PAGE：A Position-Aware Graph-Based Model for Emotion Cause Entailment in Conversation

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Code： https://github.com/XiaojieGu/PAGE

2023.4.6 • ChongQing

—— ICASSP 2023

Reported by Renhui Luo

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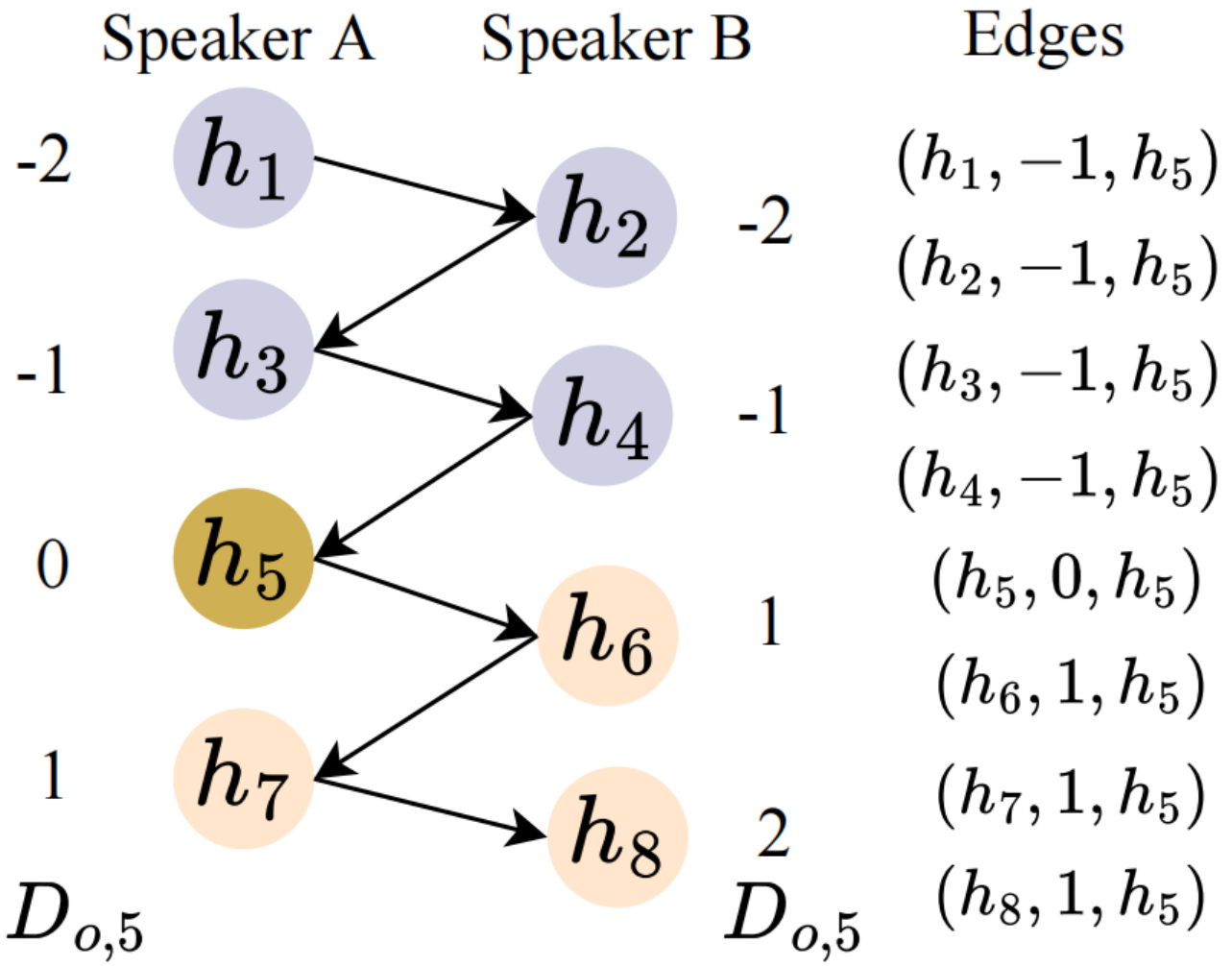
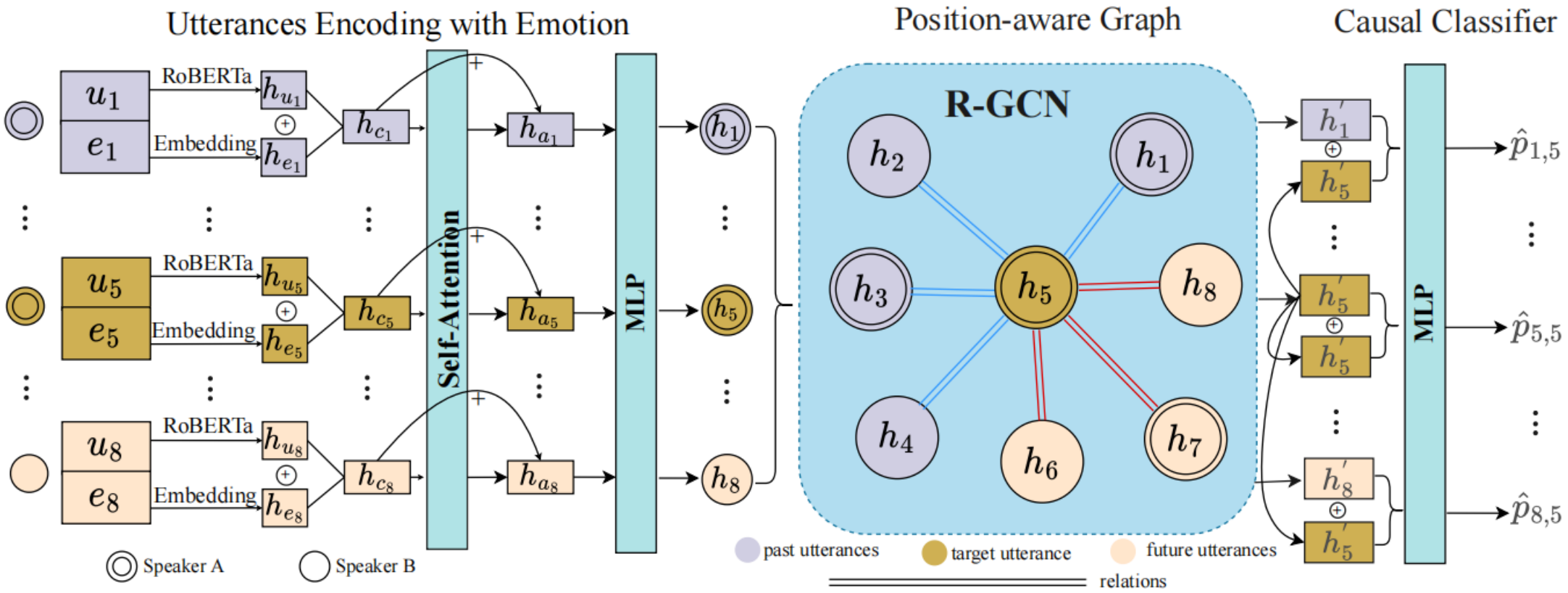
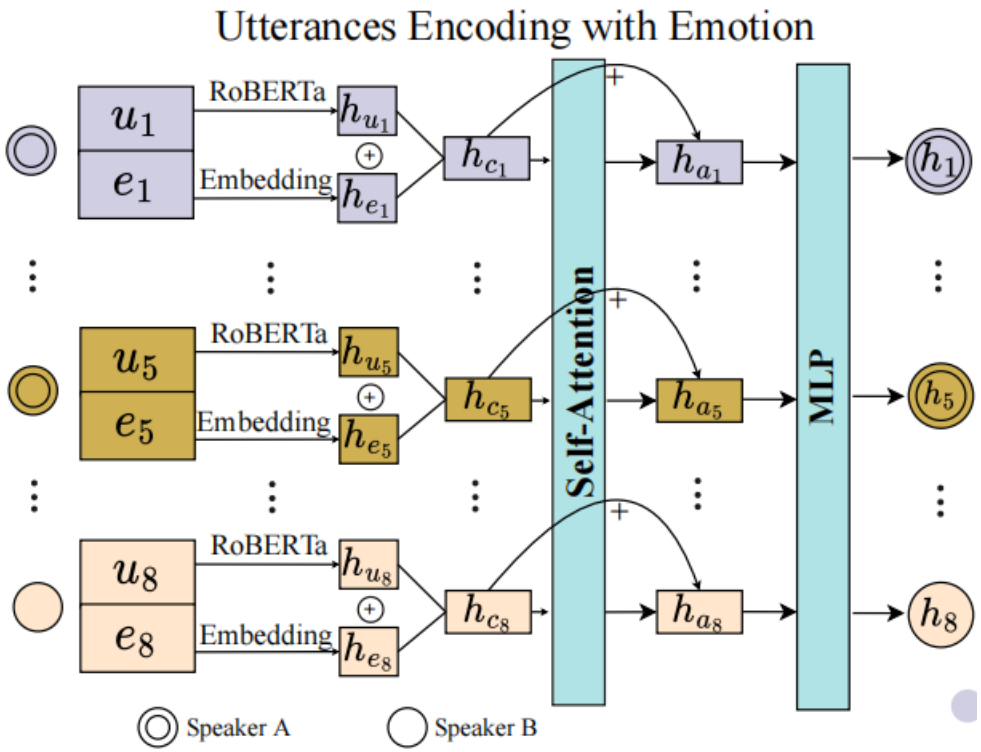
Introduction



