Method to Improve Emotion Recognition Performance of Conversation Text for Non-face-to-face Counseling

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ABSTRACT

Recently, the importance of counseling is increasing due to the Corona Blue caused by COVID-19. In addition, non-face-to-face counseling, which has been prepared for a change in counseling media, is increasing, and research on this is being actively conducted. In non-face-to-face counseling, it is most important to accurately understand the client's feelings. Most conversation texts are classified as one emotion. However, there is a limit to recognizing the exact emotions inherent in conversation, so a method for recognizing emotions that combine sentiment is needed. Therefore, in this paper, we propose a technique for improving emotion recognition performance using conversation text, which is easy to collect data in non-face-to-face counseling. It recognizes more accurate emotions by combining sentiment with surprise and neutral emotions in conversation texts. To validate the proposed method, the accuracy was 74.8% when compared with the multi emotion recognition model.

KEYWORDS

Conversation text emotion recognition, Emotion recognition performance improvement

1 INTRODUCTION

Counseling is to normalize the problems of modern people who are experiencing various problems through conversation between the counselor and the client [1]. Recently, the importance of counseling is increasing due to mental health problems such as depression and anxiety due to the corona blue caused by COVID-19 [2]. In addition, with the proliferation of non-face-to-face services, the need for non-face-to-face counseling with a change in the media in counseling is increasing, and related research is being actively conducted. In non-face-to-face counseling, it is most important to accurately understand the client's emotions. In this case, emotions are recognized using conversation text, which is data that is easy to collect. Conversation texts are mostly classified as one emotion. However, it has a disadvantage in that the accuracy is not high and it is difficult to recognize the inherent accurate emotion. For more accurate emotion recognition, a method of combining sentiment with emotion recognition of conversation text is needed. Therefore, in this paper, we propose an emotion recognition performance improvement technique that combines sentiment with surprise and neutral emotions among the emotions of conversation text written by clients to improve emotion recognition performance in non-face-to-face counseling.

The structure of this paper is as follows. In Chapter 2, we describe emotion recognition and sentiment recognition, and in Chapter 3, we describe the method for improving the performance of conversation text emotion recognition proposed in this paper. Finally, Chapter 4 describes and concludes the conclusion and future research.

2 RELATED WORKS

2.1 Emotion Recognition

Emotion recognition is being actively researched as a field of emotion computing. Depending on the type of modality, it is possible to classify emotions into voice, biosignal, vision, and text. Compared with other modalities, text-based emotion recognition is necessary to enable more accurate emotion recognition [3]. In text emotion recognition, emotion was mostly determined by extracting emotion keywords. However, it is difficult to accurately recognize emotions because various syntactic information or semantic information inherent in the sentence is lost. In addition, there is a limit to the machine's ability to recognize complex human thoughts such as emotions. As a study to improve text emotion recognition performance, multidimensional emotions were recognized by learning Valence, Arousal, and Dominance [4]. In addition, various emotions were recognized by classifying conversation sentences into multiple emotions [3].

2.2 Sentiment Recognition

Sentiment recognition is a field of text mining and is also called opinion mining. It is a method of classifying and estimating the sentiment of positive and negative by analyzing the opinions, attitudes, or tendencies of people appearing in documents [5]. Sentiment recognition is based on determining the sentiment polarity of a word, the smallest unit of a document [6]. Therefore, it is important to use a sentiment dictionary that accurately applies the sentiment polarity of a word. Sentiment recognition consists of collecting various data from the web or bulletin board, classifying only text elements to be used for sentiment recognition, and judging

the preprocessed data as positive or negative. As a study for automatically analyzing sentiment, reviews were classified as attributes, and then sentiments were classified by applying semantic topic reclassification [7].

3 Method to improve emotion recognition performance of conversation text

3.1 Configuration diagram of the proposed method

In this paper, for more accurate emotion recognition in non-face-to-face counseling, we propose an emotion recognition performance improvement technique that combines sentiment with the emotion of the client's conversation text. Figure 1 is a configuration diagram of the method proposed in this paper.

