MUNI FI

Taggers

PA154 Language Modeling (7.2)

Pavel Rychlý

pary@fi.muni.cz

Statistical Tagger

- using Viterbi algorithm to find the most probable sequence of tags
- sometimes even greedy search works
- the hard part is to find probabilities

TreeTagger

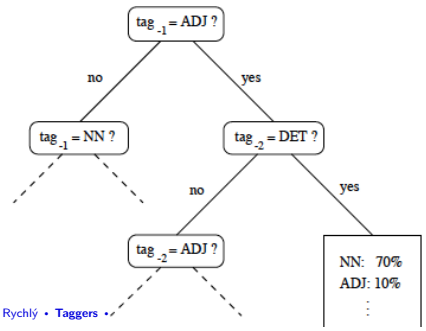
- Helmut Schmid, Stuttgart 1994
- originally developed and evaluated on English, later also German
- disambiguation of proper nouns (named entities) and regular words
- smoothing with Equivalence Classes
  - words with the same set of possible tags
- tag is atomic, no attributes or categories
- probabilities: decision trees
- Vitterbi algorithm
- https://www.cis.uni-muenchen.de/~schmid/tools/TreeTagger/

TreeTagger - decision tree

- decision tree
  - binary tree
  - one condition in each inner node
  - yes/no leads to left/right child
  - every input (token) finds a leaf
- construction based on information gain

TreeTagger - decision tree example

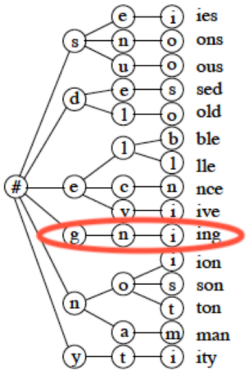
- *house* in "The big house" is
  - *NN* with probability 0.7
  - *ADJ* with probability 0.1



TreeTagger - lexicon

- lexicon of words with respective tags
  - probabilities of tags from a training corpus
- words not included in lexicon
  1. lowercase in lexicon
  2. suffix lexicon
  3. default entry (relative frequencies in suffix tree)

TreeTagger - suffix lexicon



TreeTagger – results

tagging method	accuracy
suffix lexicon only (1)	96.05 %
(1) + prefix lexicon	96.10 %
(1) + equival. class smoothing	96.52 %
(1) + sentence initial word treatm.	96.46 %
all features (5)	96.98 %
(5) + additional word/tag-pairs (6)	97.04 %
(6) + additional probabilities	< 97.04 %
(5) + standard MM formula	97.53 %

TreeTagger – results

method	context	accuracy
trigram tagger	trigram	96.06 %
TreeTagger	bigram	95.78 %
TreeTagger (0.1)	trigram	96.34 %
TreeTagger	quatrogram	96.36 %
TreeTagger (10^{-10})	trigram	96.32 %

RFTagger

- Helmut Schmid, Florian Laws, Stuttgart 2008
- non-atomic tags
- https://www.cis.uni-muenchen.de/~schmid/tools/RFTagger/
- Das zu versteuernde Einkommen sinkt. („The to be taxed income decreases.“ The taxable income decreases.)

Das	ART.Def.Nom.Sg.Neut
zu	PART.Zu
versteuernde	ADJA.Pos.Nom.Sg.Neut
Einkommen	N.Reg.Nom.Sg.Neut
sinkt	VFIN.Full.3.Sg.Pres.Ind
.	SYM.Pun.Sent

RFTagger - tags

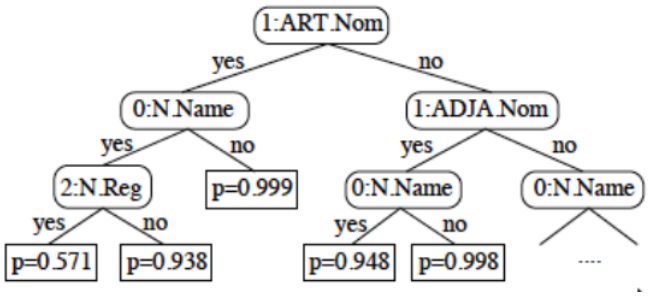
- tag = vector of attributes
- each part of speech - different vector (set of attributes)
- attribute values separated by dot (.)
- first attribute = PoS
- tagging - first Pos, then respective attributes

RFTagger - decision tree

- decision tree
  - condition on one attribute only
- separate tree for each value of an attribute
  - leaf - one probability of that value

RFTagger – decision tree

nominative case of nouns (N.Nom)



RFTagger – results

TreeTagger	RFTagger
Baseline – 70,54 %	Kontext 1 – 90,89 %
Kontext 1 – 86,22 %	Kontext 2 – 92,06 %
Kontext 2 – 87,31 %	Kontext 10 – 92,43 %
Kontext 5 – 87,47 %	
Kontext 10 – neuspělo	