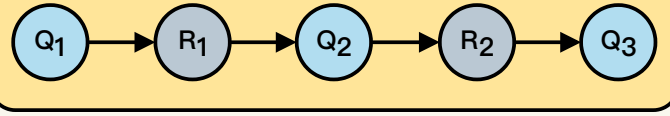


(1) Discourse Coherence Learning

Pre-Training

Dialogue Sequence



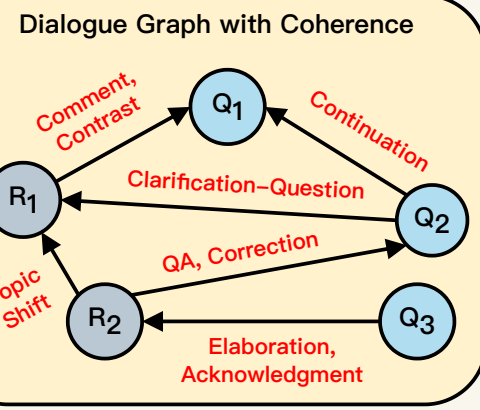
$$\mathcal{L}_{DA} = \mathcal{L}_{SPP} + \mathcal{L}_{TC} + \mathcal{L}_{GR}$$

$$\mathcal{L}_{DCU} = \mathcal{L}_{RC} + \mathcal{L}_{NRTP} + \mathcal{L}_{LP}$$

Dialogue Alignment Loss \mathcal{L}_{DA}

\mathcal{L}_{DCU}

Discourse Coherence Understanding Loss



Dialogue

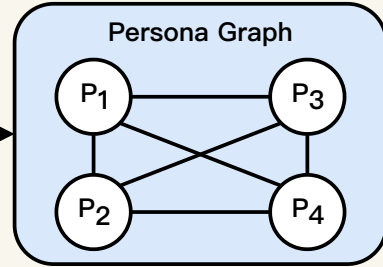
Q1: That isn't very nice. Context
R1: No, and I cry about it whilst I am on the bus for school. very sad.
Q2: What do your friends think?
R2: They try to help me, they also help me with my math, I am terrible at that.
Q3: I don't like it either. love music. Query

Coherence Relations

Persona

* I'm 13 years old.
* I ride the bus to school.
* I hate math class.
* I'm on the soccer team.

Persona Graph



Persona Graph Encoder

GAT

Dialogue Graph Encoder

DialogueGAT

Order Attention

Turn Attention

Attention-based Feature Fusion

GRAPH REPRESENTATION

(2) Persona-consistency Learning

Text Encoder



$h_{\langle BOS \rangle}$ $h_{\langle PER \rangle}$ h_{p_1} ... $h_{\langle QEY \rangle}$ h_{q_1} $h_{\langle RSP \rangle}$ h_{r_1} ... $h_{\langle QEY \rangle}$ h_{q_k} $h_{\langle EOS \rangle}$

Persona

Context

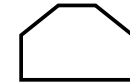
Query

$\langle BOS \rangle$ $\langle PER \rangle$ p_1 ... $\langle QRY \rangle$ q_1 $\langle RSP \rangle$ r_1 ... $\langle QRY \rangle$ q_k $\langle EOS \rangle$

Next Response Type Prediction (Dialogue Graph Encoder)

$\langle qa \rangle$ QA, $\langle topic\ shift \rangle$ Topic Shift, and $\langle continuation \rangle$ Continuation

(3) Personalized Response Generation



Token



Special Token



Vector



Pre-Training

Personalized Response

I prefer soccer, but what music do you like?

Language Modeling Loss \mathcal{L}_{LM}

Linear

Dynamic Weighted Aggregation

τ

Coherence-aware Attention

Coherence Embeddings

$h_{\langle Prompt \rangle}$ $h_{\langle BOS \rangle}$ $h_{\langle RSP \rangle}$ h^{r,k_1} h^{r,k_2} ... $h^{r,k_{|K|-2}}$ $h^{r,k_{|K|-1}}$ $h_{\langle EOS \rangle}$

Text Decoder



Prompt $\langle BOS \rangle$ $\langle RSP \rangle$ r_1^k r_2^k ... $r_{|K|-2}^k$ $r_{|K|-1}^k$ $\langle EOS \rangle$

Ground-Truth Response