



DialogueEIN: Emotion Interaction Network for Dialogue Affective Analysis

Yuchen Liu¹, Jinming Zhao², Jingwen Hu¹, Ruichen Li¹, Qin Jin^{1*}

¹ School of Information, Renmin University of China

² Qiyuan Lab, Beijing, China

{liuyuchen_alfred, hujingwen_benja, ruichen, qjin}@ruc.edu.cn

zhaojinming@qiyuanlab.com

Code: <https://github.com/AIM3-RUC/DialogueEIN>

2023. 5. 6 • ChongQing

— COLING 2022



gesis
Leibniz-Institut
für Sozialwissenschaften



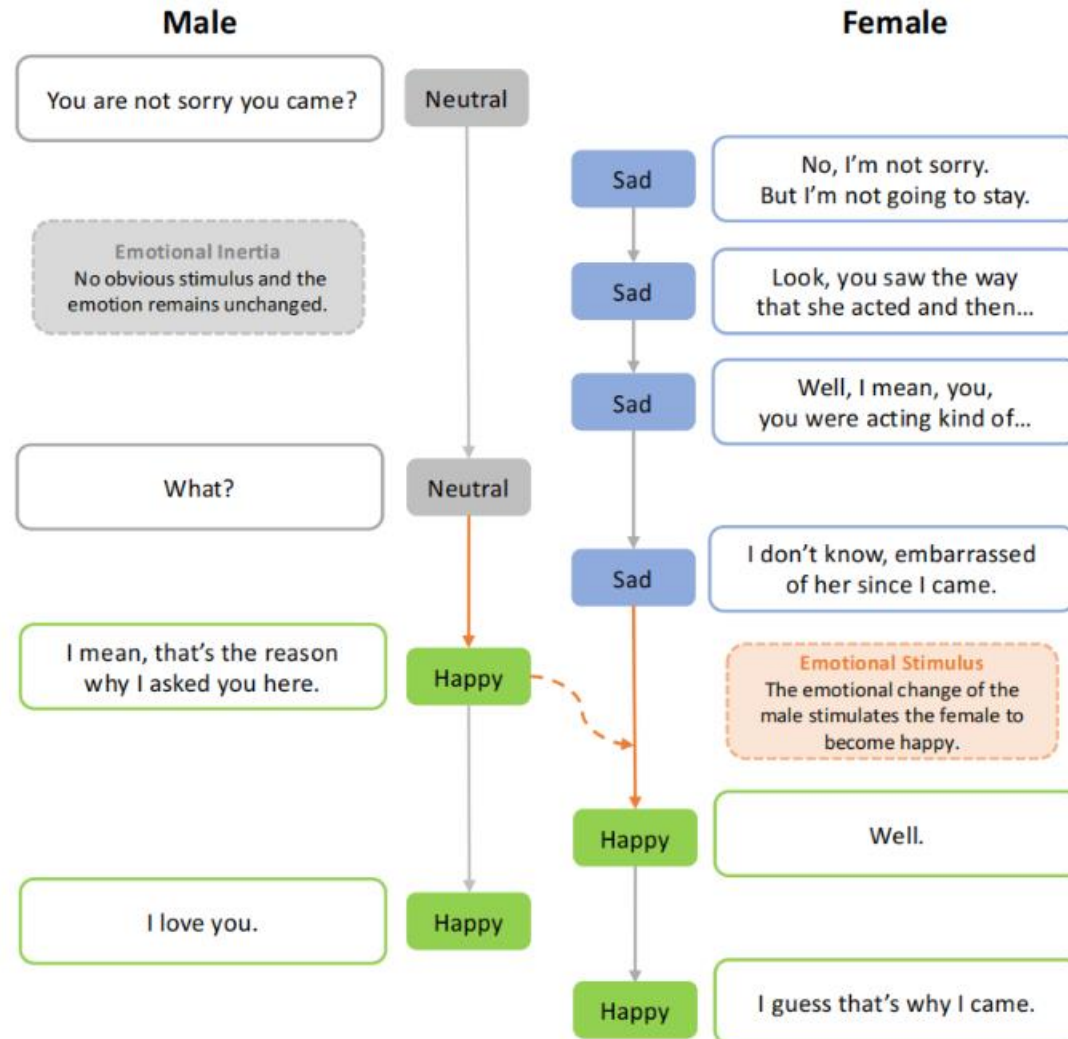
Reported by Renhui Luo



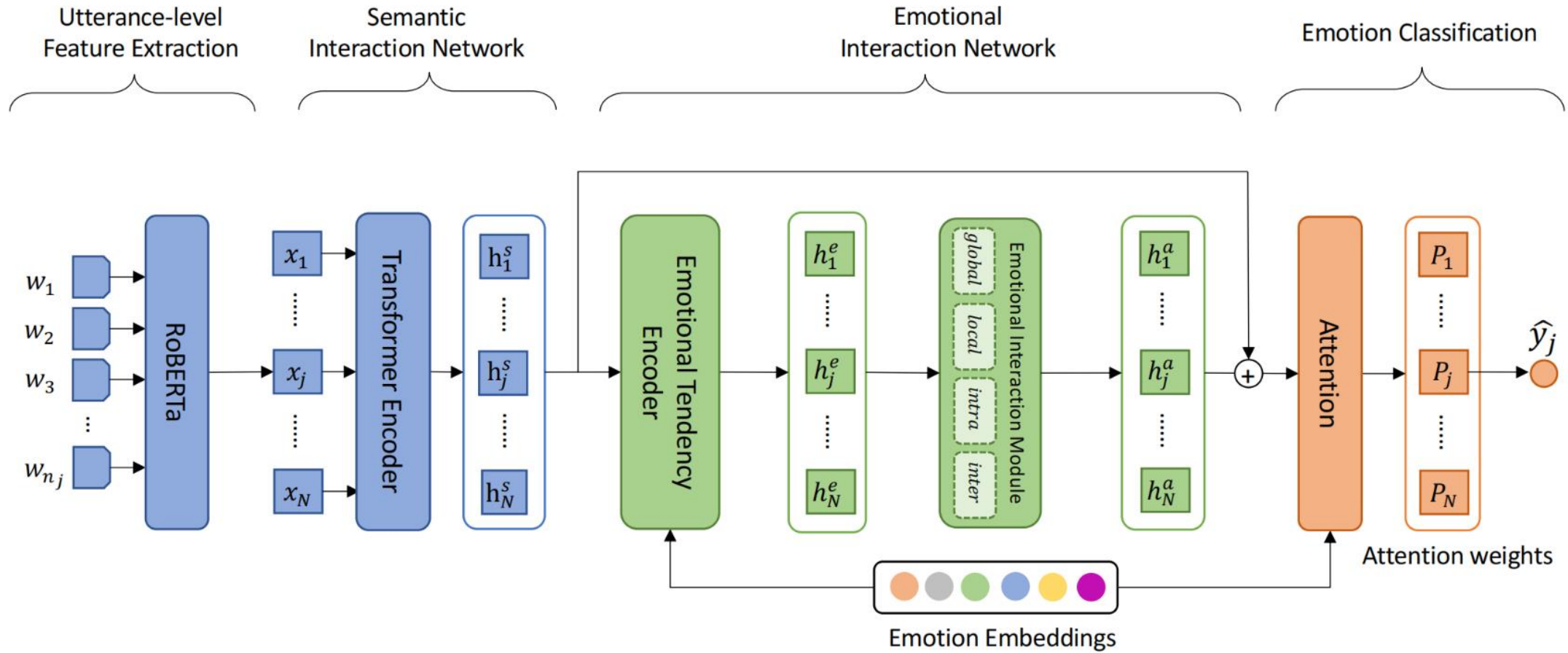
- 1.Introduction**
- 2.Overview**
- 3.Methods**
- 4.Experiments**



