Emotion Preservation in Neural Machine Translation (NMT)

Chinese-English (C-E) NMT of Emotion-loaded Microblog Texts: Analysis and Solutions

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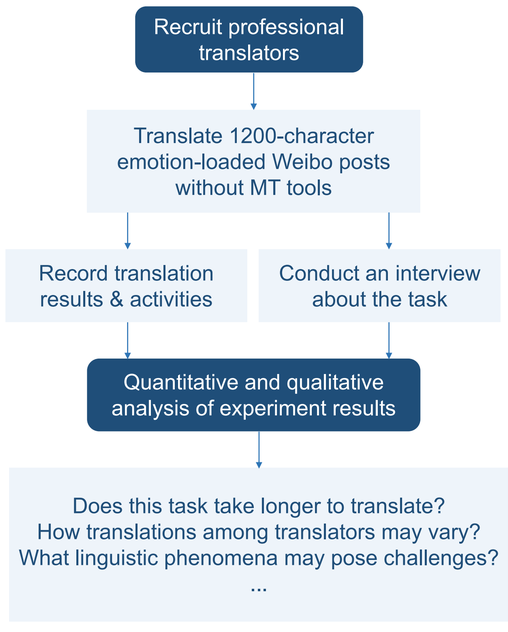
Importance of C-E NMT of Emotions

- **Basic function of language:** one of language's important functions is emotive, and social media texts are among the most important types of emotional texts.
- **Scale & time effectiveness**: NMT is more suitable for this type of texts due to its nature of large quantity and user-generation at anytime online.
- **Distinctive features of Chinese social media texts:** Chinese social media texts have its own features such as homophone phrase substitutions, which are less studied and worth looking into.

Challenges of Translation of Emotions

Research Question 1: What are the challenges of translating Chinese emotion-loaded microblog texts for human translators?

Methodology



Quality Assessment of NMT

Research Question 2: How popular NMT systems i.e., Google Translate perform in translating emotion-loaded microblog texts?

Methodology

Error Type
Addition
Mistranslation
Omission
Untranslated
Source error

Severity Level	Weight
Minor	1
Major	5
Critical	10
No error	0

Table 1& 2: Manual Quality Assessment of NMT Outputs

$$Error\ rate(ER) = \frac{\sum_{n=1}^{n} Error_n * Weight_{severity}}{Text\ length}$$

$Weight_{severity}$: *weight given to each error according to its severity level*

$Text\ length$: *count of all words and punctuations in the target text*

Quantitative Analysis Results

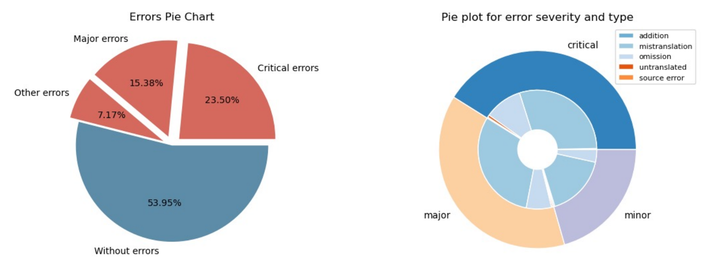


Figure 1: Pie Charts for MT Errors

Figure 1 shows about 46% of the instances were incorrectly translated and most errors are mistranslation and omission among all severity levels.

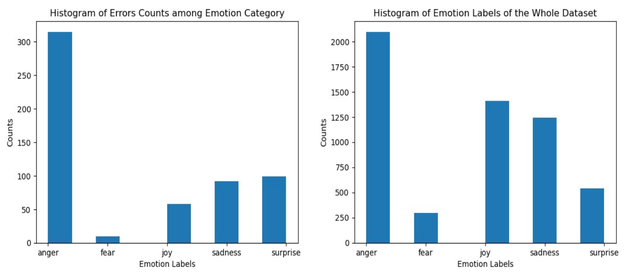


Figure 2: Label Distributions of MT Error Data VS Original Data

Figure 2 indicates the emotion label distribution after MT is different from the original data and joy data appear to be less mistranslated than other categories.

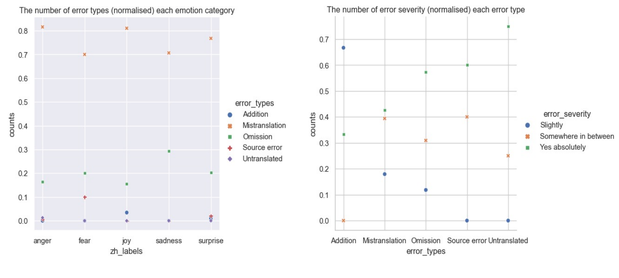


Figure 3: The Normalised Number of Error Type/Severity

Figure 3 suggests most errors are critical for each type except addition, and most errors caused by addition are minor, having slight impact on emotions.

Frequencies	Words Causing Errors	Literal Meaning
12	居然	Actually
7	尼玛	WTF
6	竟然	Surprisingly
3	特么	WTF
3	一个人	Alone/a person/the same person
2	日了狗了	Fuck
2	小公举	Little princess

Table 3: Frequency List for Error Keywords

From **Table 3** we can see that the most frequent words which lead to translation errors are emotional words/phrases, especially emotional slangs.

Qualitative Analysis Results

Mistranslation of some linguistic phenomena such as negation could result in the complete change of meaning and thus the loss of emotions in the target text. See the following example:

- ST: 没事儿少招猫逗狗！
- MT: It's okay to recruit cats and dogs!
- TT: Even if you have nothing to do, don't play with cats and dogs for fun.

Explanations: *In the source text, "少" means less, an implicit negative word. The source text meaning "Don't play with cats and dogs" was rendered into the opposite meaning "it's okay". So, the emotion was completely changed.*

Future Plan

Research Question 3: How to Improve NMT Quality

Solution 1: rebuild vocabulary and tokenizer

Solution 2: fine-tune a model with parallel data

Solution 3: few-shot learning using large language models

Solution 4: unsupervised or reinforcement learning without parallel data