

Appendix

The arc-standard transition system

SHIFT	move one item from the buffer to the stack: $(\Sigma, i B, A) \Rightarrow (\Sigma i, B, A)$
LEFT-ARC $_{\ell}$	create arc $j \rightarrow i$ with label $\ell \in \mathcal{L}$ and remove i : $(\Sigma i, j, B, A) \Rightarrow (\Sigma j, B, A \cup \{(j, \ell, i)\})$ Condition: $i \neq 0$
RIGHT-ARC $_{\ell}$	create arc $i \rightarrow j$ with label $\ell \in \mathcal{L}$ and remove j : $(\Sigma i, j, B, A) \Rightarrow (\Sigma i, B, A \cup \{(i, \ell, j)\})$

Initial configuration:

$$c_s(w_1, w_2, w_3, \dots) = ([ROOT], [1, 2, 3, \dots], \emptyset)$$

Terminal configuration:

$$c_t = ([ROOT], [], A)$$

The arc-eager transition system

SHIFT	move one item from the buffer to the stack: $(\Sigma, i B, A) \Rightarrow (\Sigma i, B, A)$
LEFT-ARC $_{\ell}$	create arc $j \rightarrow i$ with label $\ell \in \mathcal{L}$ and remove i : $(\Sigma i, j B, A) \Rightarrow (\Sigma, j B, A \cup \{(j, \ell, i)\})$ Condition: $i \neq 0$ and i has no head
RIGHT-ARC $_{\ell}$	create arc $i \rightarrow j$ with label $\ell \in \mathcal{L}$ and shift j : $(\Sigma i, j B, A) \Rightarrow (\Sigma i, j, B, A \cup \{(i, \ell, j)\})$
REDUCE	remove i : $(\Sigma i, B, A) \Rightarrow (\Sigma, B, A)$ Condition: i has a head

Initial configuration:

$$c_s(w_1, w_2, w_3, \dots) = ([ROOT], [1, 2, 3, \dots], \emptyset)$$

Terminal configuration (Σ does not have to be $[ROOT]$):

$$c_t = (\Sigma, [], A)$$

Legend:

Σ	stack
B	buffer
A	set of arcs constructed so far
i, j	items at the stack or at the buffer
$ROOT$	the root node of the tree

A configuration is written as (Σ, B, A) .

POS Tags in the standard English Scheme

Number	Tag	Description
1.	CC	Coordinating conjunction
2.	CD	Cardinal number
3.	DT	Determiner
4.	EX	Existential there
5.	FW	Foreign word
6.	IN	Preposition or subordinating conjunction
7.	JJ	Adjective
8.	JJR	Adjective, comparative
9.	JJS	Adjective, superlative
10.	LS	List item marker
11.	MD	Modal
12.	NN	Noun, singular or mass
13.	NNS	Noun, plural
14.	NNP	Proper noun, singular
15.	NNPS	Proper noun, plural
16.	PDT	Predeterminer
17.	POS	Possessive ending
18.	PRP	Personal pronoun
19.	PRP\$	Possessive pronoun
20.	RB	Adverb
21.	RBR	Adverb, comparative
22.	RBS	Adverb, superlative
23.	RP	Particle
24.	SYM	Symbol
25.	TO	to
26.	UH	Interjection
27.	VB	Verb, base form
28.	VBD	Verb, past tense
29.	VBG	Verb, gerund or present participle
30.	VCN	Verb, past participle
31.	VBP	Verb, non-3rd person singular present
32.	VBZ	Verb, 3rd person singular present
33.	WDT	Wh-determiner
34.	WP	Wh-pronoun
35.	WP\$	Possessive wh-pronoun
36.	WRB	Wh-adverb