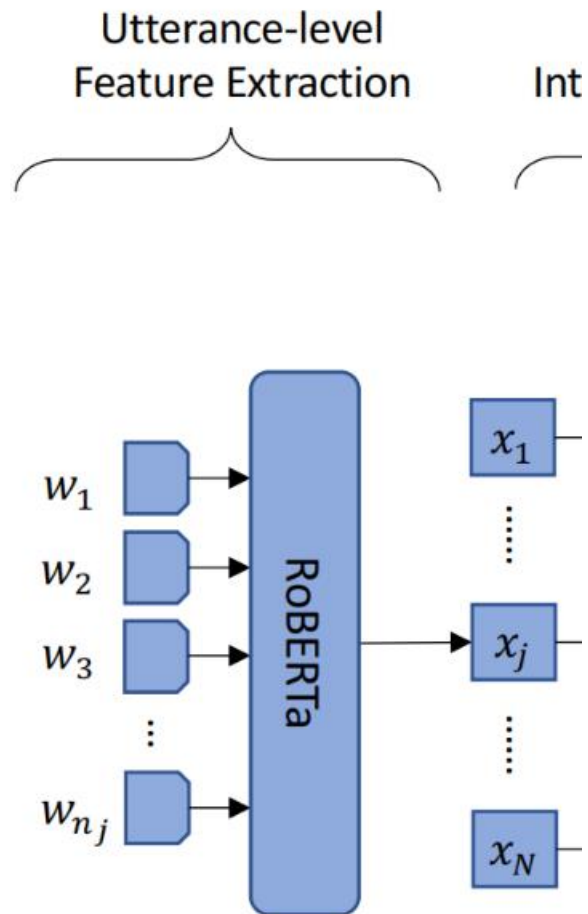
Introduction



Overview



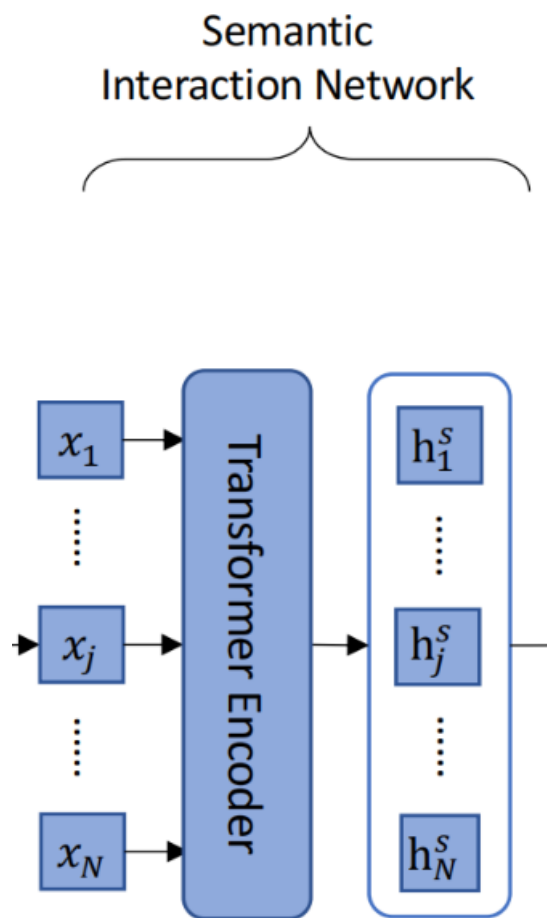
Method



$$X_j = \text{RoBERTa}([CLS], w_1^j, w_2^j, \dots, w_{n_j}^j) \quad (1)$$

$$x_j = W_u X_{j,0} + b_u \quad (2)$$

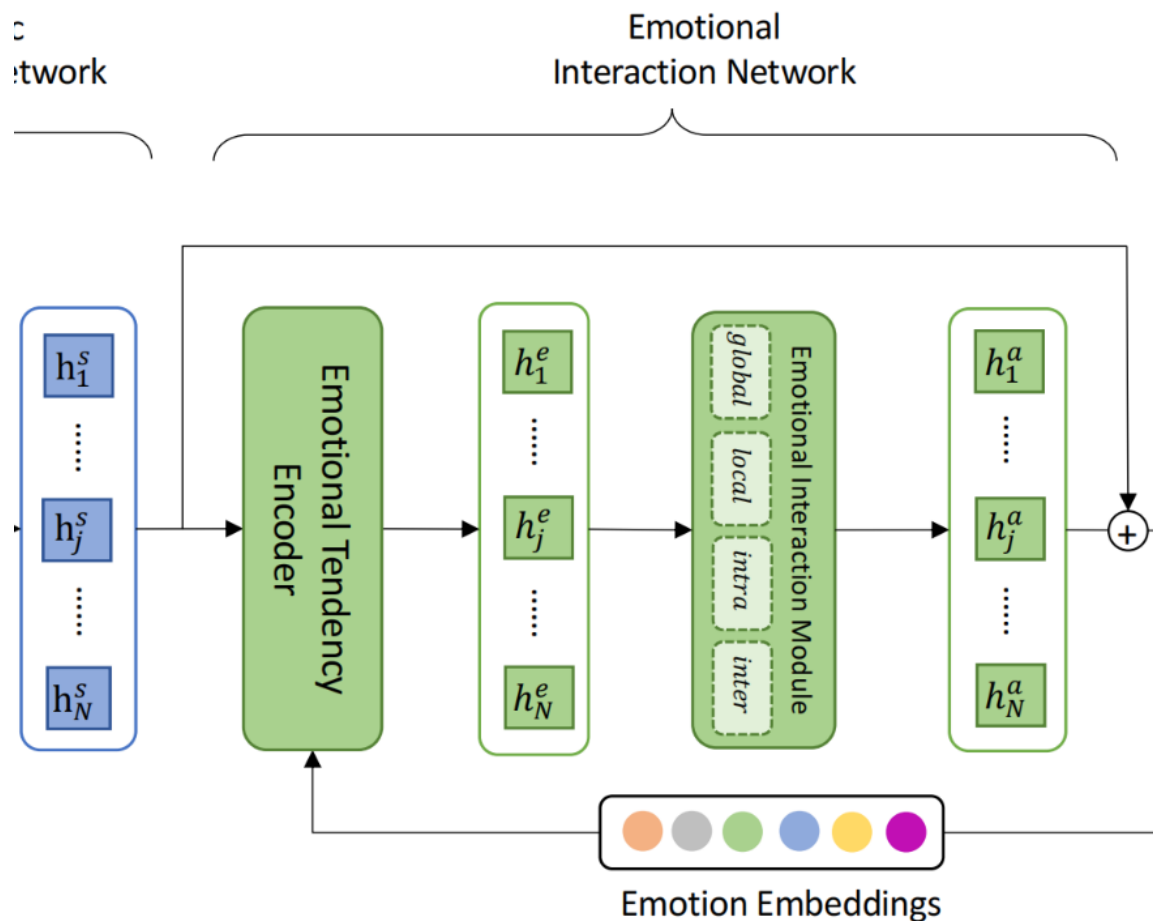
Method



