Event Extraction as Machine Reading Comprehension

Jian Liu, Yubo Chen, Kang Liu, Wei Bi, Xiaojiang Liu

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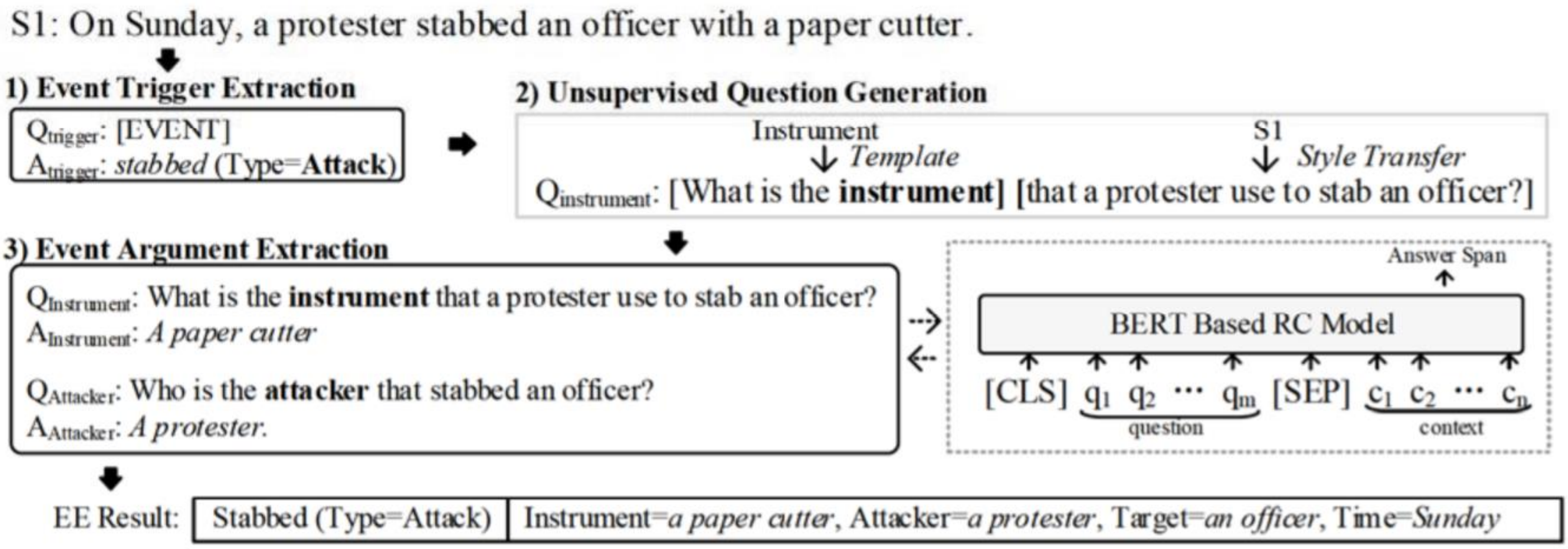
Overview

- This paper casts the event extraction (EE) as a machine reading comprehension (MRC) task.
- This strategy has been done before for other tasks, e.g., Relation Extraction, Document-level Event Argument Extraction.
- The main contribution of this paper is how they design the questions which are decomposed into two components: (i) Question Topic, and (ii) Question Context.
- Casting EE as a MRC task enables the use of data augmentation.
- Finally, their MRC-based method achieves state-of-the-art performance on ACE2005 dataset with a significant margin.

