Empathetic and Emotionally Positive Conversation Systems with an Emotion-specific Query-Response Memory

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Abstract

Emotional conversation systems generate responses for the input queries considering the speaker's emotions in a conversation. Existing emotional conversation systems output emotional responses according to either a given emotion or the user's emotion reflected in the input queries. Following a given emotion may lead to an emotional drift between the given emotion and the conversation state, and following only the user's emotion may aggravate the user's negative feelings if users suffer from a negative mood. In this paper, we propose to generate empathetic responses catering to the user's emotions while leading the conversation to be emotionally positive. Particularly, by abstracting the conversation corpus, we extract and store the different responding strategies for different users' emotions and conversational topics into a memory. We encourage positive emotions in conversation via a sentiment evaluator. We model the memory outputs with a Gaussian mixture distribution and sample a final responding strategy from the distribution. The strategy acts as a condition to a transformer model to generate responses. The experiments verify our model surpasses the baseline methods in appropriateness, diversity, and generating emotionally positive responses.

1 Introduction

Most conversation models capture only the correlation between queries and responses and may overlook speaker's emotional states in the conversation. Emotional conversation models (Zhou et al., 2018; Song et al., 2019) consider speakers' emotions during the dialogues, where the speakers can be either users or chatbots. Those models make chatbots aware of the user's emotions and enable them to respond empathetically. There are two directions for emotional conversation models. (1) Controllable response generation enables chatbots to respond conditioned on a certain emotion (Shin et al., 2020; Liu et al., 2021) or style (Zhou and Wang, 2018; Dathathri et al., 2019). Those methods require an explicit emotion label as input and the label dominates the chatbot's response. (2) Empathetic response generation, detects the user's emotion from the query so that the chatbots can respond empathetically considering the user's emotion (Lin et al., 2019, 2020).

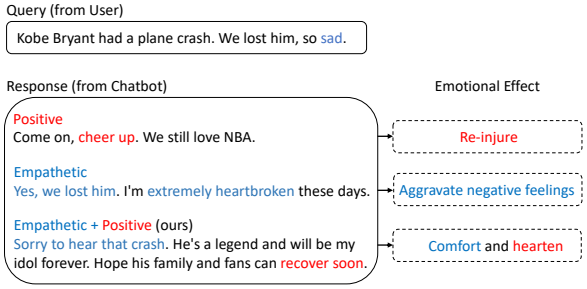

Figure 1: An example of the differences among controllable response generation (in red), empathetic response generation (in blue), and our chatbot (in a mixture of red and blue). When responding to the sad news, blunt cheering up might lead to reinjury and a plain show of empathy tends to aggravate negative feelings. A suitable response should be both empathetic and positive.

The above two directions cater to emotions in conversation but still possess some weaknesses. For the first direction, if the given emotion label mismatches with the user's emotion, controllable responses generation leads to an emotional drift (Deng et al., 2020) among dialogues, that is, the emotions of query and response are inconsistent and incoherent. As the example shown in Fig. 1, if the user tells a sad story and the chatbot aggressively encourages the emotion to be happy, the chatbot's responses may be crude resulting in reinjury to the user. As for empathetic response generation, without acquiring any additional inductive bias, the user's emotion does not necessarily hint how to respond empathetically (Shin et al., 2020), so considering the user's emotion usually pushes chatbots

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