

Effective Context Modeling Framework for Emotion Recognition in Conversations

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Challenges & Proposals

Existing SOTA methods are GNN-based, which:

- Rely on **fixed window size** → “Multi-scale” GNNs (IGM).
- Assume **pairwise relationships** → Hypergraph Module.
- Use **naive pooling mechanism** on fine-grained features.
→ Perform cross-attention to fuse representations:

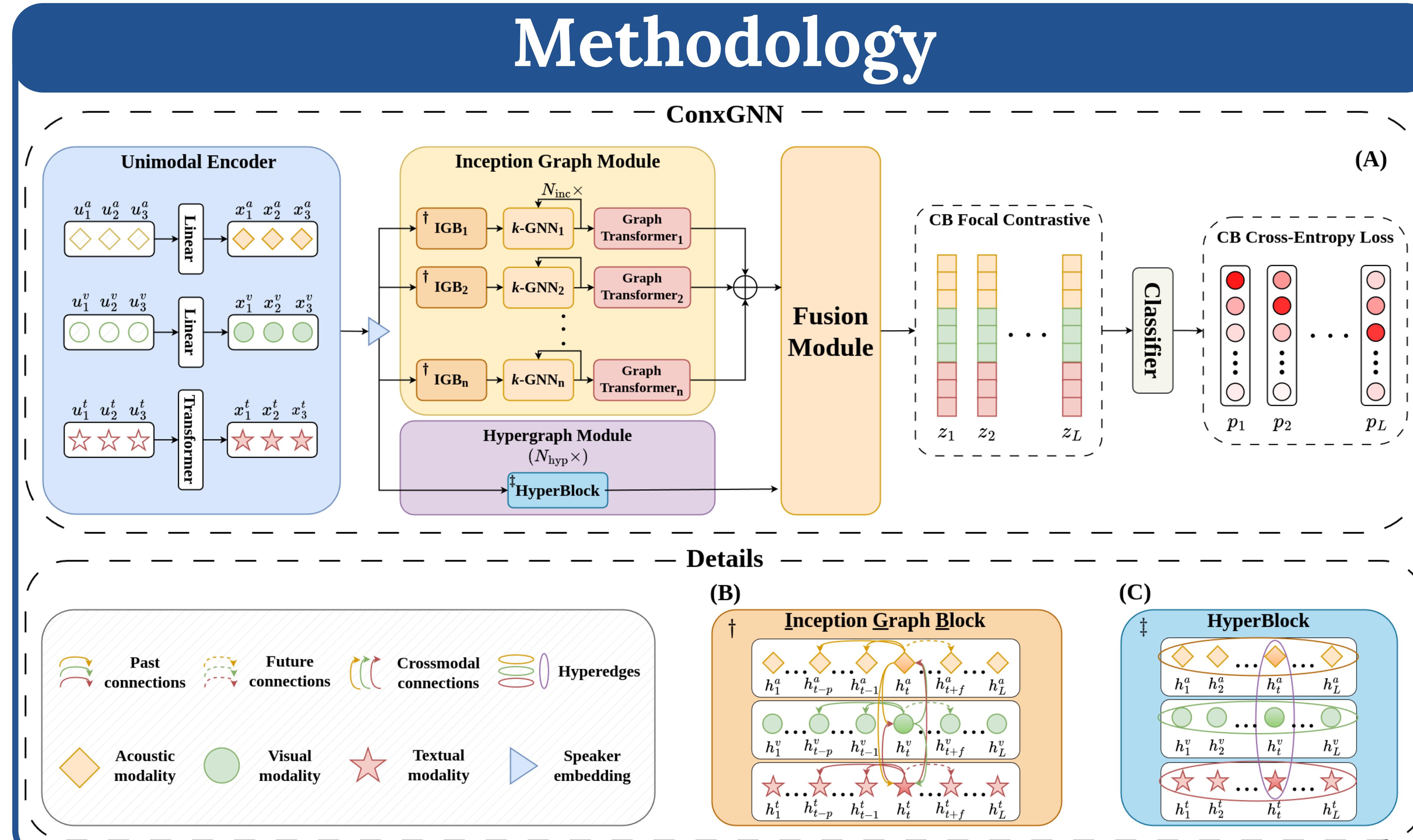
$$CA_i^{\tau \rightarrow t} = \text{Softmax}\left(\frac{(\mathbf{W}_Q \mathbf{f}_i^\tau)^\top (\mathbf{W}_K \mathbf{f}_i^t)}{\sqrt{d_h}}\right) \mathbf{W}_V \mathbf{f}_i^t$$

$$\hat{\mathbf{f}}_i^t = \mathbf{f}_i^t + CA_i^{v \rightarrow t} + CA_i^{a \rightarrow t}$$

- Overlook the issue of **class imbalance**.
→ Inject a weighting factor to loss functions.

$$w_c(i) = (1 - \beta)/(1 - \beta^{n_i}); \quad \beta \in [0, 1)$$

Methodology



Experimental Results

Main results. ConxGNN outperforms SOTA methods in MELD and IEMOCAP

Method	Network	IEMOCAP		MELD	
		Acc (%)	w-F1 (%)	Acc (%)	w-F1 (%)
IEMOCAP	DialogueGCN [6]	GNN-based	55.29	55.16	
	DialogueRNN [5]	Non-GNN	57.22	55.29	
	ICON [3]	Non-GNN	63.10	63.8	
	COGMEN [23]	GNN-based	64.02	63.78	
	CORECT [9]	GNN-based	66.20	66.39	
	ConxGNN (ours)	GNN-based	68.52	68.64	
MELD	DialogueGCN [6]	GNN-based	42.75	41.67	
	DialogueRNN [5]	Non-GNN	61.88	61.63	
	MM-DFN [24]	GNN-based	66.09	64.16	
	M ³ Net [25]	GNN-based	65.75	65.00	
	ConxGNN (ours)	GNN-based	66.28	65.69	

Ablation Studies. Components Analysis

Method	IEMOCAP		MELD	
	Acc (%)	w-F1 (%)	Acc (%)	w-F1 (%)
ConxGNN	68.52	68.64	66.28	65.69
– w/o IGM	38.48	25.68	50.84	40.21
– w/o HM	64.06	63.92	65.11	64.87
– w/o crossmodal	64.21	64.31	66.15	65.69
– w/o re-weight	63.13	63.90	65.30	65.10



Ablation Studies. Impact of Inception Graph Module with different number of branches

# Blocks	IEMOCAP		MELD	
	Acc (%)	w-F1 (%)	Acc (%)	w-F1 (%)
1	65.27	65.34	64.36	62.61
	65.29	65.31	64.27	62.65
	65.37	65.55	64.70	62.86
2	66.30	66.64	65.34	63.49
	66.02	65.88	65.40	63.44
	66.74	66.91	65.81	63.88
3	68.52	68.64	66.28	65.69