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論　文　内　容　要　旨

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学位論文題目	Research on Textual Emotion Recognition based on Deep Learning Methods (深層学習に基づくテキスト感情分析に関する研究)		

内容要旨

Textual emotion recognition (TER) is the process of automatically identifying emotional states in textual expressions. It is a more in-depth analysis than sentiment analysis. Owing to its significant academic and commercial potential, TER has become an essential topic in the field of NLP. Over the past few years, although considerable progress has been conducted in TER, there are still some difficulties and challenges because of the nature of human emotion complexity. This thesis explores emotional information by incorporating external knowledge, learning emotion correlation, and building effective neural networks.

TER task can be seen as a classification task by predicting all possible emotion labels for a given textual data. Although many public emotion-related databases have been proposed, the imbalanced data distribution between each category largely influences the classification performance. Furthermore, with the development of big data, the resources available online have shown explosive growth. How to effectively use these data, whether labeled or unlabeled, is a considerable challenge in the NLP field. To make up for the limitation of imbalanced training data, this thesis proposes a multi-stream neural network that incorporates background knowledge for text classification. To better fuse background knowledge into the basal network, different fusion strategies are employed among multi-streams. The experimental results demonstrate that, as the knowledge supplement, the background knowledge-based features can make up for the information neglected or absented in basal text classification network, especially for imbalance corpus.

Besides, this thesis focuses on the challenges of how to effectively recognize emotions according to the contextual information, which deserves attention. Due to the subjectivity of emotional expression and understanding, different emotional feelings may be produced in different scenarios. Understanding the emotions contained in the same expression could be different because of people's own experiences and current feelings. To realize contextual emotion learning, this thesis proposes a hierarchical network with label embedding. First, this network

hierarchically encodes the given sentence based on its contextual information. Then, based on an assembled training objective, a label embedding matrix is trained for emotion correlation learning. The experimental results show that the proposed method contributes to emotional feature learning and contextual emotion recognition.

Furthermore, the nature of human emotional expression is complex. Many emotional categories have a particular connection, and there is no distinct boundary, such as love and happiness. In this way, the emotional classification task cannot be regarded as a simple single-label classification problem but a more complex multi-label classification task. Besides, Emotions are related to and influenced by each other. How to improve emotion recognition performance by effectively emotion correlation learning is a core problem in this task. To realize multi-label emotion recognition and emotion correlation learning, this thesis proposed a Multiple-label Emotion Detection Architecture (MEDA). MEDA comprises two modules: Multi-Channel Emotion-Specified Feature Extractor (MC-ESFE) and Emotion Correlation Learner (ECorL). MEDA captures underlying emotion-specified features with MC-ESFE module in advance. With underlying features, emotion correlation learning is implemented through an emotion sequence predicter in ECorL module. Furthermore, to incorporate emotion correlation information into model training, multi-label focal loss is proposed for multi-label learning. The proposed model achieved satisfactory performance and outperformed state-of-the-art models on both RenCECps and NLPCC2018 datasets, demonstrating the effectiveness of the proposed method for multi-label emotion detection.

Finally, this thesis concludes the whole works and discusses future directions. This paper mainly investigates the background and research status of the TER task and proposes some TER approaches for addressing some existing challenges. The future works are based on the previous works and can be extended to other scenarios, such as the dialogue level TER system, worthy of further attention.