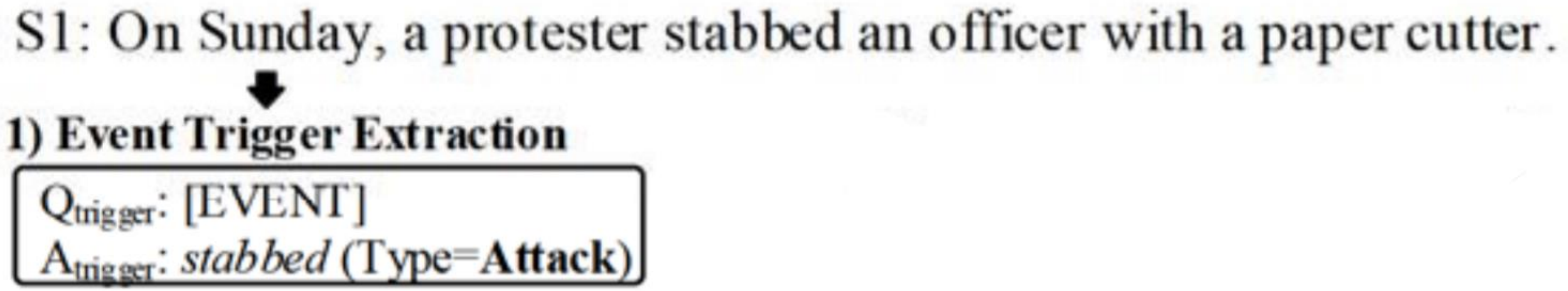
Casting EE as a MRC task



Finding event triggers

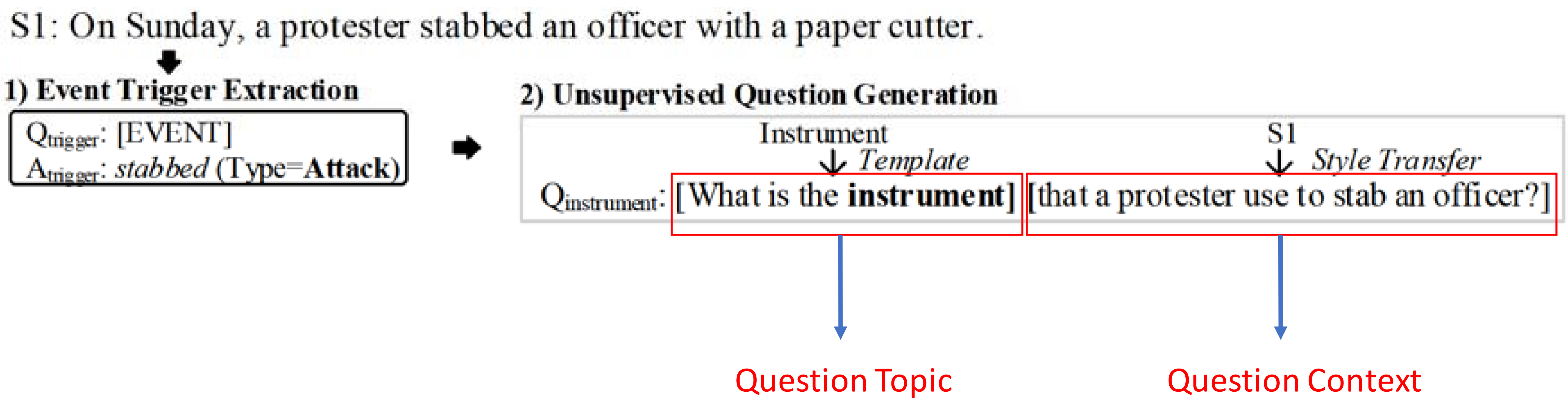
- Finding event triggers:

[CLS] [EVENT] [SEP] Sentence [SEP]



Finding event arguments

- Generating questions to find event arguments:



