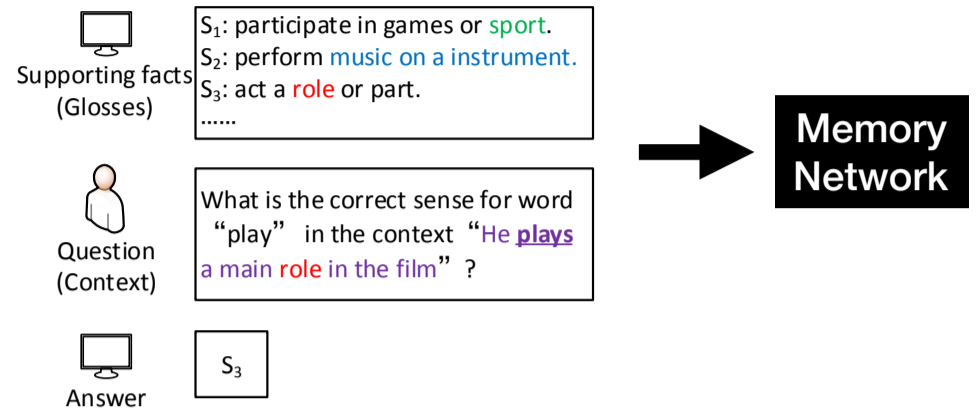
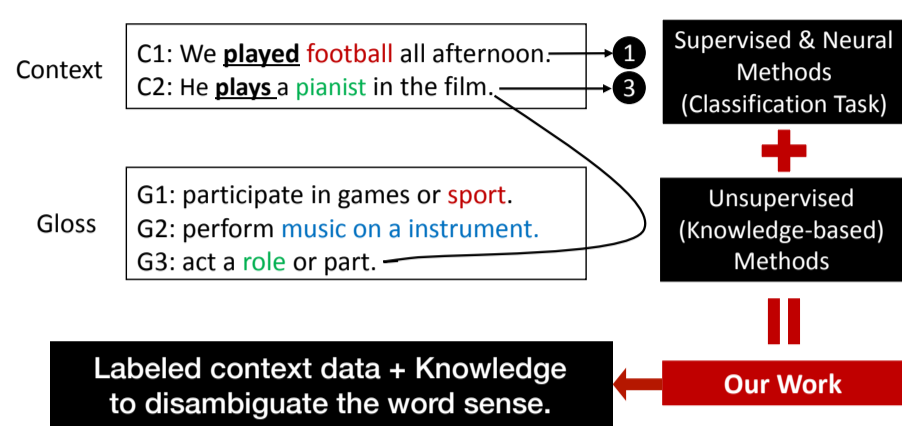
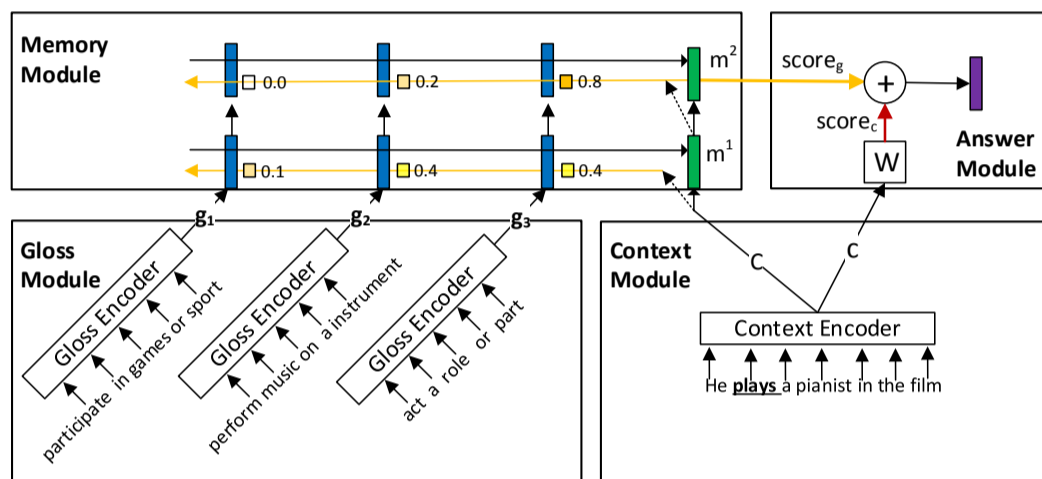


