Rudolf Rosa
rosa@ufal.mff.cuni.cz

Using a Collection of Many Treebanks for Exploring the Structure of Natural Language Sentences

Charles University in Prague
Faculty of Mathematics and Physics
Institute of Formal and Applied Linguistics

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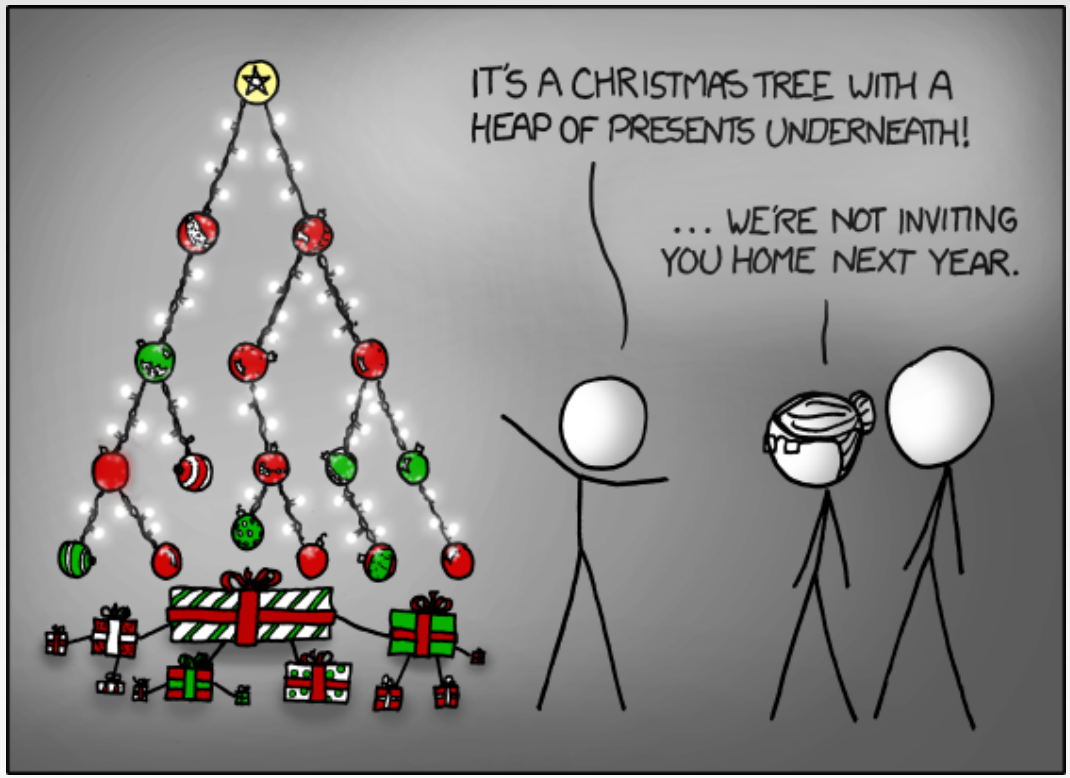
The questions

- Are trees good?
  - as a representation of sentence syntactic structure
- If no...
  - ...what is?
- If yes...
  - ...which ones?
  - ...how to get them?



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  - ...how to get them? *semi-supervised parsing?*

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The answers?

- Are trees good?
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- If no...
  - ...what is?
- If yes...
  - 2 ...which ones? *as in treebanks? harmonized?*
  - 1 ...how to get them? *semi-supervised parsing?*

The answers?

- Are trees good?
  - as a representation of sentence syntactic structure
- If no...
3. ...what is? *some fuzzier structures?*
- If yes...
2. ...which ones? *as in treebanks? harmonized?*
1. ...how to get them? *semi-supervised parsing?*

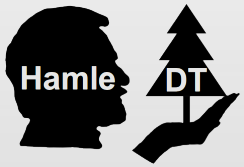
Supervised parsing is limited

- take a treebank (TB) and train a parser on it
- HamleDT
  - collection of **30** TBs
    - ar, eu, bn, bg, ca, cs, da, nl, en, et, fi, de, el, grc, hi, hu, it, ja, la, fa, pt, ro, ru, sk, sl, es, sv, ta, te, tr
  - some TBs small or low quality...
- there are about **7000** languages!
  - plus various types (e.g. speech)
  - annotating TBs is costly

