

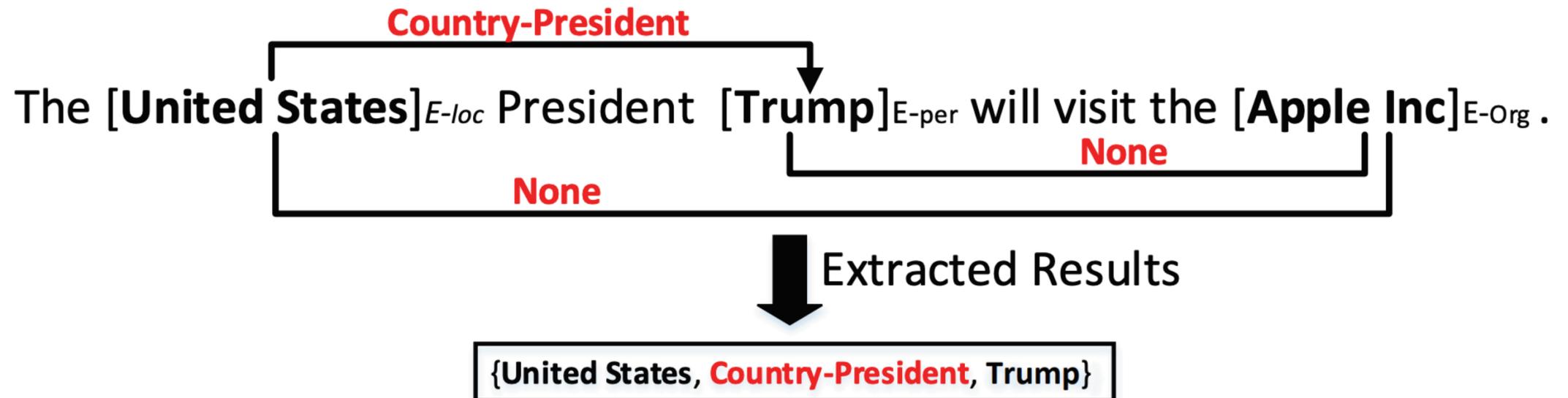
GraphRel

2019/08/14

Peng-Hsuan Li

Tsu-Jui Fu, Peng-Hsuan Li, WeiYun Ma. [GraphRel: Modeling Text as Relational Graphs for Joint Entity and Relation Extraction](#). ACL 2019.