Background : What is WSD

Motivation: Treat WSD as QA



Gloss-augmented WSD Model (GAS)



Memory Module

Attention Calculation

$$e_i^k = g_i \cdot m^{k-1}$$

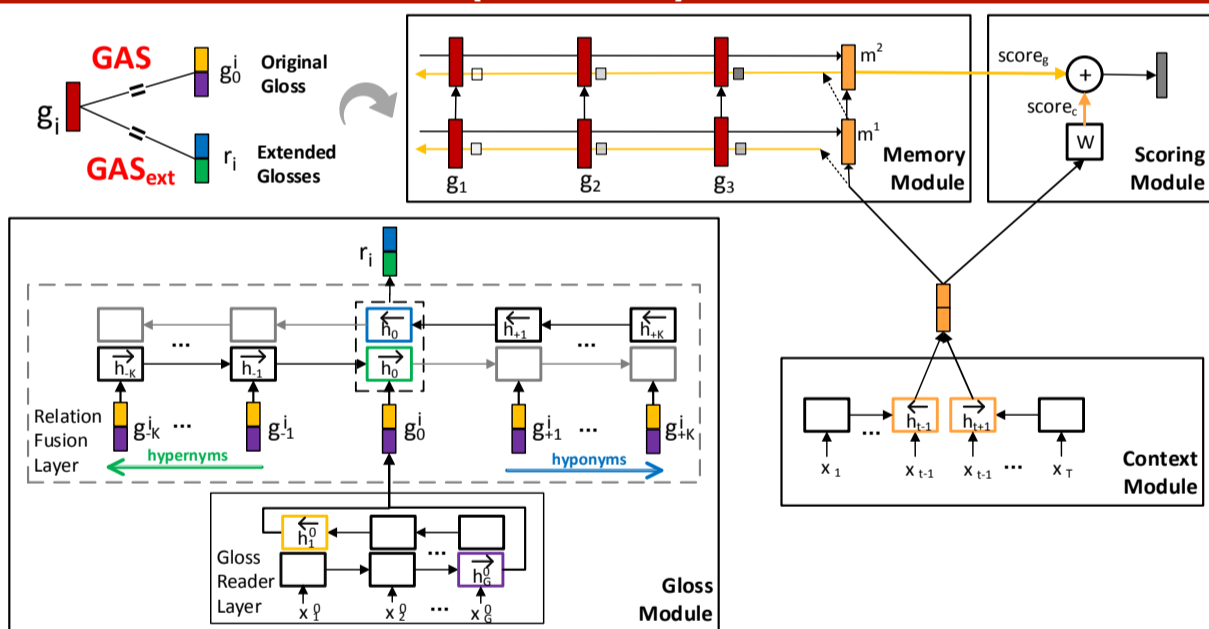
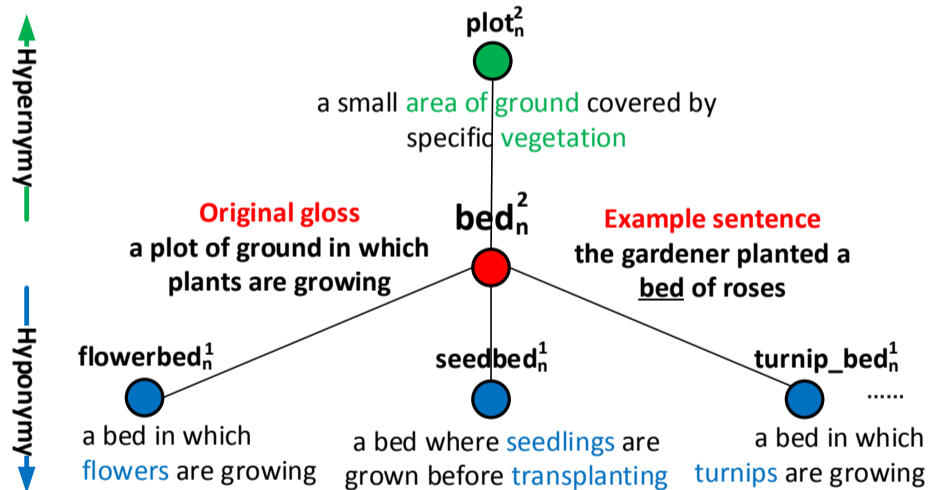
$$\alpha_i^k = \frac{\exp(e_i^k)}{\sum_{j=1}^{|st|} \exp(e_j^k)} \quad u^k = \sum_{i=1}^n \alpha_i^k g_i$$

