Textual Emotion-Cause Pair Extraction in Conversation

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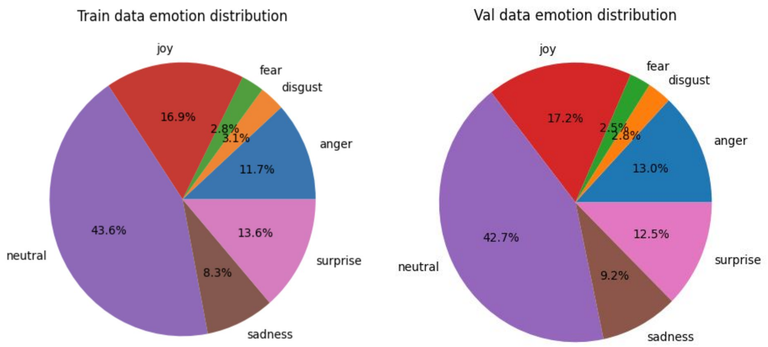
Abstract

- SemEval-2024 Task 3, Subtask 1: Extract emotion-cause pairs from conversations.
- Two-step pipeline: Emotion classification and cause identification.
- Utilized novel architectures and OpenAI's ChatGPT 4.
- Applied a question-answering model for cause extraction.

Introduction

- **Motivation:** Understanding human emotions in textual conversations is a fundamental aspect of improving human-computer interaction which has application in support borts,sentiment analysis, customer service automation.
- **Goal**: Identify emotion-cause pairs within conversations involving multiple speakers.
- **Dataset**: Annotated with emotion-cause pairs and emotion labels i.e. *anger*, *disgust*, *fear*, *joy*, *sadness* and *surprise* for emotional utterances and the non-emotional utterances are labelled as “neutral”.
- **Input**: Conversations with speaker tags and utterances.
- **Output**: Emotion-cause pairs, each containing an emotion utterance and its corresponding textual causal span.

Data Analysis



Methodology

Task Pipeline Overview:

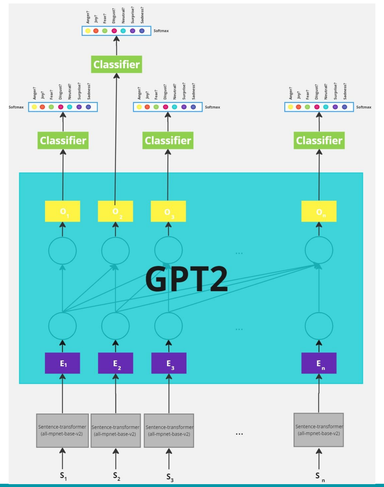
- Two stages: Emotion Recognition in Conversation (ERC) and Cause-Emotion Extraction (CEE).
- **ERC**: Classifies utterances into one of Ekman’s six emotions or as "neutral".
- **CEE**: Identifies the textual cause for the target utterances emotion.

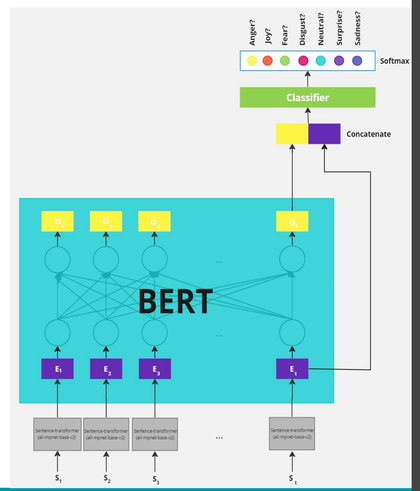
Emotion Recognition in Conversation (ERC):

- **Utterance Level**: Uses transformers like BERT and RoBERTa to classify the target utterance with context from preceding utterances.
- **Conversational Level:** Employs a GPT2-based architecture considering the entire conversation for collective labeling.

Cause-Emotion Extraction (CEE):

- Employs question answering for emotion cause extraction via causal span identification, which involves
  - **Context**: A combination of all preceding utterances and the target utterance.
  - **Question**: Formulated to inquire about the causal relationship between evidence and target utterances emotion.
  - **Answer**: The textual span within the context that triggered the target utterances emotion.





Results and Ablation Study

Model	Accuracy	Macro F1	Weighted F1
BERT	0.32	0.27	0.32
RoBERTa	0.31	0.27	0.30
GPT2	0.36	0.30	0.37
Zero Shot GPT 4	0.38	0.12	0.28
In Context Learning GPT 4	0.58	0.37	0.53

Scores on the Validation Set (ERC Task)

ERC Model	Cause Model	Wt. Strict F1	Wt. Prop. F1	Strict F1	Prop. F1
GPT2	QA	0.1345	0.1767	0.1283	0.1626
BERT	QA	0.1318	0.1704	0.1283	0.1581
RoBERTa	QA	0.1314	0.1697	0.1301	0.1629

Testing Scores on Leaderboard

ERC Model	Cause Model	Wt. Strict F1	Wt. Prop. F1	Strict F1	Prop. F1
Ground truth	QA	0.3430	0.4612	0.0.3441	0.4594
GPT2	QA	0.1153	0.1543	0.1135	0.1443
BERT	QA	0.1181	0.1673	0.1148	0.1568
RoBERTa	QA	0.1132	0.1623	0.1123	0.1557

Ablation Study on Validation Set

Ranked 5th in the CodeLab Competition among the 31 participating teams.

Future Work

- Using some state-of-the-art models for finding the ERC task.
- Develop an end-to-end architecture that directly identifies the emotion-cause pair because, as observed in our models, errors can stem from both the emotion and cause models, resulting in greater inaccuracies.

References

[1] S. Poria, N. Majumder, D. Hazarika, D. Ghosal, R. Bhardwaj, S. Y. B.Jian, P. Hong, R. Ghosh, A. Roy, N.Chhaya et al., “Recognizing emotion cause in conversations,” Cognitive Computation, vol. 13, pp. 1317–1332, 2021.

[2] R. Xia and Z. Ding, “Emotion-cause pair extraction: A new task to emotion analysis in texts,” arXiv preprint arXiv:1906.01267, 2019.