

# Expressions Causing Differences in Emotion Recognition in Social Networking Service Documents

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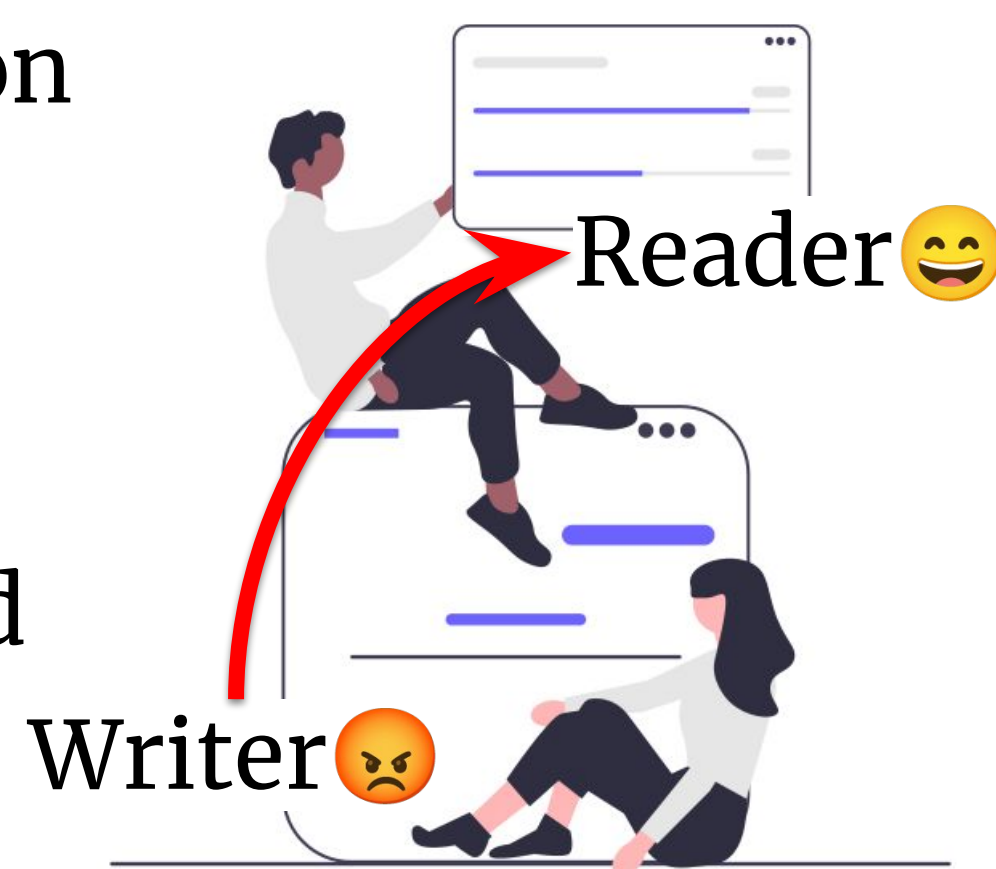


## Summary

- Detection of expressions that cause differences in the writer's and reader's perception of emotion
- Identification of hidden emotional expressions unconsciously used by writers

## Background

- With the increase in online communication via SNS, the discrepancy between the perceptions of writers' and readers' has become a problem
- Identifying the writer's true emotions and the expressions that cause differences in emotional perception is important



## WRIME Dataset

WRIME: A New Dataset for Emotional Intensity Estimation with Subjective and Objective Annotation [Kajiwara+ NAACL'21]

- Japanese SNS-document dataset with 4 levels of emotional intensity annotated by the writer and 3 readers
  - 8 emotional labels are annotated (😊, 😭, 😄, 😟, 😡, 😞, 😓, 😇)

Examples of "joy 😊" emotional labels

Text 📝 早寝するつもりが飲み物がなくなりコンビニへ。ん、今日、風が涼しいな。  
 I was going to go to bed early, but ran out of drinks and went to the convenience store. Hmm, the wind is cool today.