Semi-supervised techniques

- e.g. we have an English TB, but no Punjabi TB
- delexicalized parsing (no words, just tags)
  - train a delexicalized parser on EN TB
  - apply to PA text (there is a PA tagger)
- parse tree projection
  - train a full parser on EN TB
  - take parallel PA-EN text (can use SMT)
  - parse the EN side
  - project the tree through word-alignment to PA side

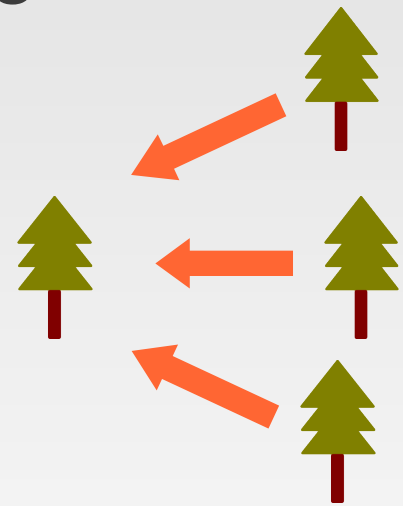
Harmonization of trees and tags

- HamleDT (ÚFAL) 

  - PDT-like trees, tags converted to Interset
- Universal Dependency Treebanks (Google)
  - Universal Stanford Dependencies, Universal POS
- 1 style fits all? 1 style for a language family?
- how to evaluate the style fitness? (**unsolved**)
  - parser-friendliness (achievable parsing accuracy)?
  - extrinsic evaluation (e.g. in Depfix post-editing)?

My plan: Multisource projection

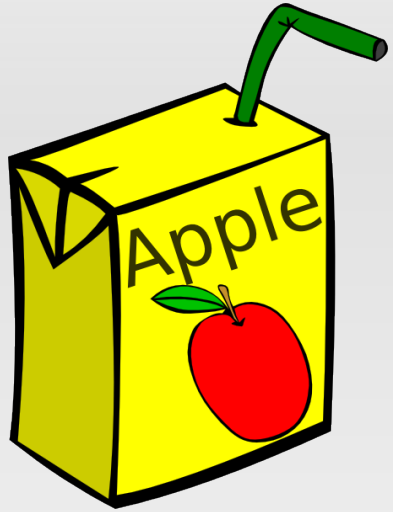
- translate the (Punjabi) text into the 30 languages
- parse each of them by a supervised parser
- each potential edge in (PA) tree gets a score
  - number of trees that confirm it?
  - or sum of scores assigned to it by the parsers?
    - normalized, weighted by language similarity...?



- find the parse tree = the maximum spanning tree
  - McDonald's parser (Chu-Liu-Edmonds algorithm)

Making it more fuzzy?

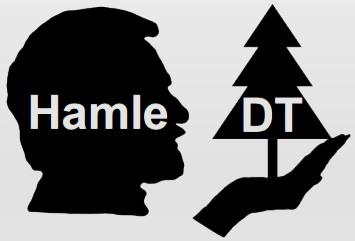
- suggested using fuzzy input features
  - edge score instead of edge existence
  - similar approach for tags?
    - e.g. **apple** juice:
      60% noun, 40% adjective



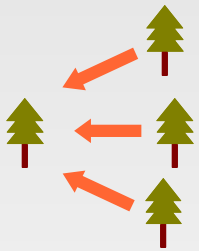
- edge scores more useful than the tree?
  - applications use individual edges, not whole tree
    - e.g. Depfix post-editing (edge-local)

Conclusion

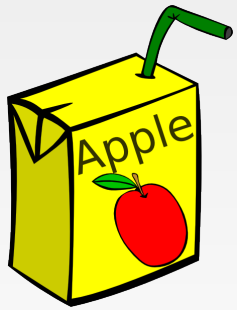
- HamleDT: 30 treebanks
  - Prague style, Interset tags
  - extrinsic evaluation of harmonization?



- semi-supervised parsing
  - multisource projection?



- adding more fuzziness
  - fuzzy input features?
  - and/or even fuzzy output?



Thank you for your attention

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