SentEmojiBot : Empathising Conversations Generator

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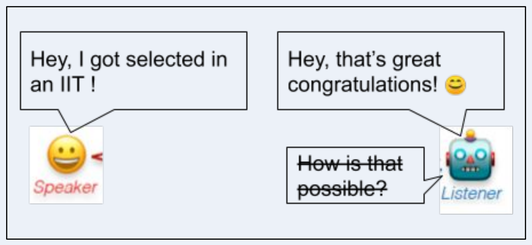
Problem Statement and Motivation

- Traditional chatbots are unable to recognise the feelings of the person and reply accordingly.
- They also lack the ability to use emojis effectively for creating an engaging and empathising conversation.
- Emojis are gaining popularity in day-to-day computer-mediated conversations (CMCs), resulting in more interactive conversations.
- Prior work has either classified the emojis or generated empathetic dialogue without the use of emojis.
- The use of empathising replies in CMCs makes it more relatable and emojis improve it further. When a chatbot uses emojis, it can become more like a human in conversation.



Previous work

- **Empathetic Dialogues (Facebook Research):** This proposed a new benchmark for empathetic dialogue generation. It has three approaches - using transformers and BERT to create an empathetic dialogue agent. It also proposed a dataset, Empathetic Dialogues.
- **CAiRE:** An End-to-End Empathetic Chatbot - It is an empathising chatbot that takes into account the persona and a history of a few utterances for generating a response.
- **SemEval 2018** Tasks: Emoji Prediction

Datasets

Empathetic Dialogues dataset:
- Columns: conversation id, utterance id, context, prompt, speaker id, utterance, self evaluation
- 24,850 conversations, 79190 sentences, 32 emotions

Emoji2vec dataset:
- Trained from Unicode descriptions.
- Trained over 67k English tweets labelled manually for positive, neutral or negative sentiment.

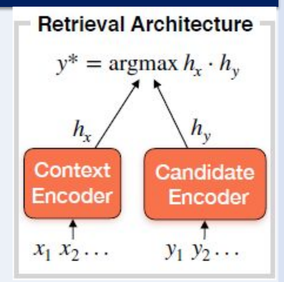
Mapping of Emotions and Emojis:
- Manually annotated most frequently used emojis into 10 emotion classes.

SentEmoji dataset:
- Dataset generated by us using Empathetic Dialogues dataset, emoji2vec model and word2vec model. (example of conversation in figure).
- In each utterance, emoji has been added and also the number basic emotions are taken to be 10
- Dataset accepted in CoDS-COMAD 2020

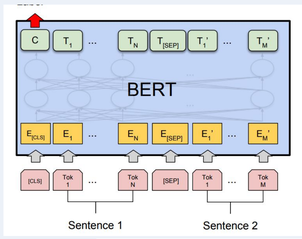
Implementation

Preprocessing
- Tokenizing utterances using Bert Tokenizer.
- Adding special tokens like [CLS] and [SEP], to mark start and end of utterance.
- Converting to vectors using their indices from dictionary.
- Padding the sequences to make them of same length as others in batch.

Retrieval based architecture
- Two encoders separately encoding the context and target.
- Candidates are formed by encoding all target sequences in batch.
- Model chooses the candidate utterance which maximises the softmax dot product $h_x.h_y$.

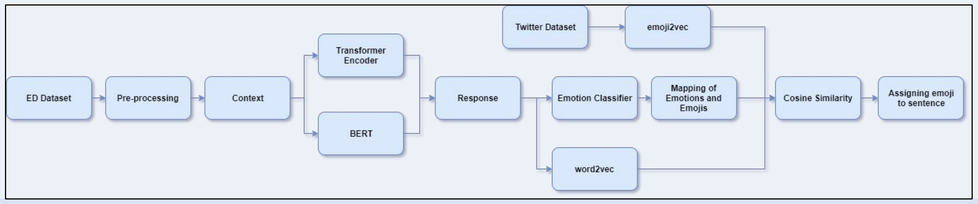


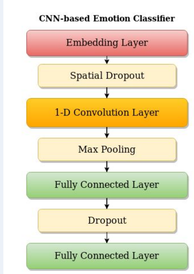
Fine-tuning BERT
- Used Pre-trained BERT implementation provided by Hugging Face.
- Fine-tuned on ED dataset.
- Retrieval based architecture.



CNN based emotion classifier
- Takes a sentence/utterance.
- Tokenizes it and converts it into a vector of 1000 dimensions
- Trained on the contexts of the the Empathetic Dialogues dataset for 10 emotion classes

Emoji2vec
- Pre-trained on twitter dataset using skip-gram method.





Results

- BERT performs better than the transformer for conversation generation.
- Emojis have an positive impact in making the conversation empathetic.

Model	BLEU	P@1,100
Transformer	4.38	3.65%
BERT	**5.78**	**36 %**

User Study	Average Empathising score (1-5 scale)
Responses without emojis	2.9 / 5
Responses with emojis	**3.3 / 5**

Emotion Classifier

Relevance of emoji (user study) (1-5 scale)	3.03 / 5
Macro F1 score	56%
Macro-accuracy	58%

References

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