Overview


Utterances Encoding with Emotion
Position-aware Graph
Causal Classifier
RoBERTa
Embedding
Self-Attention
MLP
R-GCN
Speaker A
Speaker B
past utterances
target utterance
future utterances
relations

Method



$$h_w = \text{RoBERTa}\left([CLS], w_1, w_2, \ldots, w_m, [SEP]\right), \quad (1)$$

get utterance representation $h_u \in \mathbb{R}^{d_u}$ by a linear projection

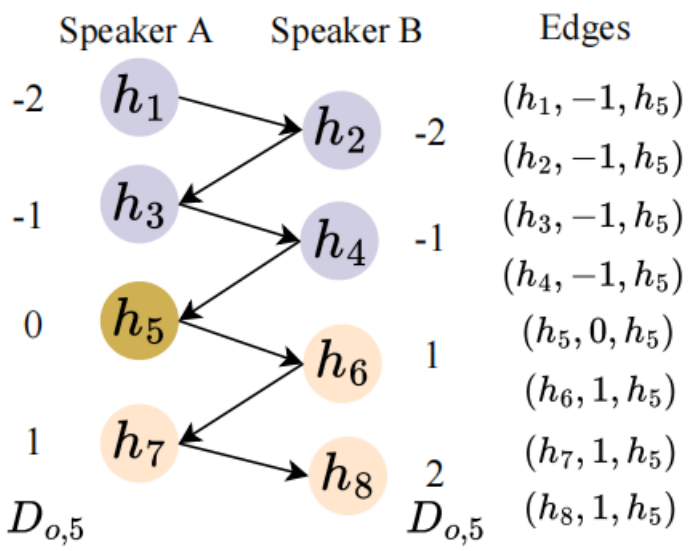
$$h_c = h_e \oplus h_u$$

$$head_N = \text{softmax}\left(\frac{QK^T}{\sqrt{d_u}}\right)V, \quad (2)$$

$$x = h_a + h_c$$

$$h_n = \sigma\left(MLP(x)\right) + x, \quad (3)$$

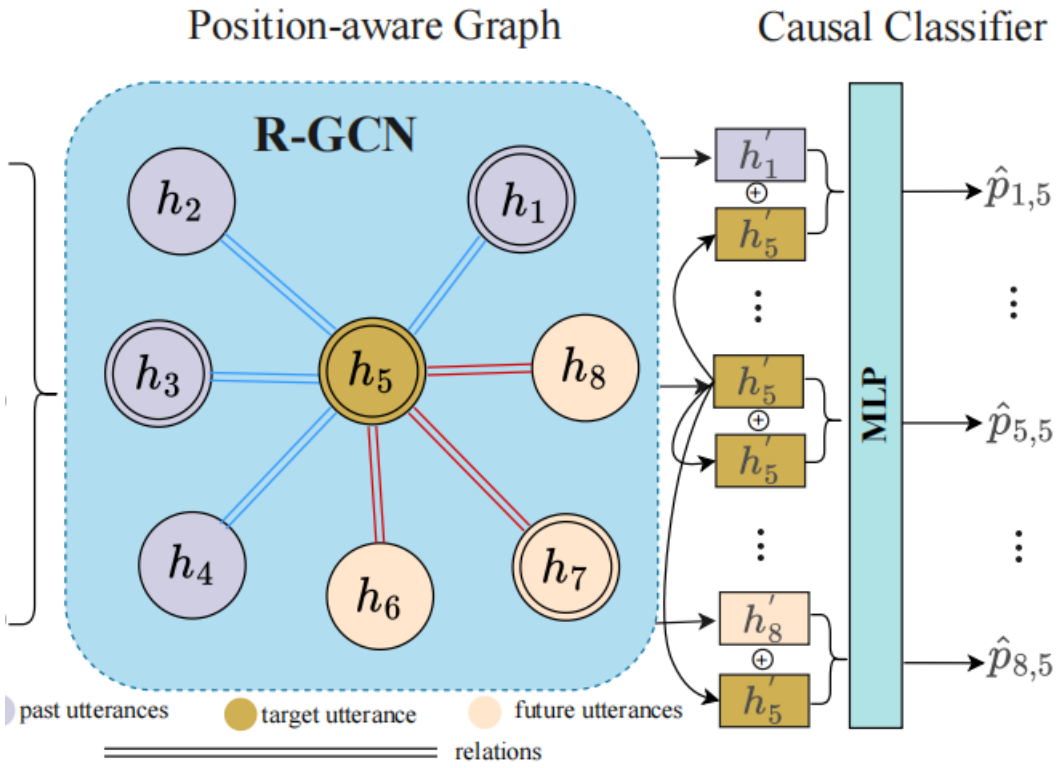
Method



$$D_{o,t} = \begin{cases} \frac{o-t}{2} & S_o = S_t \\ -1 & S_o \neq S_t \ and \ t = o \pm 1. \\ \frac{o-t-1}{2} & others \end{cases} \quad (4)$$

$$r_{o,t} = \begin{cases} -w & D_{o,t} < -w \\ D_{o,t} & D_{o,t} \geq -w \ and \ o \leq t. \\ 1 & o > t \end{cases} \quad (5)$$

Method



$$h_t^{'} = \sigma\left(\sum_{r\in\mathcal{R}}\sum_{o\in\mathcal{N}_t^r}\frac{1}{c_{t,r}}W_r h_o + W_0 h_t\right), \tag{6}$$

$$\hat{p}_{o,t} = \sigma\left(\mathrm{MLP}\left(h_o^{'} \oplus h_t^{'}\right)\right). \tag{7}$$