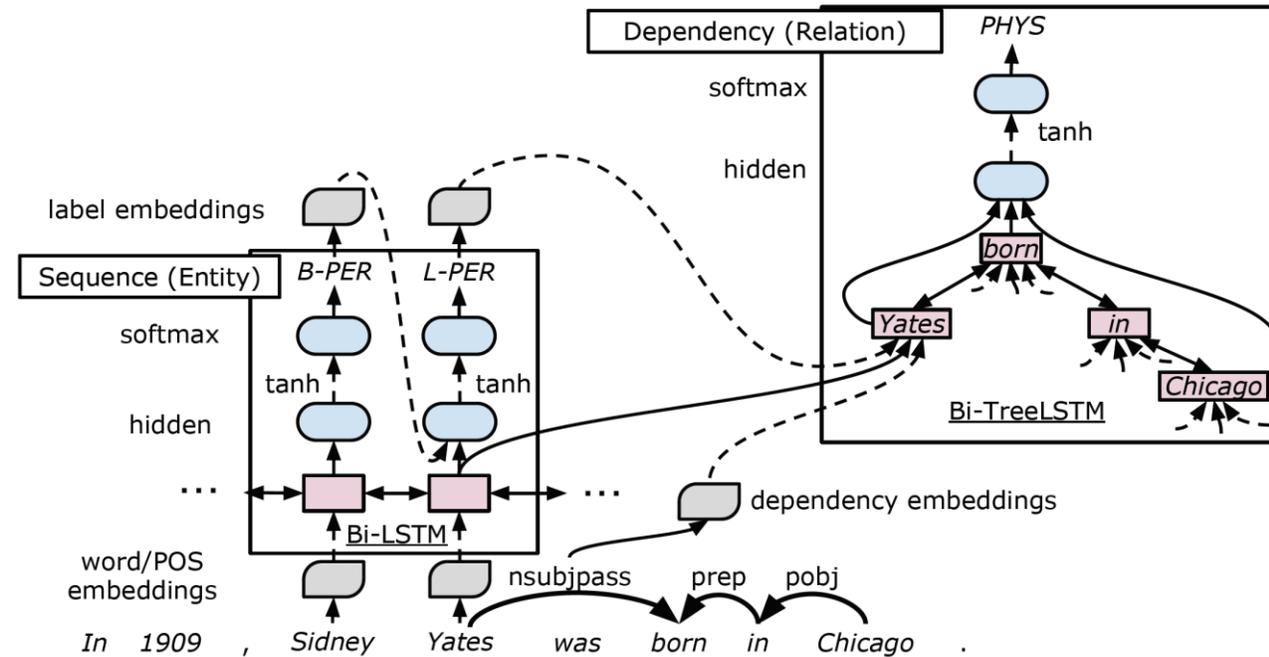
Relation Extraction



Key Aspects

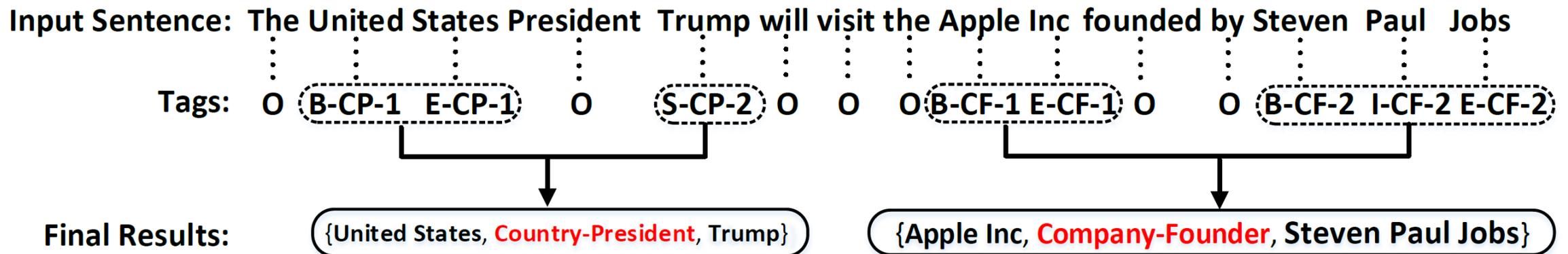
- **Joint** NER and RE
- Prediction of relations with **overlapping** entities
- Consideration of the **interaction** between (overlapping) relations

Pipelined (Miwa and Bansal. ACL 2016.)



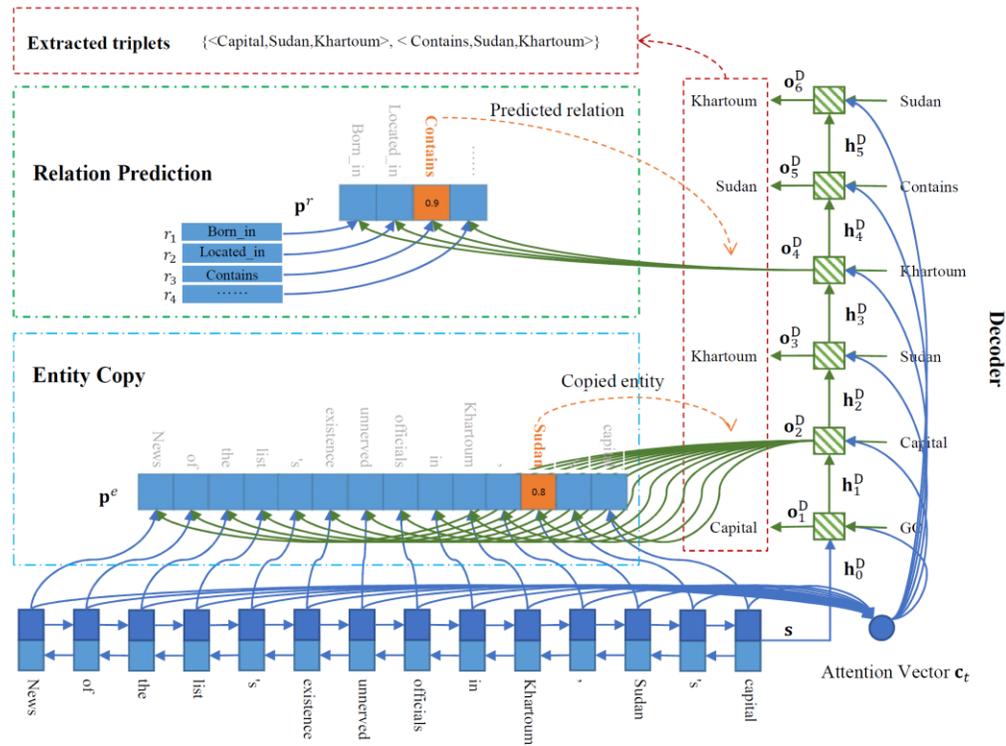
- Joint, no parameter-sharing
- Overlapping
- No interaction

Sequence Labeling (Zheng et al. ACL 2017.)



