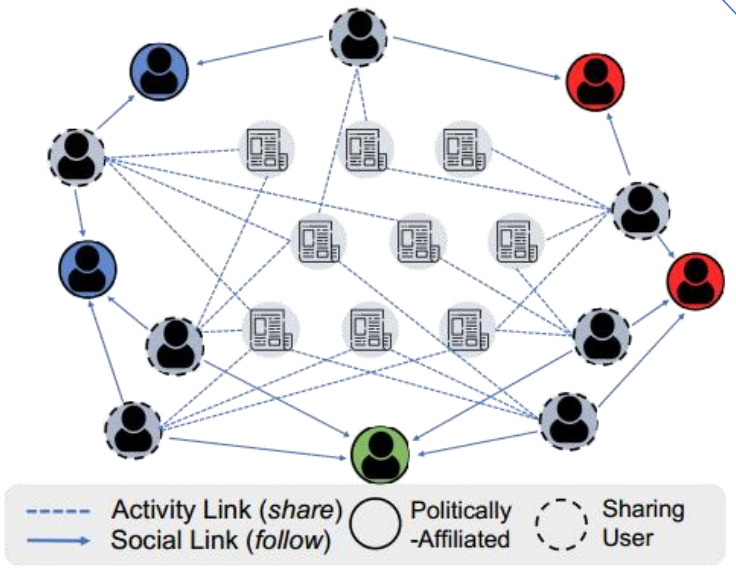
Encoding Social Information with Graph Convolutional Networks for Political Perspective Detection in News Media

利用图卷积网络对Social Information进行编码，
用于新闻媒体中的政治倾向性检测

ACL 2019

social information graph

- 政治用户P ⊂ V
- 普通用户U ⊂ V
- 新闻文本A ⊂ V
- 关注关系Eup ⊂ E
- 分享关系Eau ⊂ E



Articles	10,385	Twitter Users	1,604
-Left	3,931	Pol. Users	135
-Right	2,290	Left Pol. Users	49
-Center	4,164	Right Pol. Users	51
Sources	86	Center Pol. Users	35
Types	94	Avg # shared per Article	23.29
Events	2,020	Avg # pol. users followed	20.36

文本分类

- Majority
- Linear BoW
- Bias Feat.
- Avg WE
- SkipThought
- HLSTM
- HLSTM + Bias Feat.

Joint模型

$$L_{align} = -\sum_{a \in A} \log P(a^g | a^t)$$

- Full Supervision
- Distant Supervision
- Inference

基于图的表示

- Directly Observed Relationships in Graph (DOR)

$$L_{UP} = -\sum_{u \in U} \sum_{p \in P_u} logP(p|u)$$

$$P(p|u) = \frac{exp(e_u^T e_p)}{\sum_{q \in P} exp(e_u^T e_q)}$$

$$L_{DOR} = L_{clf} + L_{UP} + L_{AU}$$

- GCN

$$h_i^{(l+1)} = \sigma\left(\sum_{j \in N(i)} M^{(l)}(h_i^{(l)}, h_j^{(l)}) \right)$$

$$M^{(l)}(h_i^t, h_j^t) = W^{(l)} h_j$$

$$H^{(l+1)} = \sigma(\hat{A} H^{(l)} W^{(l)})$$

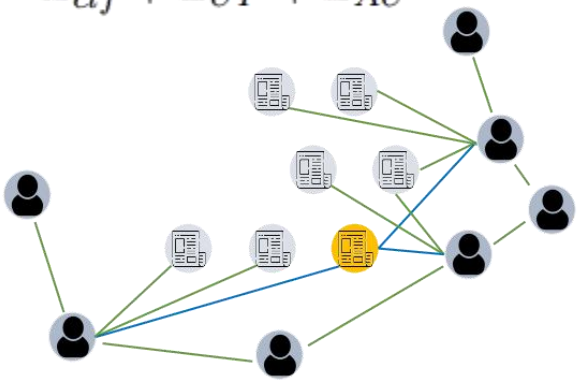


Figure 2: Example of Unfolding of GCN Computational Graph

$$V = \text{softmax}\left(\hat{A} \tanh\left(\hat{A} X W^{(0)} \right) W^{(1)} \right)$$

文本分类

Model	Split	Text
Majority	Rand	40.10
	Event	40.10
	Time	40.50
Linear BoW	Rand	58.47
	Event	59.88
	Time	55.41
Bias Feat.	Rand	54.06
	Event	53.51
	Time	52.96
Avg WE	Rand	59.37
	Event	59.37
	Time	53.46
SkipThought	Rand	68.67
	Event	66.35
	Time	60.89
HLSTM	Rand	**74.59**
	Event	**73.55**
	Time	**66.98**
HLSTM + Bias Feat.	Rand	69.32
	Event	69.87
	Time	66.79

基于图的表示

Model	Split	Graph	User	G+U
DOR	Rand	74.74	72.02	74.57
	Event	74.87	72.74	75.18
	Time	65.65	65.07	65.36
	Dist	56.45	56.95	56.54
GCN	Rand	88.65	78.83	**88.89**
	Event	**88.78**	76.11	88.70
	Time	81.14	71.31	**82.00**
	Dist	63.72	40.08	**67.03**

Joint模型

Model	Split	Graph	User	G+U	Text	G+T	G+U+T
GCN + SkipThought	Rand	89.95	81.49	89.75	70.61	90.34	91.02
	Event	89.40	79.06	89.64	69.16	90.15	90.78
	Time	84.95	76.59	85.30	64.12	84.09	86.25
	Dist	67.78	45.30	70.03	58.68	69.82	70.66
GCN + HLSTM	Rand	89.03	83.66	88.57	86.84	91.48	**91.74**
	Event	89.34	80.22	88.62	88.39	91.69	**91.72**
	Time	84.83	74.50	85.09	81.36	85.57	**86.21**
	Dist	71.74	69.39	71.16	61.13	**72.16**	71.85

Table 4: Results of Joint Model Combining Text and Graph Relations

Model	Split	Graph	User	G+U	Text	G+T	G+U+T
GCN + HLSTM (50%)	Rand	86.73	78.62	86.24	85.62	89.31	89.35
	Event	86.55	78.34	85.89	84.52	89.21	89.51
	Time	82.25	70.93	81.45	80.05	85.57	85.48
GCN + HLSTM (10%)	Rand	76.13	57.76	75.55	78.61	81.35	81.49
	Event	76.58	57.10	75.75	77.60	80.55	80.93
	Time	73.24	54.09	72.48	72.92	76.52	76.75

Table 5: Results of Joint Model with Reduced Links for Test Documents