$$h^0 = [x_1, x_2, \dots, x_N] + \text{PosEnc}(0 : N) \quad (3)$$

$$h^s = \text{TRMEncoder}(h^0) \quad (4)$$

Method



$$e_i = E^l(l_i) \quad (5)$$

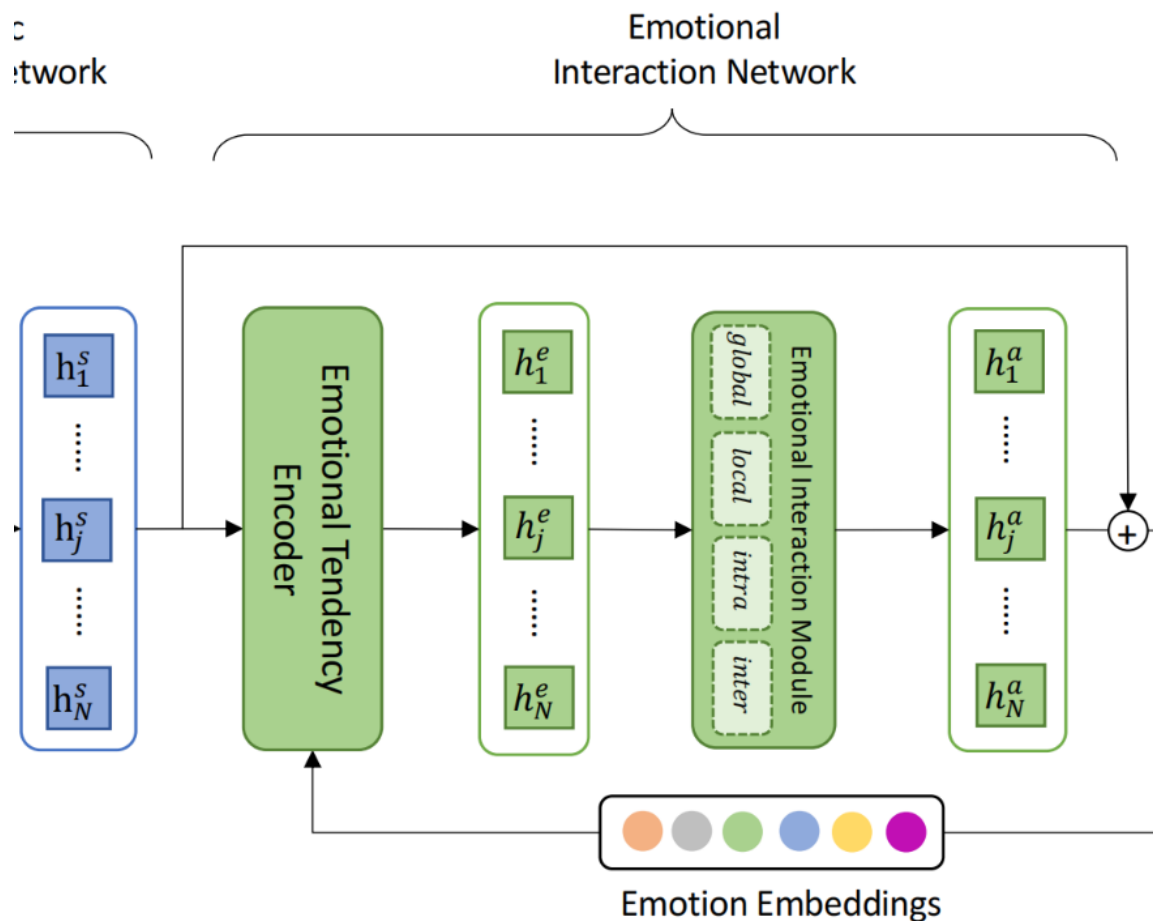
$$h^e = \text{MHA}(h^s, e, e) + h^s \quad (6)$$

$$A(Q, K, V, M) = \text{softmax}\left(\frac{QK^T}{\sqrt{d_h}} + M\right)V \quad (7)$$

$$\text{MHA}(Q, K, V, M) = \text{Concat}(\text{head}_1, \dots, \text{head}_n)W^O \quad (8)$$

$$\text{head}_i = A(QW_i^Q, KW_i^K, VW_i^V, M) \quad (9)$$

Method



$$h^{ei} = \text{Concat}\{\text{MHA}_{EI}(h^e, h^e, h^e, m) | m \in M\} \quad (10)$$