Memory Update

Linear: $m^k = Hm^{k-1} + u^k$

Concatenation: $m^k = \text{ReLU}(W[m^{k-1} : u^k : c] + b)$

Extended Gloss-augmented WSD Model (GAS_ext)

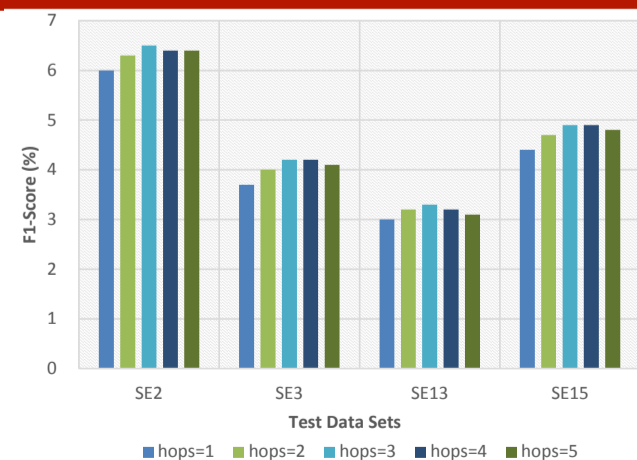


Expand the gloss through its semantic relations to enrich the gloss information

Experiments

System	Test Datasets				Concatenation of Test Datasets				
	SE2	SE3	SE13	SE15	Noun	Verb	Adj	Adv	All
MFS baseline	65.6	66.0	63.8	67.1	67.7	49.8	73.1	80.5	65.5
Lesk _{ext+emb} (Basile et al., 2014)	63.0	63.7	66.2	64.6	70.0	51.1	51.7	80.6	64.2
Babelfy (Moro et al., 2014)	67.0	63.5	66.4	70.3	68.9	50.7	73.2	79.8	66.4
IMS (Zhi and Ng, 2010)	70.9	69.3	65.3	69.5	70.5	55.8	75.6	82.9	68.9
IMS _{+emb} (Iacobacci et al., 2016)	72.2	70.4	65.9	71.5	71.9	56.6	75.9	84.7	70.1
Bi-LSTM (Kågeback and Salomonsson, 2016)	71.1	68.4	64.8	68.3	69.5	55.9	76.2	82.4	68.4
Bi-LSTM _{+att.+LEX} (Raganato et al., 2017a)*	72.0	69.4	66.4	72.4	71.6	57.1	75.6	83.2	69.9
Bi-LSTM _{+att.+LEX+POS} (Raganato et al., 2017a)*	72.0	69.1	66.9	71.5	71.5	57.5	75.0	83.8	69.9
GAS (Linear)*	72.0	70.0	66.7	71.6	71.7	57.4	76.5	83.5	70.1
GAS (Concatenation)*	72.1	70.2	67.0	71.8	72.1	57.2	76.0	84.4	70.3
GAS _{ext} (Linear)*	72.4	70.1	67.1	72.1	71.9	58.1	76.4	84.7	70.4
GAS _{ext} (Concatenation)*	72.2	70.5	67.2	72.6	72.2	57.7	76.6	85.0	70.6

F1-score (%) for fine-grained English all-words WSD on the test sets



Pass=3 performs best

Context: He plays a pianist in the film					
Glosses	Pass 1	Pass 2	Pass 3	Pass 4	Pass 5
g_1 : participate in games or sport					
g_2 : perform music on a instrument					
g_3 : act a role or part					

Conclusion

- Incorporating glosses can greatly improve the performance.
- Extending the original gloss can further boost the results.
- Multi-pass can help to recognize the infrequent senses.