CLAIM

1. A system for recognizing a sentiment of a user's feedback comprising:

an encoder configured to receive an input text for the user's feedback, break up the input text into text tokens, and encode each text token; and

a decoder connected to the encoder and configured to output a sentiment score for the input text,

wherein the encoder is further configured to read the encoded text token in a bidirectional manner by a Bidirectional Long Short-Term Memory Network (Bi-LSTM) model to obtain a forward node value and a backward node value, and concatenate the forward node value and the backward node value together to obtain a vector representing semantic meaning of the input text,

the decoder is configured to receive the vector from the encoder, obtain a probability of each sentiment score by mapping the vector into each sentiment score, and determine the sentiment score for the input text based on the probability,

the encoder comprises a series of Bi-LSTM layers in which the Bi-LSTM model is operated,

in a first Bi-LSTM layer of the Bi-LSTM layers, the encoder is configured to input the encoded text token into the Bi-LSTM model, and the Bi-LSTM model is configured to obtain a first forward node value and a first backward node value and concatenate the first forward node value and the first backward node value together, and

in a next Bi-LSTM layer of the Bi-LSTM layers, the encoder is configured to input the concatenated first forward node value and first backward node value into the Bi-LSTM model, and the Bi-LSTM model is configured to obtain a next forward node value and a next backward

node value and concatenate the next forward node value and the next backward node value together.

2. The system according to claim 1, wherein the input text relates to a sentence, and the encoder is configured to break up the input text into the text tokens each corresponding to a plurality of words included in the sentence.

3. The system according to claim 1 or claim 2, wherein the encoder comprises a max pooling layer in which a max pooling function is operated,

in a final Bi-LSTM layer of the Bi-LSTM layers, the Bi-LSTM model is configured to obtain a final forward node value and a final backward node value, and concatenate the final forward node value and the final backward node value together, and

in the max pooling layer, the max pooling function is configured to process the concatenated final forward node value and final backward node value to obtain the vector.

4. The system according to any one of claims 1 to 3, wherein the encoder is further configured to encode the each text token using a Byte Pair Encoding model.

5. The system according to claim 4, wherein the encoder is further configured to encode a stop token representing an end of the input text using the Byte Pair Encoding model, and input the encoded stop token into the Bi-LSTM model.

6. The system according to any one of claims 1 to 5, wherein the decoder is configured to input the vector into a Feedforward Neural Network (FFNN) model configured to map the vector to the each sentiment score.

7. The system according to claim 6, wherein the decoder comprises a series of FFNN layers in which the FFNN model is operated, and a Softmax layer in which a Softmax function is operated,

the decoder is configured to input the vector into the FFNN model in the series of FFNN layers to obtain an output, and input the output of the FFNN model into the Softmax function, and

the Softmax function is configured to obtain the probability of the each sentiment score and determine the sentiment score for the input text based on the probability.

8. A method of recognizing a sentiment of a user's feedback, the method comprising:

receiving an input text for the user's feedback;

breaking up the input text into text tokens;

encoding each text token;

reading the encoded text token in a bidirectional manner by a Bidirectional Long Short-Term Memory Network (Bi-LSTM) model to obtain a forward node value and a backward node value;

concatenating the forward node value and the backward node value together to obtain a vector representing semantic meaning of the input text;

obtaining a probability of each sentiment score by mapping the vector into each sentiment score; and

determining a sentiment score for the input text based on the probability,

wherein the Bi-LSTM model is operated in a series of Bi-LSTM layers, and

the reading the encoded text token in a bidirectional manner comprises:

inputting the encoded text token into the Bi-LSTM model in a first Bi-LSTM layer of the Bi-LSTM layers;

obtaining a first forward node value and a first backward node value;

concatenating the first forward node value and the first backward node value together;

inputting the concatenated first forward node value and first backward node value into the Bi-LSTM model in a next Bi-LSTM layer of the Bi-LSTM layers;

obtaining a next forward node value and a next backward node value; and

concatenating the next forward node value and the next backward node value together.

9. The method according to claim 8, wherein the input text relates to a sentence, and

the breaking up the input text into text tokens comprises: breaking up the input text into the text tokens each corresponding to a plurality of words included in the sentence.

10. The method according to claim 8 or claim 9, wherein a max pooling function is operated in a max pooling layer, and

the reading the encoded text token in a bidirectional manner comprises:

obtaining a final forward node value and a final backward node value in a final Bi-LSTM layer of the Bi-LSTM layers;

concatenating the final forward node value and the final backward node value together in the final Bi-LSTM layer of the Bi-LSTM layers;

processing the concatenated final forward node value and final backward node value in the max pooling layer; and

obtaining the vector in the max pooling layer.

11. The method according to any one of claims 8 to 10, wherein the encoding each text token comprises: encoding the each text token using a Byte Pair Encoding model.

12. The method according to claim 11 further comprising:

encoding a stop token representing an end of the input text using the Byte Pair Encoding model; and

inputting the encoded stop token into the Bi-LSTM model.

13. The method according to any one of claims 8 to 12, wherein the obtaining a probability of each sentiment score by mapping the vector into each sentiment score comprises: inputting the vector into a Feedforward Neural Network (FFNN) model configured to map the vector to the each sentiment score.

14. The method according to claim 13, wherein the FFNN model is operated in a series of FFNN layers, and a Softmax function is operated in a Softmax layer,

the obtaining a probability of each sentiment score by mapping the vector into each sentiment score comprises:

inputting the vector into the FFNN model to obtain an output in the series of FFNN layers;

inputting the output of the FFNN model into the Softmax function in the Softmax layer;

obtaining the probability of the each sentiment score in the Softmax layer; and

determining the sentiment score for the input text based on the probability in the Softmax layer.

15. A data processing apparatus configured to perform the method of any one of claims 8 to 14.

16. A computer program element comprising program instructions, which, when executed by one or more processors, cause the one or more processors to perform the method of any one of claims 8 to 14.