HIT-SCIR at MRP 2020: Transition-based Parser and Iterative Inference Parser

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Overview of Our Techniques

- **Rank 3rd according to ALL-F1**
- **Submission models:**
  - **Transition-based Parser for Flavor (1) (UCCA、EDS、PTG)**
  - **Iterative Inference Parser for Flavor (2) (AMR、DRG)**

System	UCCA	EDS	PTG	AMR	DRG	ALL
Hitachi	0.75	0.94	0.89	0.82	0.93	0.86
UFAL	0.76	0.93	0.88	0.80	0.94	0.86
HIT-SCIR	0.75	0.87	0.84	0.70	0.89	0.81
HUJI-KU	0.73	0.80	0.54	0.52	0.63	0.64
ISCAS	0.06	0.86	0.18	0.61	0.69	0.48
TJU-BLCU	0.10	0.49	0.21	0.30	0.40	0.30

- **Cross-Framework**

System	UCCA	PTG	AMR	DRG	ALL
UFAL	0.81	0.91	0.78	0.90	0.85
Hitachi	0.79	0.87	0.80	0.93	0.85
HIT-SCIR	0.80	0.78	0.49	0.68	0.69
HUJI-KU	0.75	0.58	0.45	0.62	0.60

- **Cross-Lingual**

Transition-based Parser

- **Treat parsing as a sequence of actions, such as *SHIFT, REDUCE, EDGE*.**
  - **Flexible in predicting the anchor information, using the *NODE* ops.**

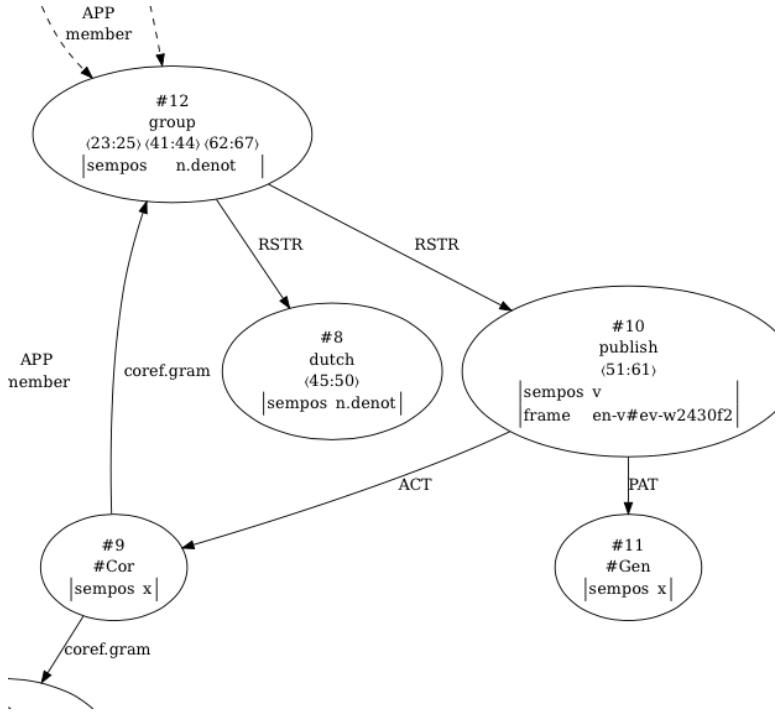
- **We use this system to parse the UCCA\EDS\PTG.**
  - **Adopt HIT-SCIR-2019 for UCCA/EDS.**
  - **We present a new transition-based parser for PTG.**

PTG

- We propose a new transition-based arc-eager parser for PTG.

- PTG is not a DAG (directed acyclic graph).
- Resolve cycle caused by coref.gram edge
  - Reverse edge

- Two classes of Node
  - #node: the label comes from a fixed vocab
  - node: aligns to the tokens of sentence