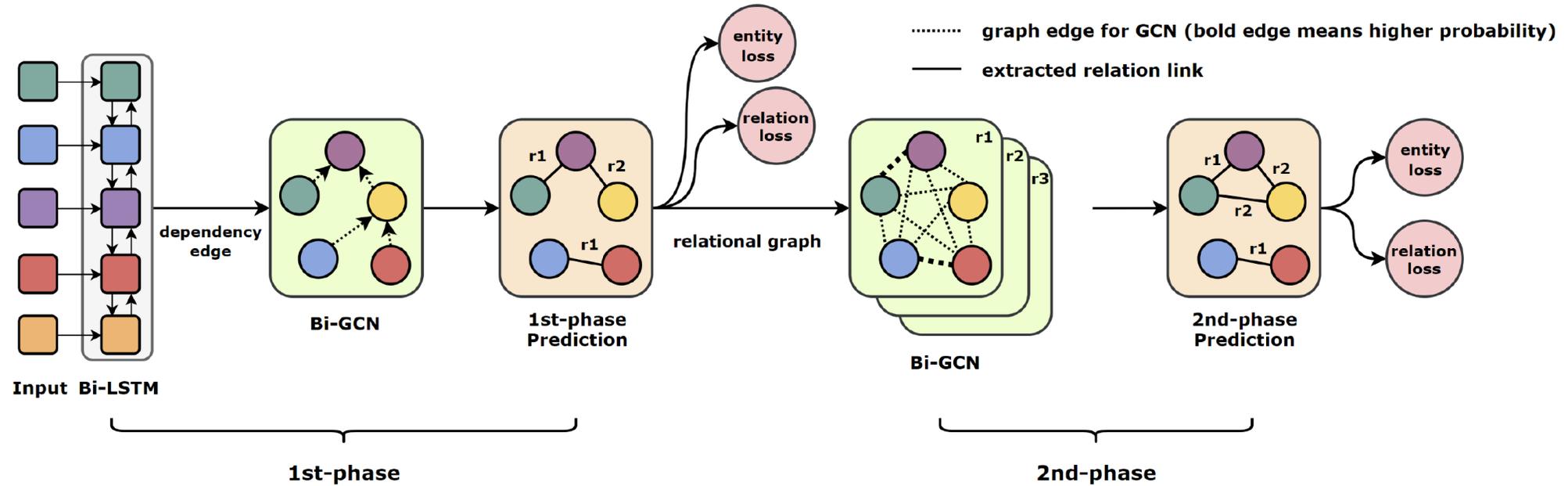
- Joint
- No overlapping
- Interaction

Seq2Seq (Zeng et al. ACL 2018.)

