



论文分享

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Generate, Delete and Rewrite: A Three-Stage Framework for Improving Persona Consistency of Dialogue Generation

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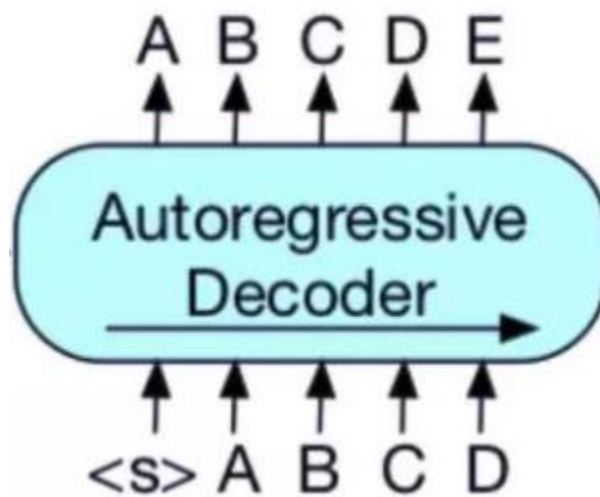
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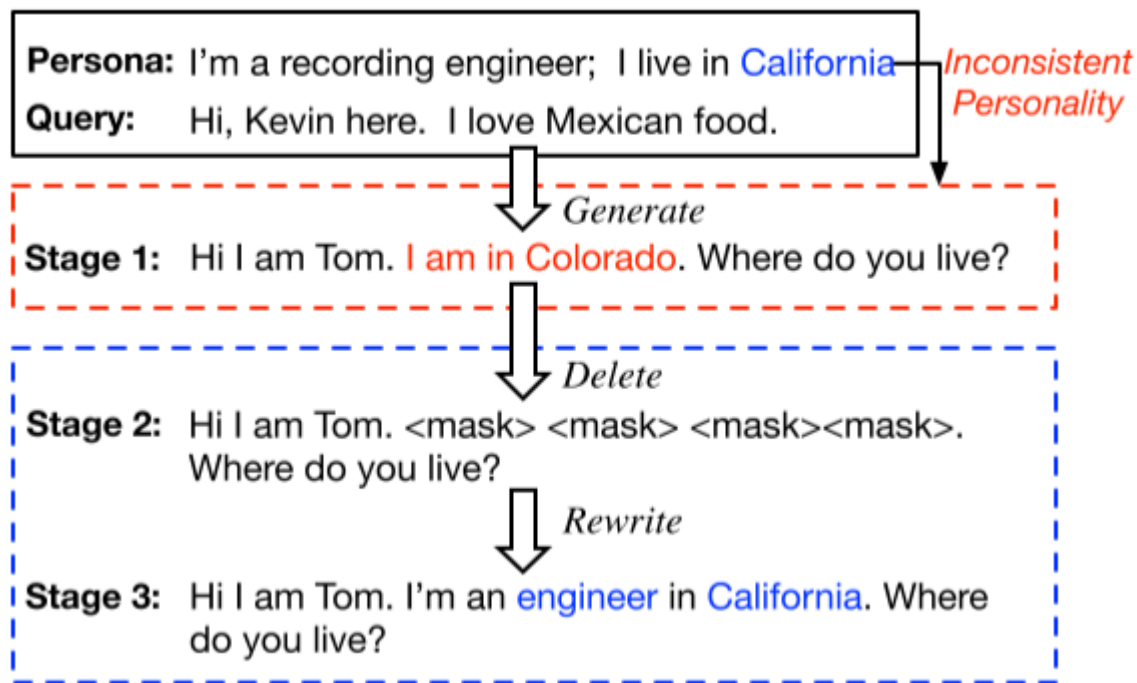