$$h^a = \text{LayerNorm}(h^{ei}W^a + b_a + h^s) \quad (11)$$

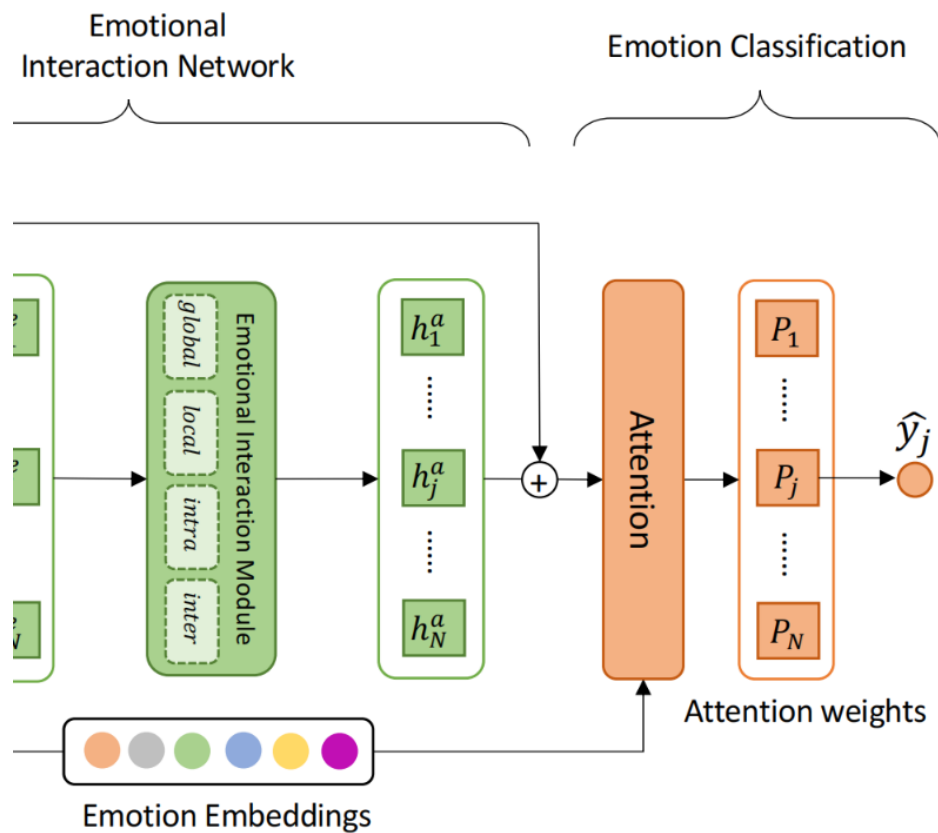
$$m_{i,j}^{global} = 0 \quad (12)$$

$$m_{i,j}^{local} = \begin{cases} 0, & \text{if } |i - j| < w/2 \\ -\infty, & \text{otherwise} \end{cases} \quad (13)$$

$$m_{i,j}^{intra} = \begin{cases} 0, & \text{if } p(u_i) = p(u_j) \\ -\infty, & \text{otherwise} \end{cases} \quad (14)$$

$$m_{i,j}^{inter} = \begin{cases} 0, & \text{if } p(u_i) \neq p(u_j) \text{ or } i = j \\ -\infty, & \text{otherwise} \end{cases} \quad (15)$$

Method



$$P_j = \text{softmax}(e^T W^c h^a) \quad (16)$$

$$\hat{y}_j = \text{argmax}(P_{1:|L|,j}) \quad (17)$$

$$L = -\frac{1}{\sum_{k=1}^T N(k)} \sum_{i=1}^T \sum_{j=1}^{N(i)} \log P_{i,j} [y_{i,j}] \quad (18)$$



Experiments

Dataset	dialogues			utterances		
	train	val	test	train	val	test
IEMOCAP	100	20	31	4830	980	1623
MELD	1038	114	280	9989	1109	2610
EmoryNLP	713	99	85	9934	1344	1328
DailyDialog	11118	1000	1000	87170	8069	7740

Table 1: Data distribution of the four datasets.



Experiments

	IEMOCAP	MELD	EmoryNLP	DailyDialog
	Avg(w)	Avg(w)	Avg(w)	Avg(micro)
KET	59.56	58.18	33.95	53.37
DialogueGCN	64.18	58.10	-	-
+RoBERTa	64.91	63.02	38.10	57.52
DialogXL	65.94	62.41	34.73	54.93
DAG-ERC	68.03	63.65	39.02	59.33
DialogueRNN	62.75	57.03	-	-
+RoBERTa	64.76	63.61	37.44	57.32
COSMIC	65.25	65.21	38.11	58.48
CESTa	67.10	58.36	-	63.12
DialogueEIN(Ours)	68.93	65.37	<u>38.92</u>	<u>62.58</u>