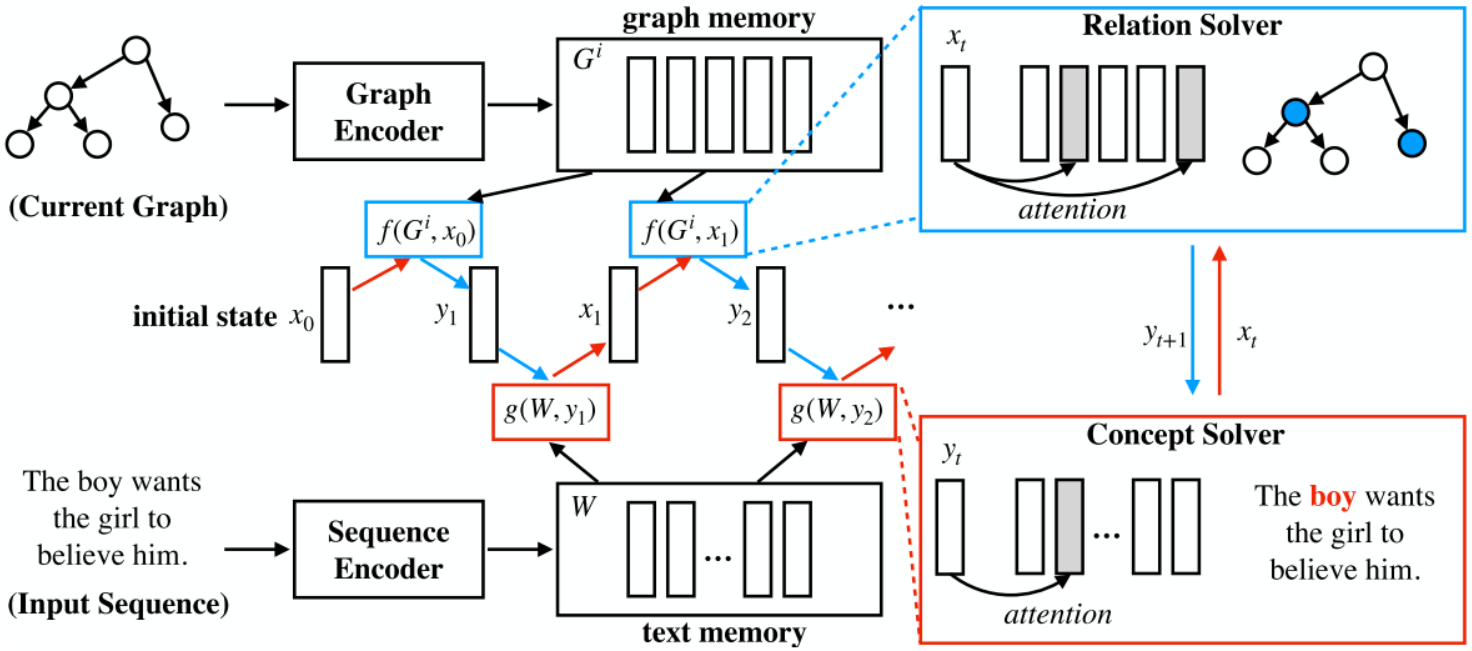
PTG Transition System

- #Action/ #Token = 4.656 (Train)

Before Transition					Transition	After Transition					Condition
Stack	List	Buffer	Nodes	Edges		Stack	List	Buffer	Nodes	Edges	
S	L	$x \mid B$	V	E	SHIFT	$S \mid L \mid x$	$\emptyset$	B	V	E	concept(x)
$S \mid x$	L	B	V	E	REDUCE	S	L	B	V	E	
$S \mid x$	L	$y \mid B$	V	E	RIGHT-EDGE$_X$	$S \mid x$	L	$y \mid B$	V	$E \cup \{(x,y)_X\}$	
$S \mid y$	L	$x \mid B$	V	E	LEFT-EDGE$_X$	$S \mid y$	L	$x \mid B$	V	$E \cup \{(x,y)_X\}$	
$S \mid y$	L	$x \mid B$	V	E	SELF-EDGE$_X$	$S \mid y$	L	$x \mid B$	V	$E \cup \{(x,x)_X\}$	
$S \mid x$	L	B	V	E	PASS	S	$x \mid L$	B	V	E	
S	L	$x \mid B$	V	E	DROP	$S \mid L$	$\emptyset$	B	V	E	token(x)
S	L	$x \mid B$	V	E	NODE$_X$	S	L	$y \mid x \mid B$	$V \cup \{y_{label=X}\}$	E	token(x)
S	L	$x \mid B$	V	E	NODE-ROOT$_X$	S	L	$y \mid x \mid B$	$V \cup \{y_{label=X}\}$	E	root(x)
S	L	$x \mid B$	V	E	TERMINAL-NOLABEL	S	L	$y \mid x \mid B$	$V \cup \{y\}$	E	
S	L	$x \mid B$	V	E	TERMINAL$_X$	S	L	$y \mid x \mid B$	$V \cup \{y_{label=X}\}$	E	
[root]	$\emptyset$	$\emptyset$	V	E	FINISH	$\emptyset$	$\emptyset$	$\emptyset$	V	E	

Table 3: The transition set of PTG parser. We write the **Stack** with its top to the right, the **Buffer** with its head to the left and the **List** with its head to the left. The elements in **Stack** and **List** are all concept nodes. Indicator function token(x) means x is a token of the sentence, while concept(x) means it's a concept node. root(x) indicates x is the top node.

Iterative Inference Parser



- **Treat parsing as a series of dual decisions on the input sequence and the incrementally constructed graph**

Cai, ACL2020, AMR Parsing via Graph-Sequence Iterative Inference

Rule-based Tagger

- We propose a rule-based tagger for EDS/PTG property prediction.

Training

- Count the co-occurrence of node label, upos, dep and property.

Infering

- Select the property based on the co-occurrence statistics.
  - If the triple (node label, upos, dep) is not found, we backoff to the tuple (upos, dep).

	Oracle Node Label				Rule Node Label			
	Accuracy	P	R	F1	Accuracy	P	R	F1
Train	0.9059	0.9868	0.8388	0.9068	0.8912	0.9843	0.9133	0.9474
Dev	0.9107	0.9872	0.8449	0.9105	0.8893	0.9838	0.9128	0.9470

PTG Property Score on Train/Dev

Conclusion

- **Submission systems:**
  - **Transition-based Parser for Flavor (1) including UCCA, EDS, and PTG.**
  - **Iterative Inference Parser for Flavor (2) including AMR and DR.**

- **Our Contribution:**
  - **Rule-based tagger for EDS/PTG property prediction.**
  - **Transition-based parser for PTG graph.**

- **Our code: https://github.com/DreamerDeo/HIT-SCIR-CoNLL2020**