Chunking

LING 570

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Week 10: 11/30/09

What is chunking?

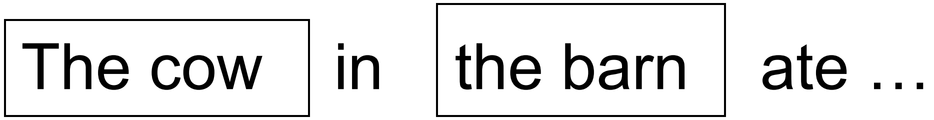
- Also called *partial or shallow parsing*.

- Task: to assign some additional structure to tagged input.

  – The structure is often not nested: “dividing input text into non-overlapping segments”

  – Some material in the input can be skipped over.

Ex:



The cow in the barn ate …

Why chunking?

- Used when full parsing is not feasible or not desirable.
- Often application-specific
- An example: find subcategorization frames for verbs:

  give NP to NP

  give NP NP

  give NP up
- Another example: Information Extraction (IE)

General process

• Tokenization:	The	student	bought	two	books
• POS tagging:	DT	N	V	CD	N
• Chunking:	NP			NP	
• Extraction:	NP		V	NP	
• …					

Evaluation

- System output: the set of chunks returned by the chunk parser
- Gold system: the set of chunks in the gold standard
- Correct: the correct set of chunks
- Prec = Correct/Guessed
- Recall = Correct/Gold
- F-score = 2 Prec * Recall / (Prec + Recall)

Methods

- Rule-based:
  - Ex: regular expression:

    NP: DT JJ* NN

- Converting it to a POS tagging problem

Longest Match

- Abney 1995 discusses longest match heuristic:
  - One FSA for each phrasal category
  - Winner is the FSA with the longest match

Time flies like an arrow

Longest Match

- Some example rules:

  NP → D N

  NP → D Adj N

  VP → V

- Encoded each rule as an automaton

- Stored longest matching pattern (the winner)

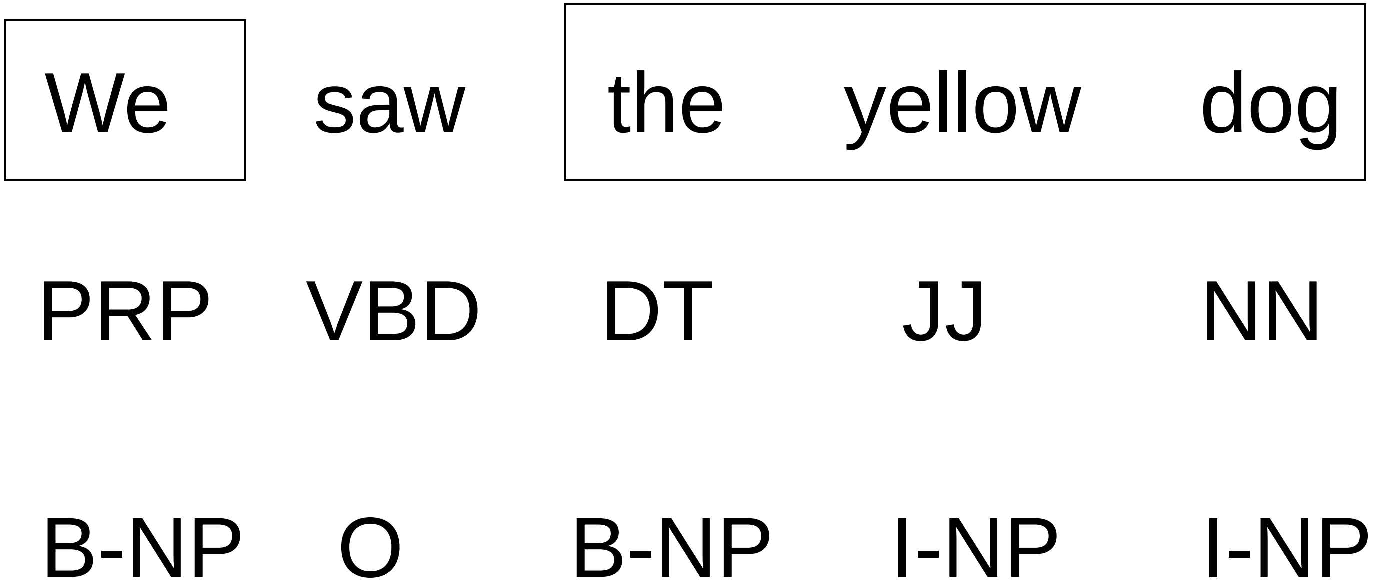
- If no match for a given word, skipped it (in other words, didn’t chunk it)

- Results: Precision 0.92, Recall 0.88

Converting the chunking task into a tagging problem

- Tagset:
  - IOB scheme:
    - B-X: first word of a chunk of type X
    - I-X: non-initial word of a chunk of type X
    - O: outside chunks
  - Other schemes: IOBE, etc.
    - B-X
    - I-X
    - O
    - E-X: the last word of a chunk of type X

An example



We	saw	the	yellow	dog
PRP	VBD	DT	JJ	NN
B-NP	O	B-NP	I-NP	I-NP

As a result of the conversion

- Any classification algorithm
  - MaxEnt
  - SVM
  - Boosting
  - …

- Any sequence labeling algorithm
  - HMM
  - CRF
  - …