

Argumentation × Span

- Investigated **span representations** in **argumentation structure parsing (ASP)**
- Achieved the new **state-of-the-art** in ASP
- Improved the performance** in parsing **complex structures**: deeper trees

Argumentation Structure Parsing (ASP)

Three sub-tasks:

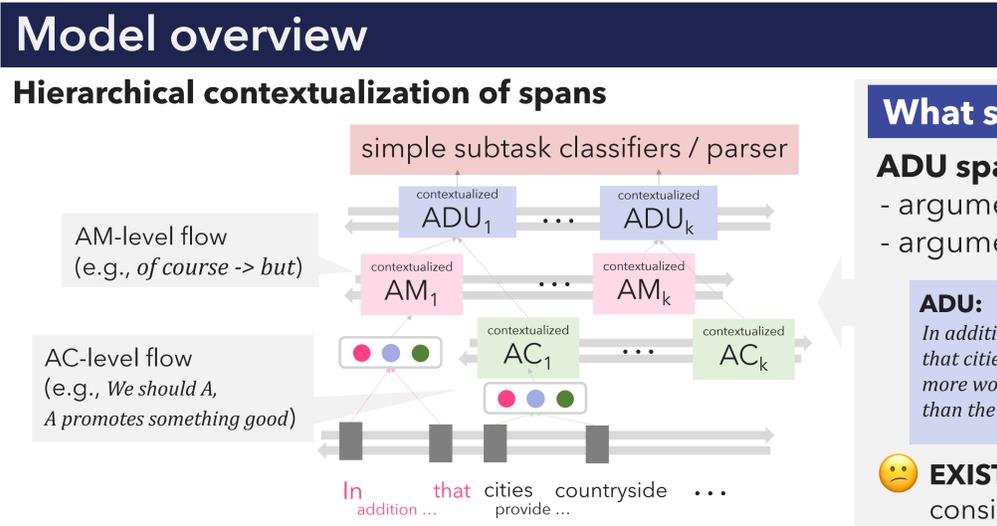
- link identification (LI)
- link type classification (LTC)
- ADU type classification (ATC)

In addition, I believe that cities provide more work opportunities than the countryside. **ADU1**
 There are not only more jobs, but they are also well-paid. **ADU2**
 Of course living in a city is more expensive, but incomes are higher too. **ADU4**

Argumentative discourse units (ADUs) are given

ADU1: In addition, I believe that cities provide ... **claim**
ADU2: There are not only more jobs, ... **premise**
ADU3: Of course living in a city is more expensive, ... **premise**
ADU4: but incomes are higher too. **premise**

support attack attack



What spans?

ADU span decomposition

- argumentative markers (**AMs**)
- argument components (**ACs**)

play different roles

ADU: In addition, I believe that cities provide more work opportunities than the countryside.

AM: In addition, I believe that

AC: cities provide more work opportunities than the countryside.

EXISTING NEURAL ASP: not explicitly considering the linguistic clues (AMs).

How to encode?

LSTM-minus span representations [Wang+, 2016]

BiLSTM

Span rep. $\vec{h}_{j+1} - \vec{h}_i$, $\vec{h}_{i-1} - \vec{h}_j$, \vec{h}_i, \vec{h}_j

well-paid . Of course ... more expensive , but ...

EXISTING NEURAL ASP: Bag-of-Words-based span rep. [Potash+, 2017]

Experiments

Dataset

Name	# Texts	# ADUs
Persuasive essay corpus (PEC) [Gurevych+, 2014]	1,833*	6,089
Arg-microtext corpus (MTC) [Peldzsus+, 2016]	112	576

* number of paragraphs

Models

Name	span rep.	dist. between AC and AM
LSTM+dist	LSTM-minus	✓
LSTM	LSTM-minus	
BoW	BoW [Potash+, 2017]	

Is ADU decomposition effective?

Is LSTM-minus span rep. effective?

Scores

F1 scores for each subtask and overall scores (avg. F1 across the subtasks)

Extract AMs from ADUs

collected 1,138 types of AMs (5.38 tokens on average).

Extraction methods

PEC: simple rules relying on original annotations

MTC: using AM lists (built from PEC and DTB)

Examples

- the other reason is that
- first, as you can see that
- in short,

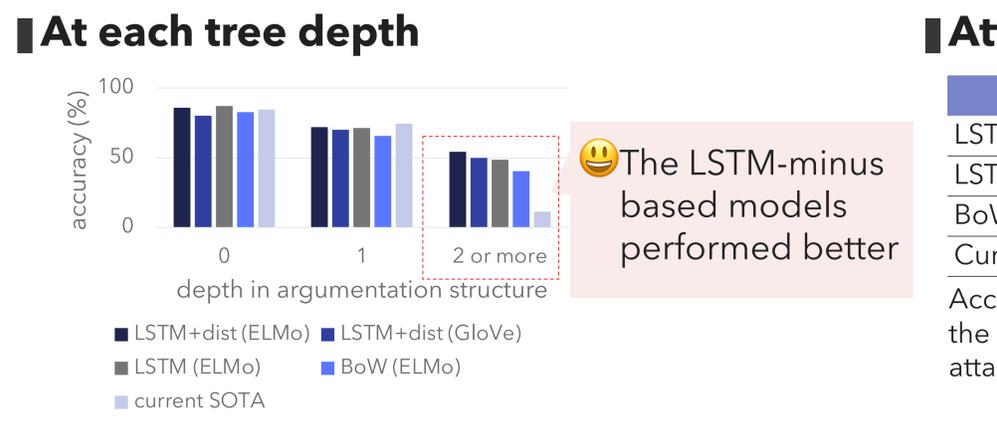
Results —richer span reps., better performance

Data.	Embed.	Model	Overall	LI	LTC	ATC
PEC	ELMo	LSTM+dist.	81.8	80.7	79.0	85.7
		LSTM	81.8	80.4	78.2	86.9
		BoW	77.1	76.2	72.3	82.9
	GloVe	LSTM+dist.	79.7	78.8	76.5	83.9
		LSTM	78.8	77.7	75.0	83.7
		BoW	76.1	74.2	71.3	82.8
		Potash+ 2017	-	76.7	-	84.9
		Gurevych+ 2017	75.2	75.1	68.0	82.6
MTC	ELMo	LSTM+dist.	78.2	73.9	77.2	83.4
		LSTM	75.0	73.0	71.5	80.5
		BoW	73.3	71.2	67.5	81.2
	GloVe	LSTM+dist.	76.5	72.6	75.4	81.5
		LSTM	70.4	70.1	64.1	76.9
		BoW	71.1	69.2	64.8	79.3
		Potash+ 2017	-	74.0	-	81.3
		Afantenos+ 2018	78.5	68.3	75.7	87.6

😊 **The LSTM-minus-based span reps.** are **effective** for ASP.

😊 **Distinction** between AMs and ACs **improved** the performance, especially on LI and LTC.

Analysis on link identification —most challenging subtask



Attack chains

Model	Acc.
LSTM+dist	71.0
LSTM	68.9
BoW	60.7
Current SOTA	50.3

Accuracy on predicting the relations which form the attack relation chain.

Attack chain

state an expected opposite opinion (ADU3) and then reattack it (ADU4).

ADU1: In addition, I believe that cities provide ...

ADU2: There are not only more jobs, ...

ADU3: Of course living in a city is more expensive, ...

ADU4: but incomes are higher too.

Current SOTA prediction

LSTM+dist prediction