自回归生成

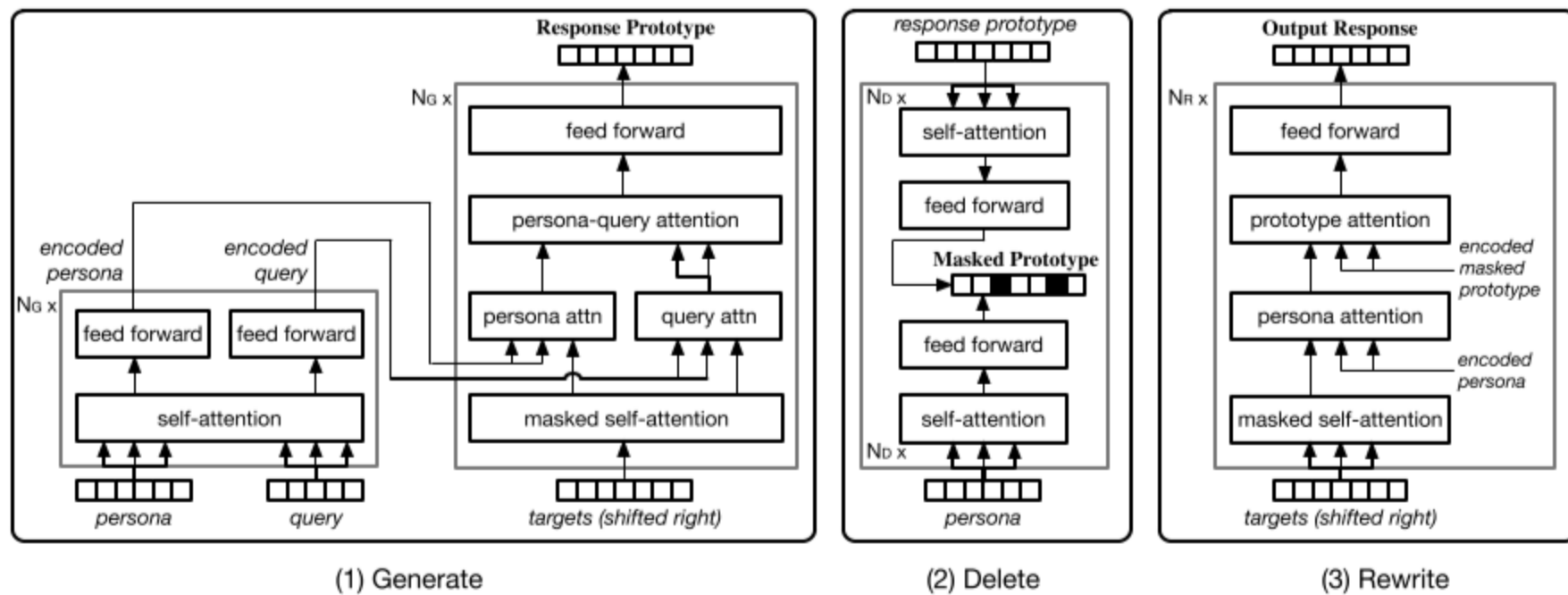


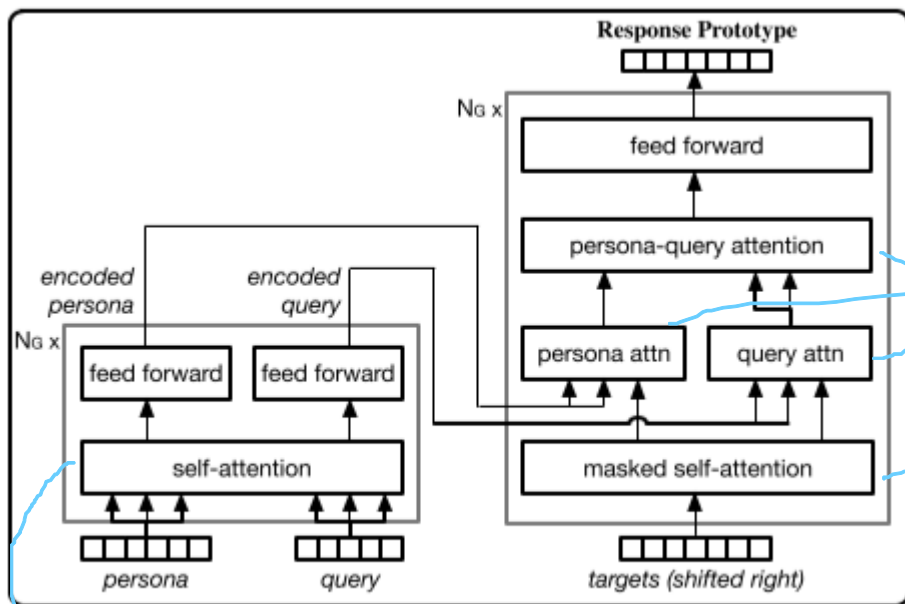
在对话生成的过程中让机器保持跟给定Persona的一致性仍然是一个大的挑战，现有的单轮对话模型仍然经常产生跟persona不一致的回答。