Joy 😊 Writer: 1 Reader 1: 0 Reader 2: 0 Reader 3: 0

- Total number of emotional labels with intensity of 2 or more in 4 levels (0 to 3)
  - Anger 😡 Writer: 3,040 → Reader: 543 → Readers tend to underestimate writers' emotions
  - Trust 😇 Writer: 5,167 → Reader: 185

## Proposed Framework

- This study focuses on anger, which has a large difference in emotion recognition between writers and readers in the dataset
- We define sentences in which the writer's anger intensity exceeded the reader's by 2 or more as hidden-anger sentences

Our proposed framework consists of two stages:

- Prediction of hidden-anger sentences
  - Building a BERT-based detector: fine-tuned a pre-trained the BERT on Japanese Wikipedia to predict hidden-anger sentences
- Detection of hidden-anger expressions
  - Analyzing sentences obtained by the detector: extracted the top 10 words with the largest differences in frequency of occurrence between hidden-anger sentences and other sentences

Examples of sentences that are extremely difficult to estimate emotionally

Text 📝 雨の日1日1回は見るとこれ  
 I see this at least once a day on rainy days.

Anger 😡 Writer: 3 Reader 1: 0 Reader 2: 0 Reader 3: 1

Text 📝 アッヒョヒョ!!!!ファ????????!!!!!!みたいな鳴き声しとる  
 It's making a chirping sound like "AHHHHHHHHH!!!! Fa????????!!!!!!!!!!!!!!".

Anger 😡 Writer: 3 Reader 1: 0 Reader 2: 0 Reader 3: 0

## Results & Discussion

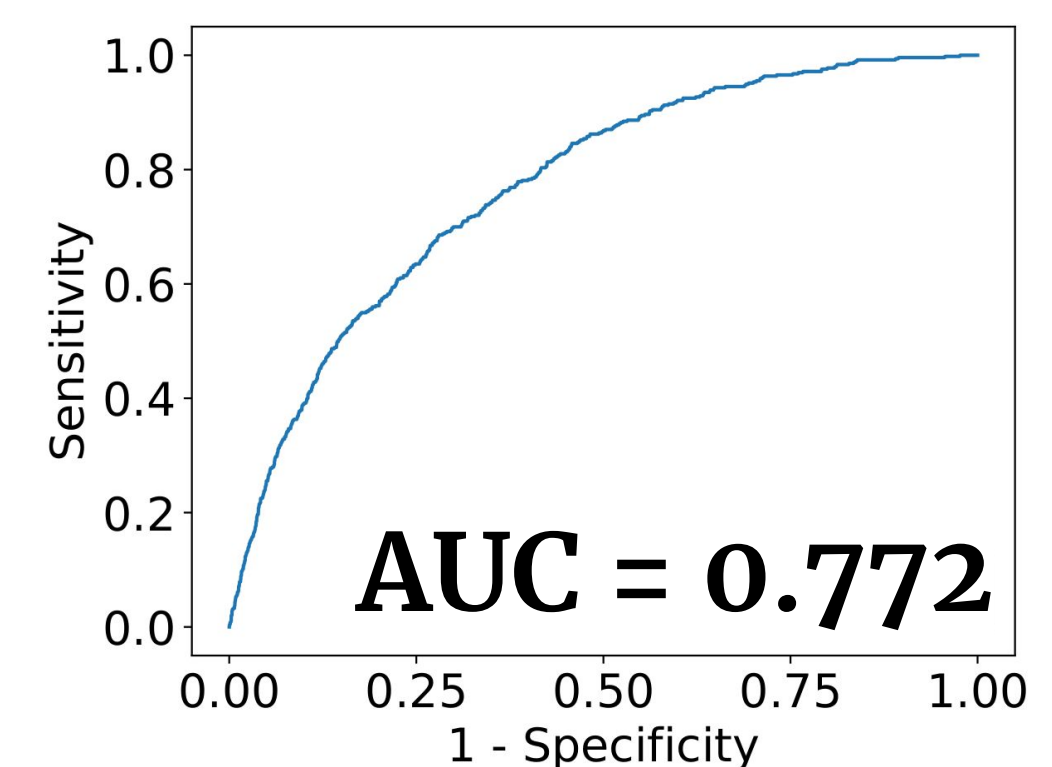
### Performance of the detector

The BERT-based model showed effectiveness as a detector of hidden-anger sentences

