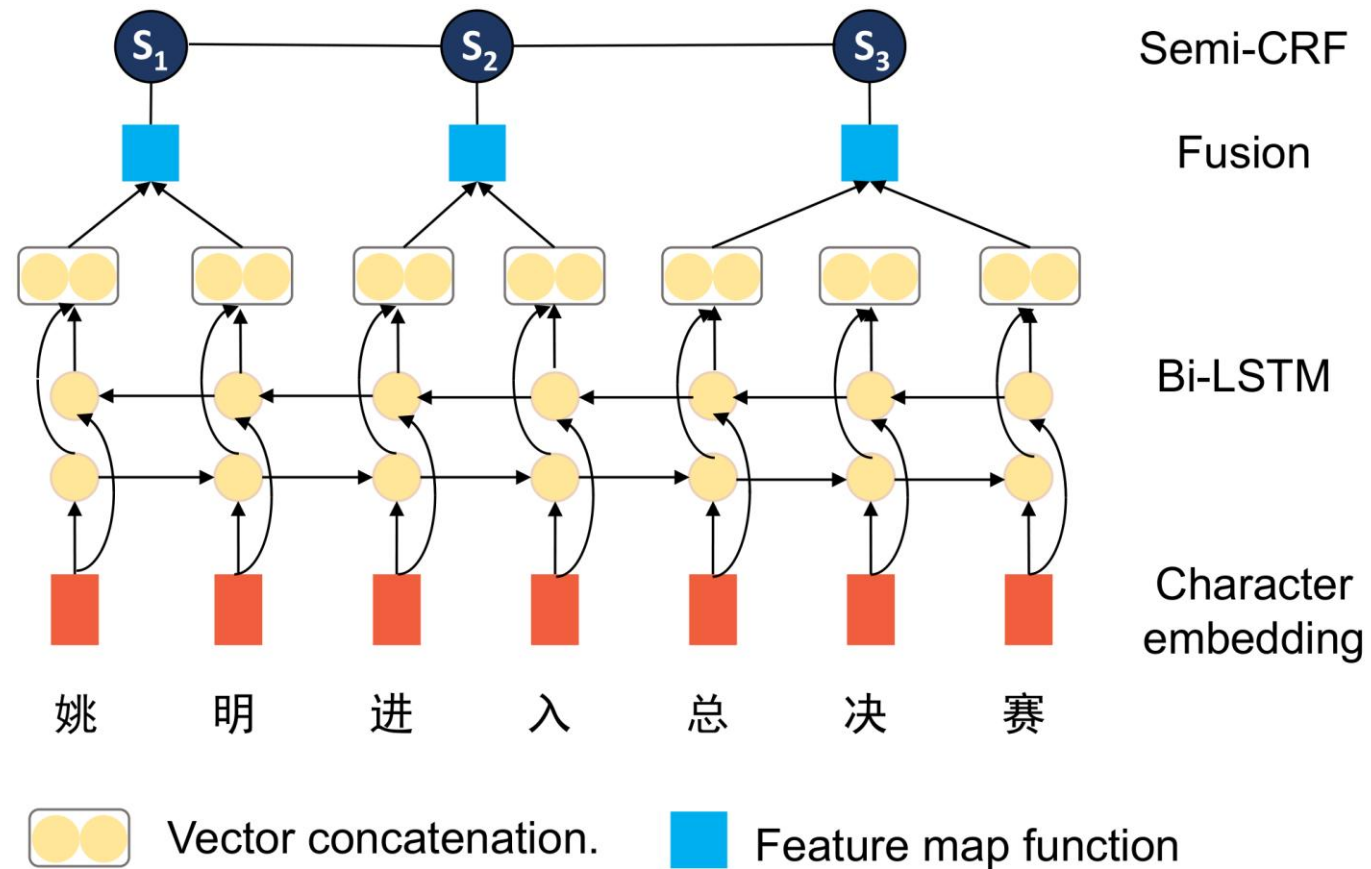


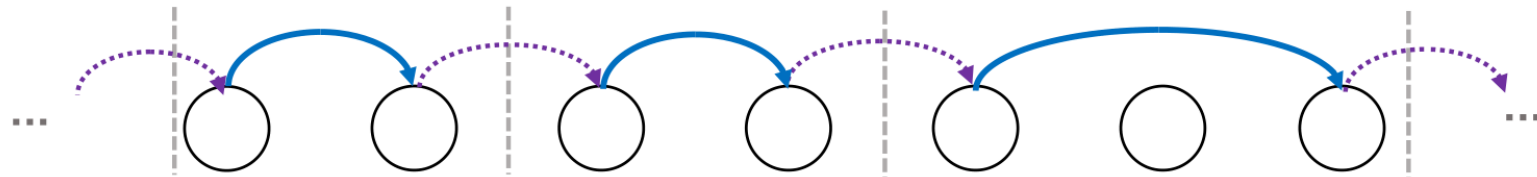
- Chinese Word Segmentation via BiLSTM+Semi-CRF with Relay Node
- Nuo Qun, Hang Yan, Xipeng Qiu, Member, CCF and Xuanjing Huang, Member, CCF
- Highlights:
 - A simple but effective BiLSTM+Semi-CRF model to extract the utilize the contextual segment information.
 - A new decoding algorithm to allow the Semi-CRF handle arbitrarily long segment with linear computation costs.
 - The combination with publicly available word embeddings makes the proposed model outperform previous word-based models.

