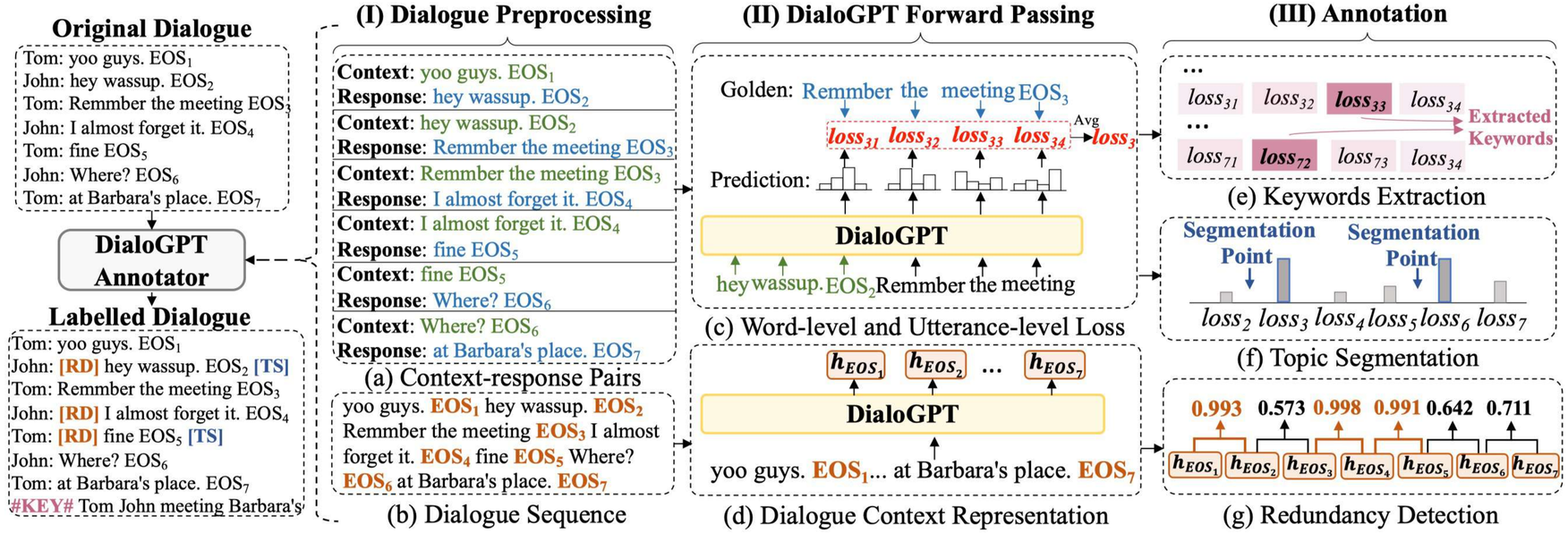
Language Model as an Annotator: Exploring DialoGPT for Dialogue Summarization

Xiachong Feng[1], Xiaocheng Feng[1,2], Libo Qin[1], Bing Qin[1,2], Ting Liu[1,2]
1 Harbin Institute of Technology 2 Peng Cheng Laboratory

Introduction

- **Dialogue Summarization**
  - Generate a succinct summary while retaining essential information of the dialogue.
- **Previous Works**
  - Previous models usually encode the dialogue with additional semantic features.
- **Problems**
  - Additional features are obtained via open-domain toolkits or relied on human annotations.
- **Our Solution**
  - View the pre-trained DialoGPT as an unsupervised dialogue annotator to label three features.

DialoGPT Annotator



Experiments

Automatic Evaluation

SAMSum Dialogue Dataset

Model	R-1	R-2	R-L
Extractive			
LONGEST-3	32.46	10.27	29.92
TextRank	29.27	8.02	28.78
Abstractive			
Transformer	36.62	11.18	33.06
D-HGN	42.03	18.07	39.56
TGDGA	43.11	19.15	40.49
DialoGPT	39.77	16.58	38.42
MV-BART	53.42	27.98	**49.97**†
Ours			
BART	52.98	27.67	49.06
BART($\mathcal{D}_{\text{KE}}$)	**53.43**††	**28.03**††	49.93
BART($\mathcal{D}_{\text{RD}}$)	53.39	28.01	49.49
BART($\mathcal{D}_{\text{TS}}$)	53.34	27.85	49.64
BART($\mathcal{D}_{\text{ALL}}$)	**53.70**†	**28.79**†	**50.81**†

AMI Meeting Dataset

Model	R-1	R-2	R-L
Extractive			
TextRank	35.19	6.13	15.70
SummaRunner	30.98	5.54	13.91
Abstractive			
UNS	37.86	7.84	13.72
TopicSeg	**51.53**††	12.23	**25.47**†
HMNet	**52.36**†	**18.63**†	24.00
Ours			
PGN	48.34	16.02	23.49
PGN($\mathcal{D}_{\text{KE}}$)	50.22	17.74	24.11
PGN($\mathcal{D}_{\text{RD}}$)	50.62	16.86	24.27
PGN($\mathcal{D}_{\text{TS}}$)	48.59	16.07	24.05
PGN($\mathcal{D}_{\text{ALL}}$)	50.91	**17.75**††	**24.59**††