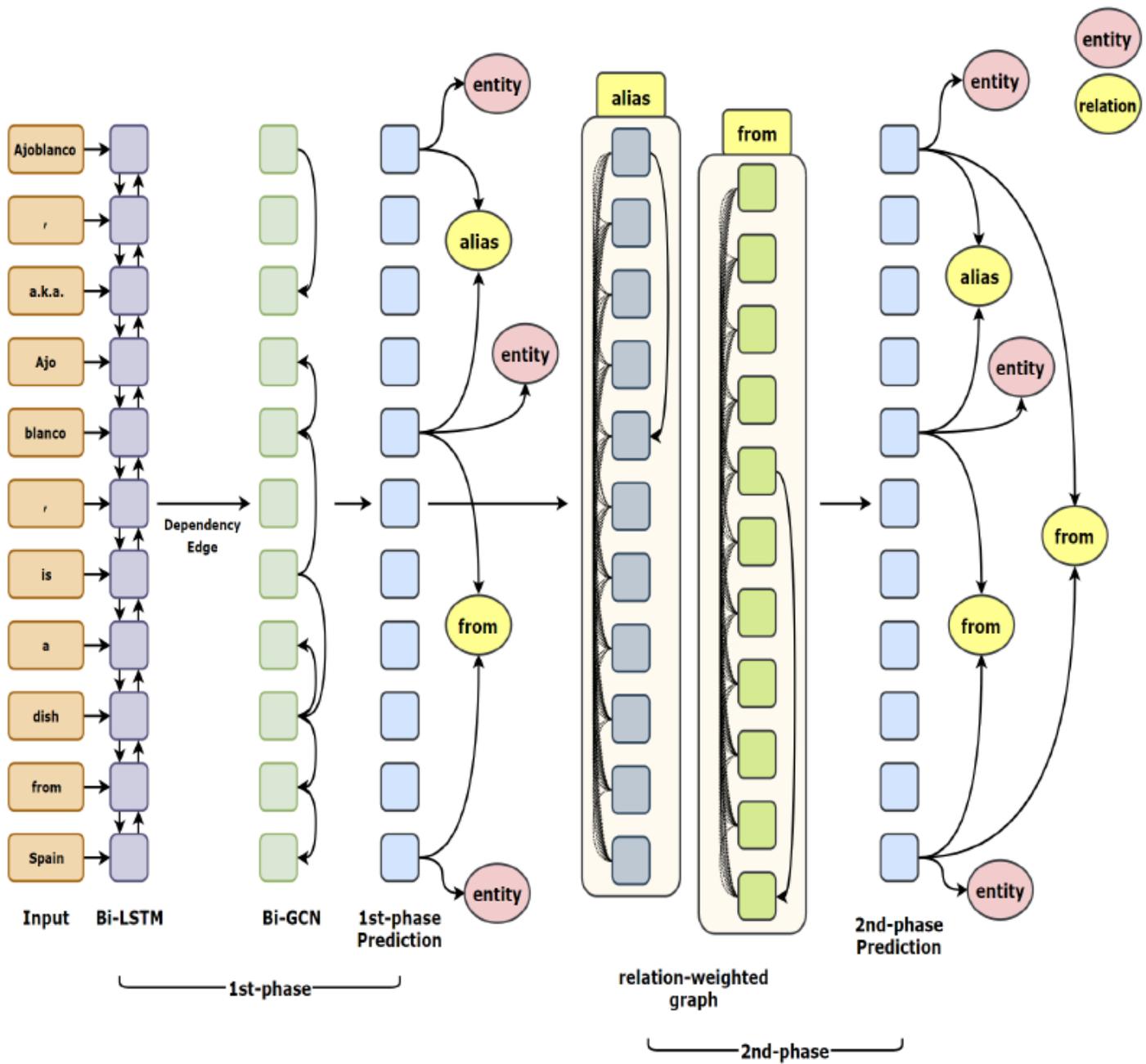


- Joint, not all NEs
- No overlapping
- Interaction, forced linear order

GraphRel: Word pair-based; 2nd phase to enhance interaction



- Joint
- Overlapping
- Interaction



2-phase prediction

- 1st-phase (usual) GCN

$$h_u^{l+1} = \text{ReLU} \left(\sum_{v \in N(u)} \left(W^l h_v^l + b^l \right) \right)$$

- 2nd-phase (relation-weighted) GCN

$$h_u^{l+1} = \text{ReLU} \left(\sum_{v \in V} \sum_{r \in R} P_r(u, v) \times \left(W_r^l h_v^l + b_r^l \right) \right) + h_u^l,$$

Experiments

- NYT

P	R	F1	NER
52.5%	19.3%	28.3%	-
37.7%	36.4%	37.1%	-
42.3%	39.2%	40.7%	89.1%
44.7%	41.1%	42.9%	91.9%

- WebNLG

Method	P	R	F1	NER
NovelTag	62.4%	31.7%	42.0%	-
CopyRE	61.0%	56.6%	58.7%	-
GraphRel _{1p}	62.9%	57.3%	60.0%	88.8%
GraphRel _{2p}	63.9%	60.0%	61.9%	89.2%

Case Study

Sentence	GraphRel _{1p}	GraphRel _{2p}
In Italy , the capital is Rome and A.S. Gubbio 1910 is located there.	(Italy , captical, Rome)	(Italy , captical, Rome) (A.S. Gubbio 1910 , ground, Italy)
Water is an ingredient in Ajoblanco , also known as Ajo blanco , a dish that comes from Andalusia Spain .	(Ajoblanco , alias, Ajo blanco) (Ajo blanco , from, Spain)	(Ajoblanco , alias, Ajo blanco) (Ajo blanco , from, Spain) (Ajoblanco , from, Spain)