learn narrative chains, including semantic roles
- "Narrative Schemas" are based on the frequency, with which discourse referents are appearing as arguments for certain verbs
- Allows Identification of common sequences and predication of next action
- Originally used on raw dependency parses
  $\longrightarrow$ Adaption to the more preprocessed output from Boxer (e.g., semantic roles)

Resources

- C&C, Boxer
- WordNet
- Weka

References

Johan Bos. Wide-Coverage Semantic Analysis with Boxer. In Johan Bos and Rodolfo Delmonte, editors, *Semantics in Text Processing. STEP 2008 Conference Proceedings*, volume 1 of *Research in Computational Semantics*, pages 277–286. College Publications, 2008. URL `http://www.aclweb.org/anthology/W08-2222`.

Aljoscha Burchardt, Anette Frank, and Manfred Pinkal. Building Text Meaning Representations from Contextually Related Frames. In *Proceedings of IWCS*, 2006.

Nathanael Chambers and Dan Jurafsky. Unsupervised Learning of Narrative Event Chains. In *Proceedings of ACL-08: HLT*, pages 789–797, Columbus, Ohio, June 2008. Association for Computational Linguistics.

Nathanael Chambers and Dan Jurafsky. Unsupervised learning of narrative schemas and their participants. In *Proceedings of the Joint Conference of the 47th Annual Meeting of the ACL and the 4th International Joint Conference on Natural Language Processing of the AFNLP*, pages 602–610, Suntec, Singapore,