

# Nested relation extraction with iterative neural network

**Yixuan CAO, Dian CHEN, Zhengqi XU,  
Hongwei Li, Ping LUO**

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# Problems & Ideas

- Problem 1: Flat vs. Nested relation extraction

- Currently: relation between entities (flat)
- Reality: relation upon relations  
(nested, i.e. hierarchical)

- Ideas: Extract the Direct Acyclic Graph

- Formulated As DAG extraction problem
- Extract layer by layer iteratively
- At each layer, 1) generate candidate, 2) classify 3) save positives

The prime minister of Canada said: “ The GDP in China was \$13.41 trillion in 2018, \$7.08 trillion less compared with the U.S., \$1.17 trillion more compared with 2017.”

**Expressed facts:**

1. (China GDP in 2018) = \$13.41 trillion
2. (U.S. GDP in 2018) - (China GDP in 2018) = \$7.08 trillion
3. (China GDP in 2018) - (China GDP in 2017) = \$1.17 trillion

**Relations:**

$R_{C8}$  : Economic-Index(China, GDP, 2018)  
 $R_{C8e}$  : Equal( $R_{C8}$ , \$12.24 trillion)  
 $R_{U8}$  : Economic-Index(U.S., GDP, 2018)  
 $R_{U-C}$  : Subtract( $R_{U8}$ ,  $R_{C8}$ )  
 $R_{U-ce}$  : Equal( $R_{U-C}$ , \$7.08 trillion)  
 $R_{C7}$  : Economic-Index(China, GDP, 2017)  
 $R_{8-7}$  : Subtract( $R_{C8}$  -  $R_{C7}$ )  
 $R_{8-7e}$  : Equal( $R_{8-7}$ , \$1.17 trillion)

- Problem 2: Mention sensitivity

- If an entity is mentioned repetitively, which one should be involved in the relation?

- Ideas: Mention-insensitive model by attention mechanism.

# Main Contributions

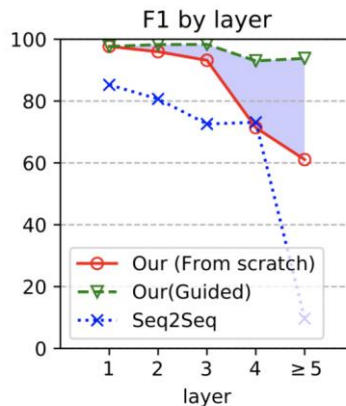
- Semantic Causality extraction**

Model	Precision	Recall	F1
Rule-based	70.80	17.48	28.04
High-arity	77.49	79.50	78.48
Our model (From scratch)	78.51	79.41	78.96
Our model (Guided)	81.63	80.99	81.31

- Formula extraction**

Model	Precision	Recall	F1
Seq2Seq	86.56	75.59	80.71
Our model (From scratch)	96.05	95.85	95.95
Our model (Guided)	97.97	97.99	97.98

- The error propagation phenomenon**



- Mention-Insensitive model performs better than Mention-Sensitive model when random level > 0.3**