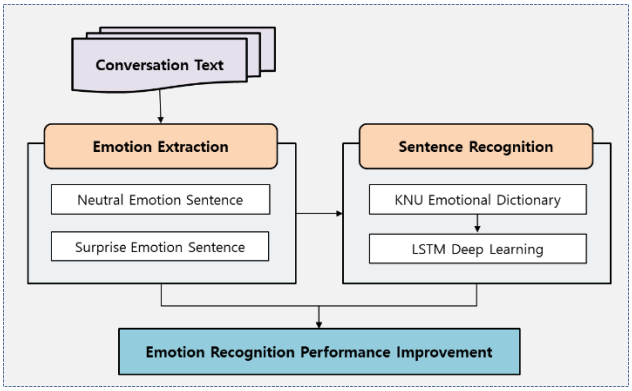

Figure 1: Configuration diagram of the proposed method

Sentiment classification extracts ambiguous neutral and surprise emotions from the conversation data set. The sentiment is determined based on LSTM by using the sentiment dictionary with the extracted data. And combining emotions and sentiments, it recognizes more accurate emotions.

3.2 Data set

In this paper, we use the 'continuous conversation data set including Korean emotion information' provided by AI-HUB [8]. The dataset is divided into sentences and emotions, and consists of a total of 55,600 sentences and is classified into 7 emotion classes. Table 1 shows the number and ratio of data by emotion.

Table 1: Number and ratio of data by emotion

Neutral	Surprise	Anger	Sadness	Happiness	Disgust	Fear	Total
43,786	4,866	3,628	1,972	1,030	220	98	55,600
78.8%	8.8%	6.5%	3.5%	1.9%	0.4%	0.2%	100%

As shown in Table 1, 78.8% of the data set consists of Neutral emotions and 8.8% of Surprise emotions, accounting for most of them at 87.6%. The remaining 12.4% consists of happy, angry, sad, disgust, and fear emotions. Happy can be classified as Positive, and angry, sad, disgust, and fear can be classified as Negative. However, Neutral and Surprise are ambiguous emotions to classify sentiments. Therefore, for more accurate emotion recognition, two emotions are extracted and sentiments are recognized.

3.2 Sentiment Recognition

The sentiment is recognized using the neutral and surprise sentences extracted earlier. In the process of determining the polarity value of text, sentiment recognition uses the KNU sentiment dictionary [9] and supervised learning is carried out using LSTM. It is determined by the polarity of the word, which is the smallest unit of the document, and labels positive as 1 and negative as 0. The data after the labeling work is trained on the LSTM model to measure the frequency of the text to classify the sentiment. Next, we proceed with embedding that turns words into numbers based on frequency.

3.3 Emotion recognition performance improvement

To improve the emotion recognition performance of conversation text, emotion and sentiment are combined. Table 2 shows the results of sentiment recognition of Neutral and Surprise emotional sentences.

Table 2: Result of emotional recognition of Neutral and Surprise emotional sentences

Conversation Text	Emotion	Sentiment
I get married and go to America right away.	Neutral	Positive
Maybe... around the end of the year?	Neutral	Negative
You gave a beautiful performance today.	Surprise	Positive
How do you beat a person like this?	Surprise	Negative

As shown in Table 2, Neutral and Surprise sentences can be classified into Positive and Negative. By recognizing emotions and sentiments together, it is possible to recognize more accurate emotions inherent in conversations.

For the verification of the proposed method, it was compared with a multi emotion recognition model that recognizes various emotions in one sentence[3]. The Sentiment of Neutral and Surprise sentences was compared with the results of multi emotion recognition and the method proposed. As a result of multi emotion recognition, if the ratio of happy is high, it is determined as Positive, and if the ratio of other emotions is high, it is determined as Negative. When the multi emotion recognition result was the correct answer, the accuracy of the proposed method was 74.8%. Therefore, by using the proposed method, it is possible to recognize emotions inherent in conversations and to improve the performance of conversation text emotion recognition.

4 CONCLUSIONS

In this paper, we proposed a method for improving the performance of conversation text emotion recognition for non-face-to-face counseling. As the data set, the 'continuous conversation data set including Korean emotion information' provided by AI-HUB was used. Neutral and surprise sentences with ambiguous sentiment classification were extracted from the data set. For the extracted sentences, the sentiment was recognized by using the sentiment dictionary and using LSTM. To validate the proposed method, the accuracy was 74.8% when compared with the multi emotion recognition model. By recognizing emotions and sentiments together, more accurate emotion recognition inherent in conversations is possible, so it is possible to improve emotion recognition performance. For future research, we plan to build a model for improving emotion recognition performance by combining text and voice data in non-face-to-face counseling.

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