因此文章提出了 生成-删除-重写 三步走的生成方式，并且在机器评价和人类评价下表现都超越了现有的模型



论文模型





(1) Generate

$$V_p^{(1)} = \text{MultiHead}(\mathbf{I}(P), \mathbf{I}(P), \mathbf{I}(P)),$$

$$O_p^{(1)} = \text{FFN}(V_p^{(1)}),$$

$$\text{FFN}(x) = \max(0, xW_1 + b_1)W_2 + b_2,$$

$$V_y^{(1)} = \text{MultiHead}(\mathbf{I}(Y), \mathbf{I}(Y), \mathbf{I}(Y)),$$

$$E^{(1)} = \text{MultiHead}(V_y^{(1)}, O_p^{(N_G)}, O_p^{(N_G)}),$$

$$F^{(1)} = \text{MultiHead}(V_y^{(1)}, O_q^{(N_G)}, O_q^{(N_G)}),$$

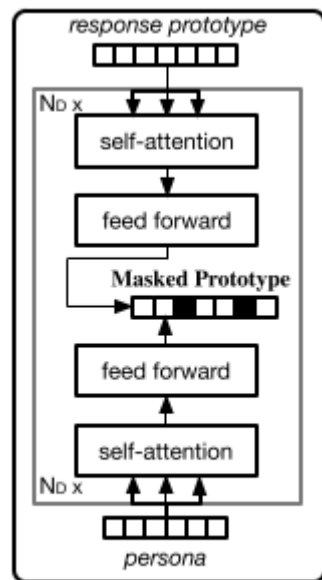
$$T^{(1)} = \text{MultiHead}(E^{(1)}, F^{(1)}, F^{(1)}),$$

$$O_{dec}^{(1)} = \text{FNN}(\text{mean}(E^{(1)}, F^{(1)}, T^{(1)})),$$

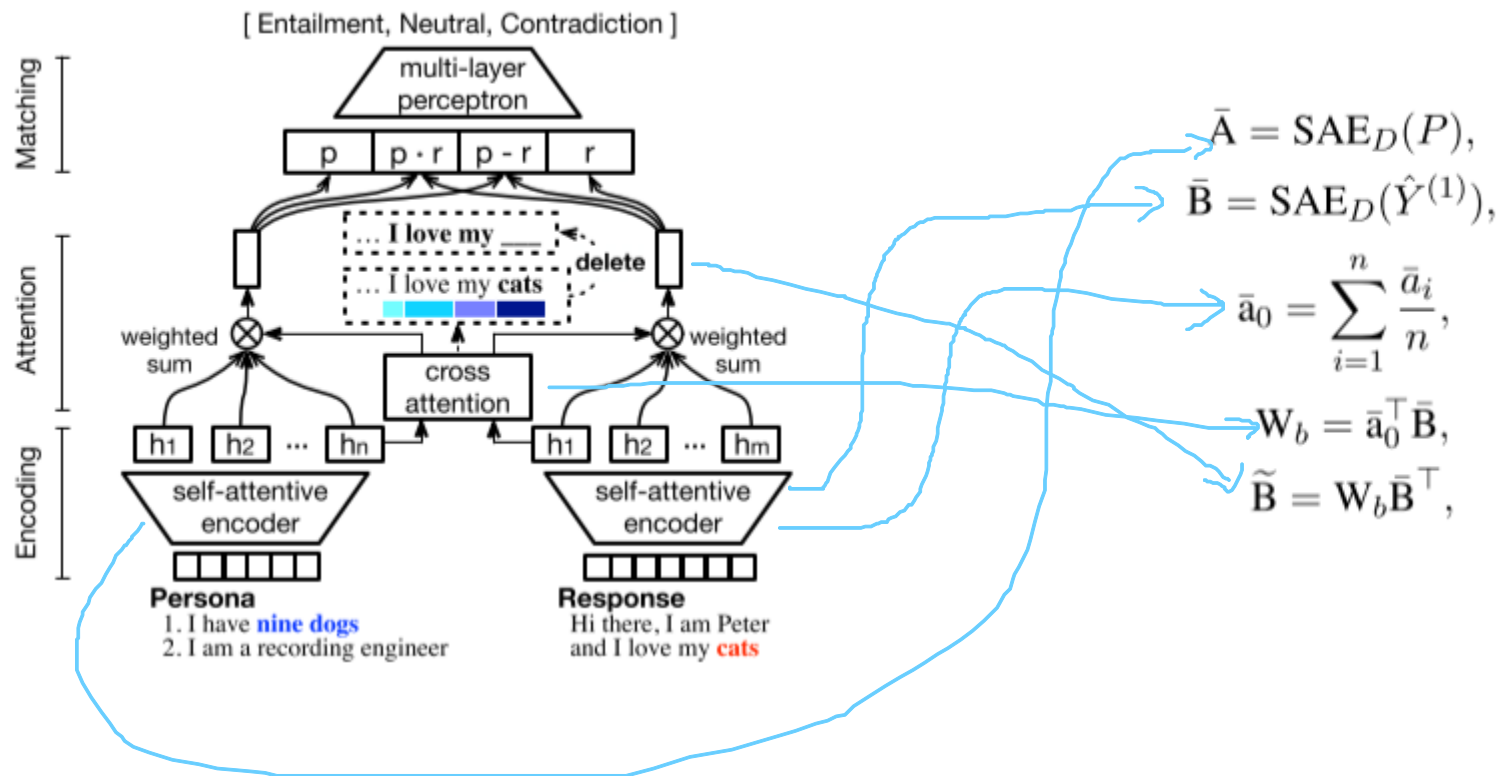
$$V_y^{(n)} = \text{MultiHead}(O_{dec}^{(n-1)}, O_{dec}^{(n-1)}, O_{dec}^{(n-1)}), \quad (11)$$