Finding event arguments

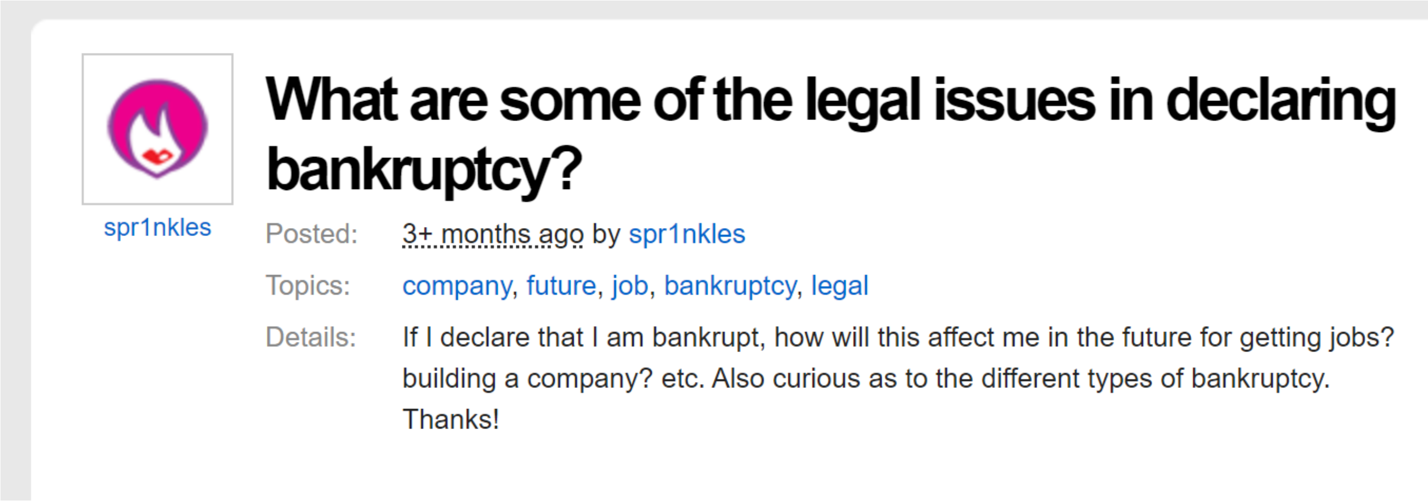
- Generating questions to find event arguments:

  + Question topic generation:

CATEGORY	ROLE	TEMPLS.
Time-related	`Time`	When
Place-related	`Place`	Where
Person-related	`Victim`, `Attacker`, ...	Who is the ROLE
General role	`Instrument`, `Target`, ...	What is the ROLE

Finding event arguments

- Generating questions to find event arguments:
  + Question context generation:
    - Crawl (topic description, question) pairs from question.com



What are some of the legal issues in declaring bankruptcy?

spr1nkles

Posted: 3+ months ago by spr1nkles

Topics: company, future, job, bankruptcy, legal

Details: If I declare that I am bankrupt, how will this affect me in the future for getting jobs? building a company? etc. Also curious as to the different types of bankruptcy. Thanks!

Finding event arguments

- Generating questions to find event arguments:
  + Question context generation:
    - Crawl (topic description, question) pairs from question.com
    - Train a MT system to "translate" topic descriptions to questions.

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    - Create the final question: Q = [Question topic] + [Question Context]

Finding event arguments

- Finding event arguments: standard MRC model.

  H_c^q = BERT([CLS] Question [SEP] Sentence [SEP])
- Start and end token of the argument is determined by:

$$p_{start} = \text{softmax}(H_c^q W_{start})$$
$$p_{end} = \text{softmax}(H_c^q W_{end})$$

Data Augmentation

- Pretrain the model with SQUAD 2.0 dataset.
- Use pretrained MRC model to train it on ACE2005.

Results: standard case

METHOD	G_E	P_E	ΔF1
JointBeam (2013)	52.7	41.8	↓10.9
DMCNN (2015)	56.8	48.0†	↓8.8
JMEE (2018b)	60.3	50.4†	↓9.9
BERTEE	60.6†	51.9†	↓8.7
Joint3EE (2019)	-	52.1	-
JointTrans (2019)	-	53.3	-
RCEE	63.6	**59.3***	↓4.3
RCEE *w/o* DA	62.7	58.7	↓4.0

Table 3: Results of argument extraction with unknown entities (P_E). ΔF1 indicates the performance gap compared with results with known entities (G_E).

Results: zero-short (golden triggers)

METHOD	1%	5%	10%	20%
DMCNN	-	8.7	16.6	23.7
dbRNN	-	8.1	17.2	24.1
BERTEE	2.20	10.5	19.3	28.6
RCEE	38.8	51.3	55.7	59.4
RCEE *w/o* DA	2.00	23.8	35.2	49.2
RCEE_ER	**49.8**	**59.9**	**65.1**	**67.6**
RCEE_ER *w/o* DA	2.20	26.5	37.8	54.1

Table 4: F1 score (%) on exploring the extremely data-scarce scenarios.