Human Evaluation

	Model	Info.	Conc.	Cov.
SAMSum	Golden	4.37	4.26	4.27
	BART	3.66	3.65	3.66
	MV-BART	3.85	3.76	3.88
	BART($\mathcal{D}_{\text{KE}}$)	3.88	3.77	3.79
	BART($\mathcal{D}_{\text{RD}}$)	3.74	**3.98** †	3.89
	BART($\mathcal{D}_{\text{TS}}$)	**3.95**††	3.76	**4.01**††
	BART($\mathcal{D}_{\text{ALL}}$)	**4.05**†	**3.78**††	**4.08**†

	Model	Info.	Conc.	Cov.
AMI	Golden	4.70	3.85	4.35
	PGN	2.92	3.08	2.70
	HMNet	**3.52**†	2.40	**3.40**†
	PGN($\mathcal{D}_{\text{KE}}$)	3.20	3.08	3.00
	PGN($\mathcal{D}_{\text{RD}}$)	3.15	**3.25**†	3.00
	PGN($\mathcal{D}_{\text{TS}}$)	3.05	**3.10**††	**3.17**††
	PGN($\mathcal{D}_{\text{ALL}}$)	**3.33**††	**3.25**†	3.10

Analysis

Effect of DialoGPT$_{KE}$

Method	R-1	R-2	R-L
Rule-Based Methods			
Entities	53.36	27.71	49.69
Nouns and Verbs	52.75	27.48	48.82
Traditional Methods			
TextRank	53.29	27.66	49.33
Topic words	53.28	27.76	49.59
Pre-trained Language Model-Based Methods			
KeyBERT			
w/ BERT emb	52.39	27.14	48.52
w/ DialoGPT emb	53.14	27.25	49.42
Ours			
DialoGPT$_{\text{KE}}$	**53.43**	**28.03**	**49.93**

Method	Precision	Recall	F_1
TextRank	47.74%	17.44%	23.22%
Entities	**60.42%**	17.80%	25.38%
DialoGPT$_{\text{KE}}$	33.20%	**29.49%**	**30.31%**

Effect of DialoGPT$_{RD}$

Model	R-1	R-2	R-L
SAMSum			
Rule-based	53.00	27.71	**49.68**
DialoGPT$_{\text{RD}}$	**53.39**	**28.01**	49.49
AMI			
Rule-based	50.19	16.45	23.95
DialoGPT$_{\text{RD}}$	**50.62**	**16.86**	**24.27**

Effect of DialoGPT$_{TS}$

Model	R-1	R-2	R-L
SAMSum			
C99			
w/ BERT emb	52.80	27.78	49.50
w/ DialoGPT emb	53.33	**28.04**	49.39
DialoGPT$_{\text{TS}}$	**53.34**	27.85	**49.64**

Model	R-1	R-2	R-L
AMI			
Golden	50.28	19.73	24.45
C99			
w/ BERT emb	48.53	15.84	23.63
w/ DialoGPT emb	**49.22**	**16.79**	23.88
DialoGPT$_{\text{TS}}$	48.59	16.07	**24.05**

Ablation Study

SAMSum Dialogue Dataset

Model	R-1	R-2	R-L
Ours			
BART	52.98	27.67	49.06
BART($\mathcal{D}_{\text{KE}}$)	53.43	28.03	49.93
BART($\mathcal{D}_{\text{RD}}$)	53.39	28.01	49.49
BART($\mathcal{D}_{\text{TS}}$)	53.34	27.85	49.64
BART($\mathcal{D}_{\text{KE+RD}}$)	53.56	28.65	50.55
BART($\mathcal{D}_{\text{KE+TS}}$)	53.51	28.13	50.00
BART($\mathcal{D}_{\text{RD+TS}}$)	53.64	28.33	50.13
BART($\mathcal{D}_{\text{ALL}}$)	**53.70**	**28.79**	**50.81**

AMI Meeting Dataset

Model	R-1	R-2	R-L
Ours			
PGN	48.34	16.02	23.49
PGN($\mathcal{D}_{\text{KE}}$)	50.22	17.74	24.11
PGN($\mathcal{D}_{\text{RD}}$)	50.62	16.86	24.27
PGN($\mathcal{D}_{\text{TS}}$)	48.59	16.07	24.05
PGN($\mathcal{D}_{\text{KE+RD}}$)	50.74	17.11	24.52
PGN($\mathcal{D}_{\text{KE+TS}}$)	50.69	16.83	24.33
PGN($\mathcal{D}_{\text{RD+TS}}$)	50.70	16.96	24.38
PGN($\mathcal{D}_{\text{ALL}}$)	**50.91**	**17.75**	**24.59**

Conclusion

- We investigate to use DialoGPT as unsupervised annotators including keywords extraction, redundancy detection and topic segmentation.
- Experimental results show that our method consistently obtains improvements upon pre-traind summarizer (BART) and non pre-trained summarizer (PGN) on both AMI and SAMSum.
- Our summarizer can achieve new state-of-the-art performance on the SAMSum dataset.

Email: xiachongfeng@ir.hit.edu.cn