Experiments

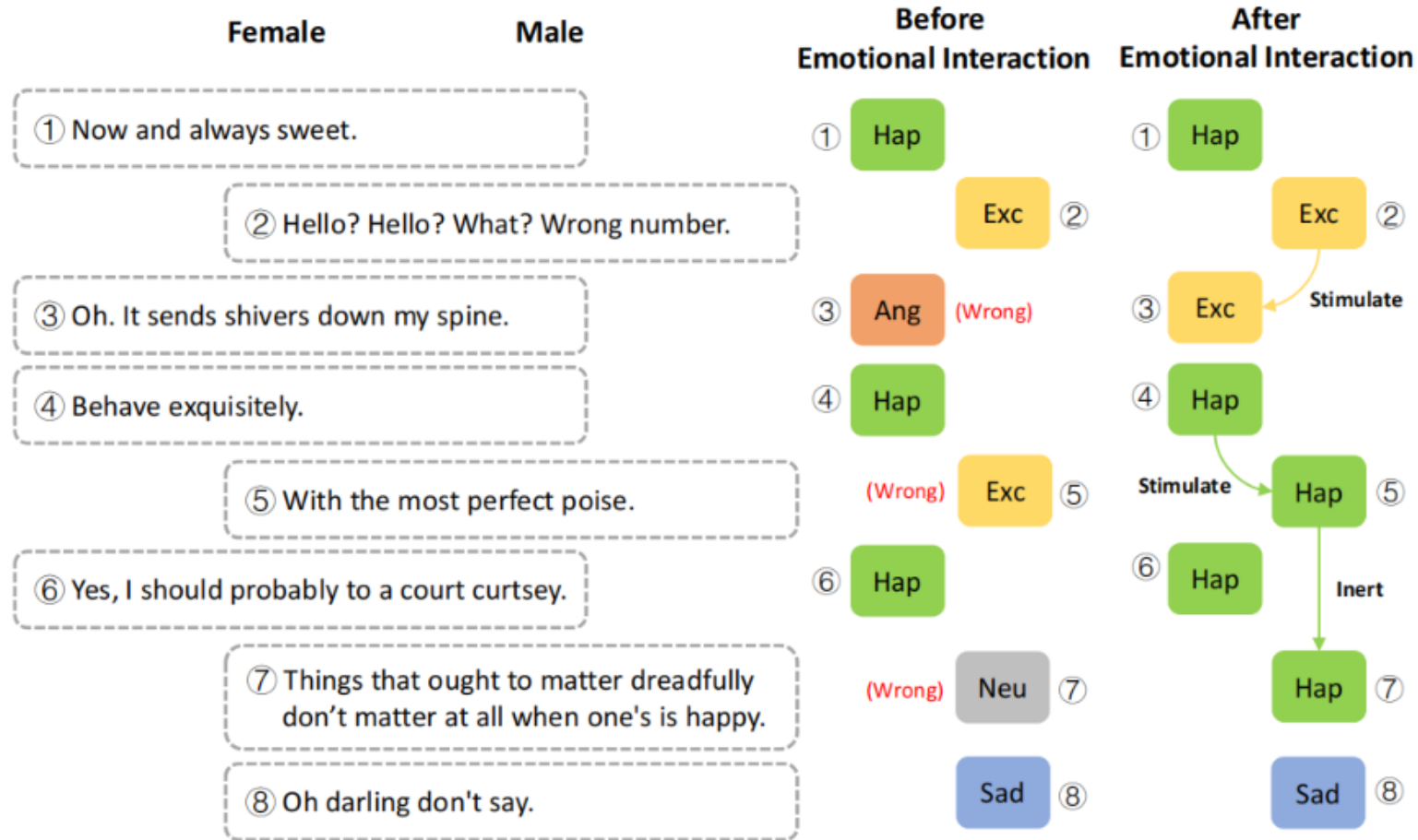
	IEMOCAP	MELD
DialogueEIN	68.93	65.37
- intra-speaker attention	68.63 (0.30↓)	64.89 (0.48↓)
- inter-speaker attention	68.43 (0.40↓)	65.10 (0.27↓)
- intra-&inter-speaker attention	67.36 (1.57↓)	64.84 (0.51↓)
- global&local attention	67.71 (1.22↓)	64.70 (0.67↓)
- Emotional Tendency Encoder	67.68 (1.25↓)	64.85 (0.52↓)
- Emotional Interaction Network	66.04 (2.89 ↓)	64.59 (0.78 ↓)



Experiments

		IEMOCAP	MELD
1	RoBERTa	63.38	62.88
2	+TRM	66.04	64.59
3	+TRM&Attentions	67.55	64.95
4	+TRM&CRF	67.11	64.62
5	+TRM&Attentions&CRF	67.76	64.69
6	DialogueEIN	68.93	65.37

Experiments





Thanks!