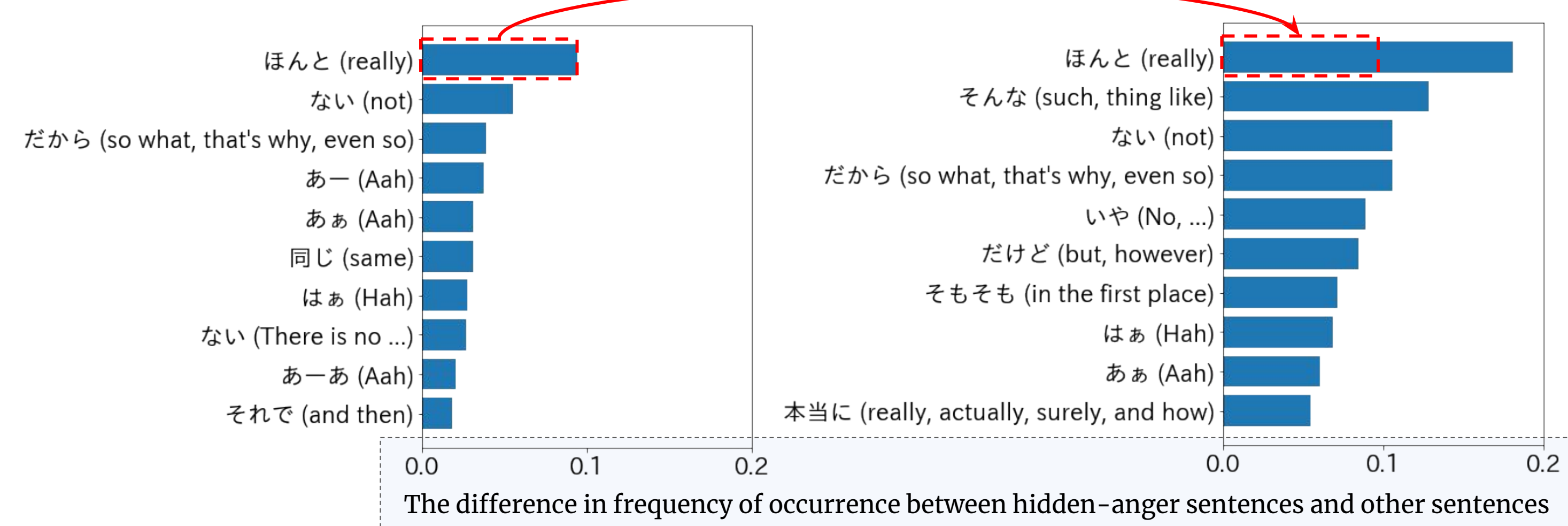
### Comparison of (a) only label information and (b) our proposal

In (b), our proposed framework:

- The differences in their frequency are more clearly shown than in (a), indicating their level as hidden-anger expressions
- Pre-removal of inappropriate sentences enabled us to detect expressions that could not be detected in (a)



ROC curve for detecting hidden-anger sentences



(a) Detection using only label information

(b) Detection using our proposed framework

### Detected word-level hidden-anger expressions

### Examples of hidden-anger sentences containing the detected words

Text 📝 草取りと朝マラソンと持久走大会だけはほんとと解せなかった。  
 I **really** didn't understand the weeding, the morning marathon, and the endurance running competition.

Anger 😡 Writer: 3 Reader 1: 0 Reader 2: 0 Reader 3: 0

Text 📝 マックでハンバーガーを注文したら店員に「ハンバーガーは無いです」と言われたので、**そんな**わけ無いでしょと思いながらもチーズバーガーを注文した

Text 📝 When I ordered a hamburger at McDonald's, the staff told me that they didn't have hamburgers, so I ordered a cheeseburger instead, even though I thought there was **no way** that was possible.

Anger 😡 Writer: 2 Reader 1: 0 Reader 2: 0 Reader 3: 0

Text 📝 私のバスケットが売り切れになったんだってさ... **だから**、勝手に私の分がキャンセルになりやがった

Text 📝 Apparently, the basketball shoes I ordered were out of stock... And **so** my order was canceled without my notice.

Anger 😡 Writer: 3 Reader 1: 1 Reader 2: 2 Reader 3: 0

- These sentences do not involve explicit expressions of anger
  - It is difficult for readers to estimate the writer's anger
- However, a careful reading of each sentence, with an awareness of the possibility of hidden-anger due to our framework, reveals why the writer may have been angry

## Conclusion & Future Work

- We proposed a framework for detecting expressions that may cause differences in emotion recognition between writers and readers
- Pre-removal of inappropriate sentences enabled us to detect expressions that could not be detected using only label information
- Sharing the findings of this study may ultimately reduce the frequency of mutual misunderstandings

### Future Work

- Analysis using the writer's recent tweets as well

