

## 論文内容要旨

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学位論文題目	Research on Emotional Conversation based on Deep Learning Approach (深層学習に基づく感情会話分析に関する研究)		
<p>内容要旨</p> <p>Owning the capability to express specific emotions by a chatbot during a conversation is one of the key parts of artificial intelligence, which has an intuitive and quantifiable impact on the improvement of chatbot's usability and user satisfaction. Enabling machines to emotion recognition in conversation is challenging, mainly because the information in human dialogue innately conveys emotions by long-term experience, abundant knowledge, context, and the intricate patterns between the affective states. Recently, many studies on neural emotional conversational models have been conducted. However, enabling the chatbot to control what kind of emotion to respond to upon its own characters in conversation is still under explored. At this stage, people are no longer satisfied with using a dialogue system to solve specific tasks, and are more eager to achieve spiritual communication. In the chat process, if the robot can perceive the user's emotions and can accurately process them, it can greatly enrich the content of the dialogue and make the user empathize.</p> <p>In the process of emotional dialogue, our ultimate goal is to make the machine understand human emotions and give matching responses. Based on these two points, this thesis explores and in-depth emotion recognition in conversation task and emotional dialogue generation task. In the past few years, although considerable progress has been made in emotional research in dialogue, there are still some difficulties and challenges due to the complex nature of human emotions. The key contributions in this thesis are summarized as below:</p> <p>(1) Researchers have paid more attention to enhancing natural language models with knowledge graphs these days, since knowledge graph has gained a lot of systematic knowledge. A large number of studies had shown that the introduction of external commonsense knowledge is very helpful to improve the characteristic information. We address the task of emotion recognition in conversations using external knowledge to enhance semantics. In this work, we employ an</p>			

external knowledge graph ATOMIC to extract the knowledge sources. We proposed KES model, a new framework that incorporates different elements of external knowledge and conversational semantic role labeling, where build upon them to learn interactions between interlocutors participating in a conversation. The conversation is a sequence of coherent and orderly discourses. For neural networks, the capture of long-range context information is a weakness. We adopt Transformer a structure composed of self-attention and feed forward neural network, instead of the traditional RNN model, aiming at capturing remote context information. We design a self-attention layer specialized for enhanced semantic text features with external commonsense knowledge. Then, two different networks composed of LSTM are responsible for tracking individual internal state and context external state. In addition, the proposed model has experimented on three datasets in emotion detection in conversation. The experimental results show that our model outperforms the state-of-the-art approaches on most of the tested datasets.

(2) We proposed an emotional dialogue model based on Seq2Seq, which is improved from three aspects: model input, encoder structure, and decoder structure, so that the model can generate responses with rich emotions, diversity, and context. In terms of model input, emotional information and location information are added based on word vectors. In terms of the encoder, the proposed model first encodes the current input and sentence sentiment to generate a semantic vector, and additionally encodes the context and sentence sentiment to generate a context vector, adding contextual information while ensuring the independence of the current input. On the decoder side, attention is used to calculate the weights of the two semantic vectors separately and then decode, to fully integrate the local emotional semantic information and the global emotional semantic information. We used seven objective evaluation indicators to evaluate the model's generation results, context similarity, response diversity, and emotional response. Experimental results show that the model can generate diverse responses with rich sentiment, contextual associations.