Qun N, Yan H, Qiu XP et al. Chinese word segmentation via BiLSTM+Semi-CRF with relay node. JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY 35(5): 1115–1126 Sept. 2020. DOI 10.1007/s11390-020-9576-4

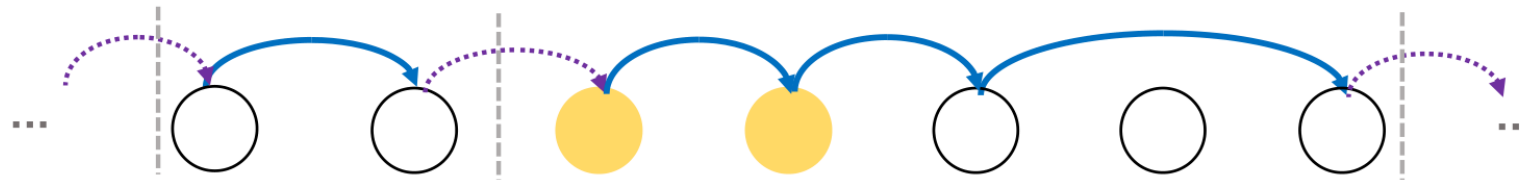
Proposed BiLSTM+Semi-CRF Architecture



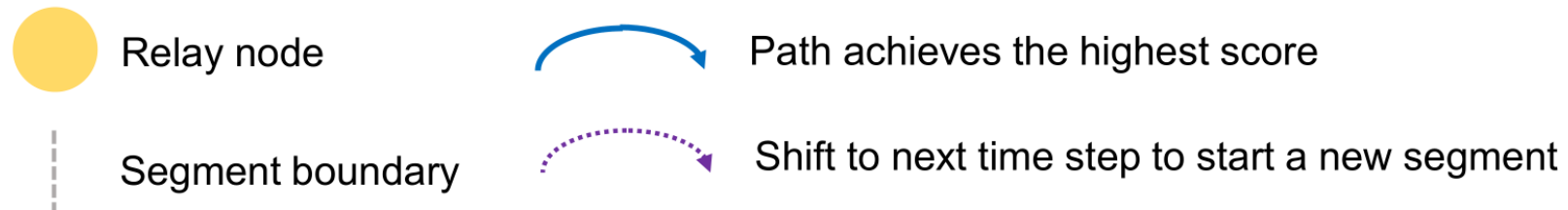
Decoding process for the Semi-CRF and Semi-CRF-Relay



(a) Path for semi-CRF



(b) Path for semi-CRF-Relay



Main Results

Table 5. Main Results (F1 Scores). The number in the brackets is the standard deviation of five repeated experiments. We set the maximum length limit $L = 4$ for all of the Semi-CRF-Relay experiments, and $L = 6$ for all of the Semi-CRF experiments.

Models	PKU	MSRA	AS	CITYU	Avg.
Character-Based Models:					
MMTNN [4]	95.2	97.2	-	-	-
GRNN [22]	94.5*	95.4*	-	-	-
LSTM [5]	94.8*	95.6*	-	-	-
BiLSTM+CRF (our implementation)	94.88(0.13)	96.92(0.07)	95.36(0.10)	95.35(0.04)	95.63
Word-Based Models:					
Neural Semi-CRF [§] [11]	93.91	95.21	-	-	-
NSSM [9]	95.5	96.5	-	-	-
SRNN [20]	91.3	90.7	93.7	93.5	92.3
BiLSTM+Semi-CRF [§]	95.03(0.07)	96.29(0.13)	95.52(0.02)	95.65(0.05)	95.62
BiLSTM+Semi-CRF-Relay [§]	94.99(0.11)	97.01(0.06)	95.58(0.04)	95.65(0.07)	95.81
BiLSTM+Semi-CRF+SE [‡]	95.69(0.01)	96.99(0.01)	95.90(0.04)	96.22(0.04)	96.20
BiLSTM+Semi-CRF-Relay+SE [‡]	95.75(0.06)	97.54(0.01)	95.87(0.03)	96.27(0.05)	96.36

[§] indicates models without the segment embedding \mathbf{e}_{s_k} .

* For a fair comparison, we use the results reported in [9], in which the preprocessing phase in the original work is not adopted.

[‡] SE means “segment embeddings”.