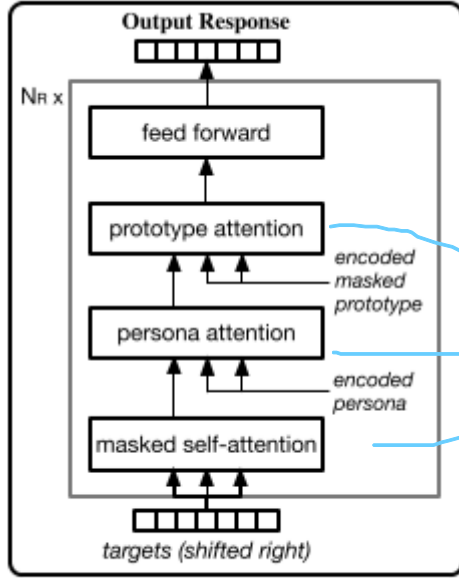
$$O_{dec}^{(n)} = \text{FNN}(\text{mean}(E^{(n)}, F^{(n)}, T^{(n)})), \quad (12)$$

$$\text{Prob}^{(1)} = \text{SoftMax}(O_{dec}^{(N_G)}W_3 + b_3),$$



(2) Delete





(3) Rewrite

$$\mathbf{O}_{mp}^{(N_G)} = \text{SAE}_G(\hat{Y}^{(2)}), \quad (19)$$

$$\mathbf{V}^{(n)} = \text{MultiHead}(\mathbf{O}_{rw}^{(n-1)}, \mathbf{O}_{rw}^{(n-1)}, \mathbf{O}_{rw}^{(n-1)}), \quad (20)$$

$$\mathbf{S}^{(n)} = \text{MultiHead}(\mathbf{V}^{(n)}, \mathbf{O}_p^{(N_G)}, \mathbf{O}_p^{(N_G)}), \quad (21)$$

$$\mathbf{K}^{(n)} = \text{MultiHead}(\mathbf{S}^{(n)}, \mathbf{O}_{mp}^{(N_G)}, \mathbf{O}_{mp}^{(N_G)}), \quad (22)$$

$$\mathbf{O}_{rw}^{(n)} = \text{FNN}(\text{mean}(\mathbf{S}^{(n)}, \mathbf{K}^{(n)})), \quad (23)$$

论文实验

对于G,R:Persona-chat
对于D:DNLI



S2SA
Per-S2SA
GPMN
DeepCopy
Per-CVAE
Transformer



两个侧重点:

1. Persona consistency
2. Response quality

每个模型收集两百条生成的Tuple(P,Q,R)进行打分

人工评测:

找五个专业的标注者进行标注

每个模型收集两百条生成的Tuple(P,Q,R)进行
打分

自动评测:

1. NLI模型检测Entailment ratio(DIIN,BERT)
2. perplexity(PPL)
3. Dist-1 / Dist-2

指标:

1. consistent(const): {0, 1} 是否跟persona一致
2. fluency(Fluc.): {1, 2, 3, 4, 5, 6}
3. relevance(Relv.): {1, 2, 3, 4, 5, 6}
4. informativeness(Info.): {1, 2, 3, 4, 5, 6}



Model	Const.	Fluc.	Relv.	Info.	PPL	Dist-1.	Dist-2.	Ent _{diin}	Ent _{bert}
S2SA	15.9%	3.17	2.84	2.63	34.8	1.92	4.86	9.80%	1.83%
GPMN	34.8%	3.78	3.57	3.76 [†]	34.1	1.89	7.53	14.5%	7.36%
Per-S2S	35.3%	3.43	3.22	3.32	36.1	2.01	7.31	13.5%	6.15%
DeepCopy	36.0%	3.26	3.08	2.87	41.2	2.35	8.93	16.7%	8.81%
Transformer	38.8%	3.46	3.65 [†]	3.54	27.9	3.12	15.8	14.2%	9.52%
Per-CVAE	42.7%	3.53	2.97	3.66	-*	3.83[†]	20.9	17.2%	7.36%
GDR (ours)	49.2%	3.86	3.68	3.77	16.7	3.66	22.7	21.5%	13.0%

GDR vs	Win(%)	Tie(%)	Lose(%)
S2SA	48.0	38.2	13.8
Per-CVAE	46.1	29.8	24.1
DeepCopy	43.8	35.5	20.7
Per-S2S	41.3	36.1	22.6
GPMN	35.0	31.0	34.0
Transformer	34.7	32.1	33.2

Model	Const.	Fluc.	Relv.	Info.	PPL
GDR	49.2%	3.86	3.68	3.77	16.7
GR	42.4%	3.72	3.40	3.66	18.0
GRdR	40.0%	3.60	3.29	3.56	20.6
G	40.1%	3.69	3.35	3.55	26.3
T	38.8%	3.46	3.65 [‡]	3.54	27.9

GDR vs	Win(%)	Tie(%)	Lose(%)
GRdR	41.7	39.5	18.8
GR	39.9	40.9	19.2
G	38.1	35.8	26.1

GDR:原模型

GR:模型不进行Delete

GRdR:Delete模块变成全随机mask掉10%的单词

G:只用G模块

T:只用G模块且不用Tuple attention



Persona	i. My mother is a dentist ii. I'm currently looking for a job
Query	I want to become a physical therapist.
Gen&Del Rewrite	I wish I could be a nurse . I want to be a <u>dentist</u> like my mom.
w/o Delete	I want to become a nurse like you.
Transfmr Per-S2S GPMN DeepCopy Per-CVAE	I hear you. I am a nurse and a mom. What kind of business? I'm a professional painter, you? What do you do for a living? I guess I would buy you one
Persona	i. Gymnastics is my favorite sport ii. I'm a gold medalist olympian
Query	I'm a minivan driver. I drive around.
Gen&Del Rewrite	That's awesome . I love to ski . That's cool. I am a <u>champion</u> <u>gymnast</u> .
w/o Delete	That's awesome. I am going to ski.
Transfmr Per-S2S GPMN DeepCopy Per-CVAE	Oh. I am still in high school . I drive a big van, but around the house. I drive a FIAT. I love it. What do you do for a living? That is why you like dogs? Tell me.
Persona	i. I like to grill outdoors ii. I have been retired for years
Query	Too old to work in construction. You?
Gen&Del Rewrite	I'm retired . I spend time outdoors . I'm <u>retired</u> . I spend most time <u>outdoors</u> .
w/o Delete	I'm retired. I spend most time outdoors.
Transfmr Per-S2S GPMN DeepCopy Per-CVAE	I am a boy and work in the construction. No, I am a student. I am a teacher, I love to be a teacher. I work in the construction industry. I am a retired officer I love my bike ride.

Thank You