Experiments

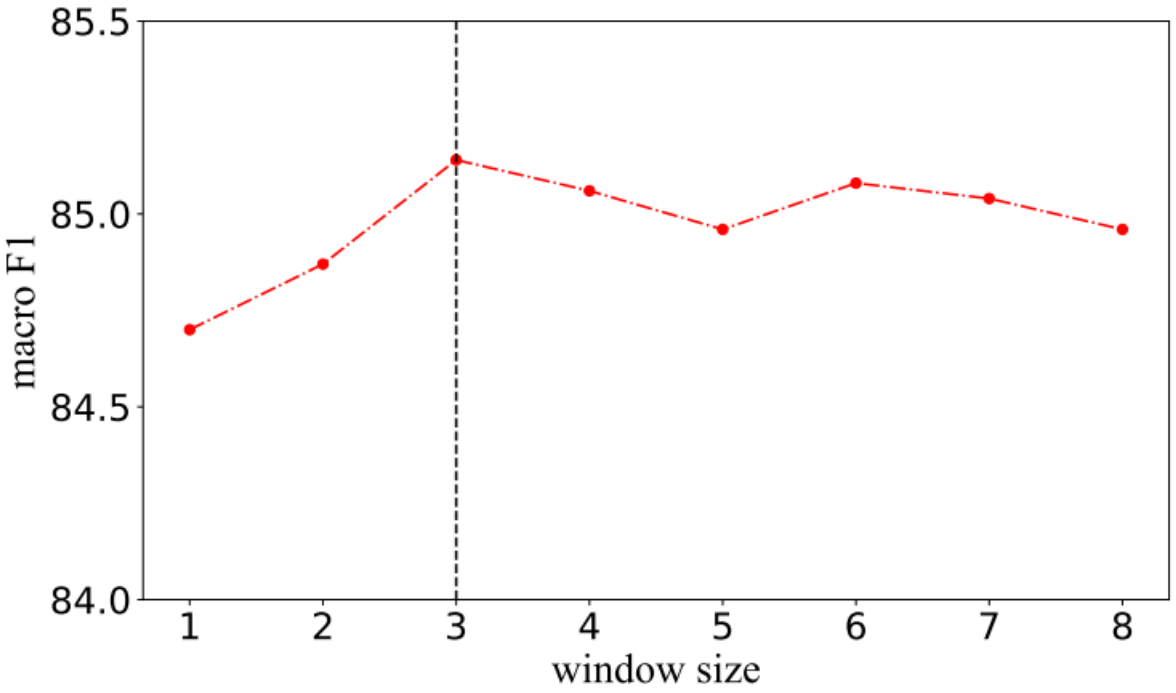
Test set	Conv.	Utt.	Avg.	Pos. Pairs	Neg. Pairs
DD	225	2,405	10	1,894	26,814
IE	16	665	41	1,080	11,305

Table 1. The statistics of RECCON test set, where "DD" and "IE" stands for the RECCON-DD and RECCON-IE test sets, respectively. Avg. represents the number of utterances per conversation on average.

Experiments

Model	DD			IE		
	Neg. F1	Pos. F1	Macro F1	Neg. F1	Pos. F1	Macro F1
Base[3]	88.74	64.28	76.51	95.67	28.02	61.85
ECPE-MLL[25]	94.68	48.48	71.59	93.55	20.23	57.65
ECPE-2D[9]	94.96	55.50	75.23	**97.39**	28.67	63.03
RankCP[26]	**97.30**	33.00	65.15	92.24	15.12	54.75
KEC♣ [8]	95.74(±0.05)	66.76(±0.33)	81.25(±0.17)	86.08(±0.46)	19.72(±1.71)	52.9(±0.8)
PAGE	95.80(±0.06)	**68.80**(±0.11)	**82.30**(±0.05)	96.41(±0.25)	**45.96**(±0.82)	**71.19**(±0.52)
-w/o PaG	93.36(±0.46)	52.94(±0.97)	73.15(±0.31)	84.53(±2.0)	21.62(±0.32)	53.07(±0.89)

Experiments



Thanks!