

An Analysis of Affective Words in Machine Translation

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Overview

To our knowledge, no-one has analysed the choice of affective word choices in a machine translation (MT) system, that is, an MT system that pays attention to the translation of words connoting some kind of affective state. “Affective states” include emotions, feelings, and moods. We are working on the analysis of affective translation in statistical machine translation (SMT) systems, in particular for translation from Spanish to English. In this paper we report on the following: availability of suitable bilingual/multilingual corpora, availability of suitable English affect seed words, manual translation of the English affect seed words into Spanish, translation of a development set of about 2,000 English sentences (each sentence contains at least one affective word) into Spanish and the evaluation of the translation on (a subset of) the development set focused on affect words.

Affective Machine Translation

The term “affective computing” was first coined by Picard (1995). Strapparava (1997) may have first used the term “affective natural language processing” while the term “affective natural language generation” has been used by Piwek (2003). Banea et al. (2008) and Brooke et al. (2009) have explored/proposed using MT techniques to generate lexicons containing emotion terms in a target language. In this paper we focus on a specific aspect of affective MT: the accurate translation of affective words.

Bilingual/Multilingual Corpora

We use the Europarl multilingual corpus (Koehn, 2005) and subtitles from www.opensubtitles.org which has a large number of parallel corpora extracted from subtitles in 30 languages. The English-Spanish subtitles corpus, for instance, consists of 24,929,151 sentence

pairs, and over 360 million words. These are the corpora we used in this paper.

We had some difficulty finding a suitable set of English affect seed words. We were interested in finding a set of bilingual (English-Spanish) or multilingual affect terms, which ruled out various English monolingual lists such as the list of 590 English words compiled by Johnson-Laird and Oatley (1989), the English WordNet, and WordNet-Affect

(<http://wdomains.fbk.eu/wnaffect.html>), which contains affective labels for English affect terms only. We found no bilingual English-Spanish lists of affect terms. We considered the “List of Affect and Emotion Terms in 5 languages,” associated with Scherer et al. (1986) and the 24 emotion terms in 24 different languages in the GRID project (Fontaine et al., 2013), but ended up using the English Geneva Affect Label Coder (GALC) as the basis for creating our English affect seed words. The GALC uses “36 affective categories commonly distinguished by words in natural languages” (Scherer, 2005, p. 714). We have adapted the English GALC in a number of ways. First, we created a list of 278 words and word-stems with the categories and language data from GALC and, through a series of steps, produced a list of 679 nouns and adjectives (and in one case an adverb) for at least one instance of each of the 278 words and word-stems in the English GALC (hence the one adverb). The result is a subset of 679 English words. This core list of 679 English affect seed words was translated into Spanish independently by two native speakers of Spanish, and the translations were agreed upon with the help of a third researcher. We have translated the 679 English words into Spanish. We have found that some English affective words did not have a direct translation into Spanish, or at least not as single words. Examples include ‘despise’ or ‘despondence’. Another of the 679 English words was ‘thrillful’, which can sometimes be translated using the Spanish

word for ‘thrilling’ or ‘thrilled’, depending on context. However, this and other adjectives ending -ful are better expressed by means of the locution “full of *noun*” (“lleno/a de *sustantivo*”); e.g., thrilling: “lleno de emoción”. Another example is the word ‘gloomful’, which we will probably translate into Spanish as ‘gloomy’ or as a locution.

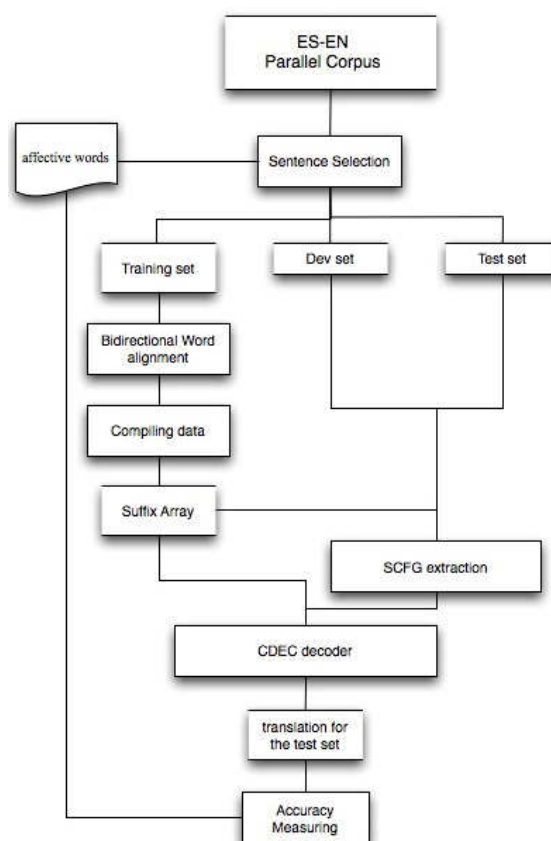
Some English words had an affective meaning for which multiple Spanish words had the same meaning. For example, ‘stunning’ (in the sense of “surprise”) corresponds to meanings of ‘asombroso’, ‘increíble’, and ‘sorprendente’. All these words have the potential to be used as translations, but the context or the register would determine which is best suited: ‘asombroso’ combines the idea of “surprise” with “admiration/awe”; ‘increíble’ (literally “unbelievable”) probably focuses more on the “surprise” notion, although it may be positive or negative. The most neutral of all is probably ‘sorprendente’ (literally, “surprising”); however, this is the one we consider the least likely to be used as a translation for ‘stunning’.

Equally, some Spanish words had an affective meaning for which multiple English words had the same meaning. The noun ‘asombro’ in Spanish combines the idea of “surprise” with “admiration/awe”. Depending on the context, this word can be used to translate the words ‘astonishment’, ‘awe’, or ‘wonder’.

Statistical Machine Translation

In order to study how SMT systems translate such affective words, we used the CDEC software as our MT system trained on both Europarl and subtitle corpora. CDEC is an implementation of a lexicalized synchronous content-free grammar (SCFG) model which is often referred to as Hiero. (SCFGs are a generalization of context-free grammars to generate strings in two languages.)

The flowchart presents the main elements of our MT system. For developing and testing the system we exclude two subset of training sentences that contain at least one affective word. Our development set contains 2000 and test set contains 1000 sentences.



Results

For testing, we first calculated the BLEU score: 0.31 on the development set and 0.30 on the test set. These results are comparable to other Spanish-English SMT systems. We also conducted a preliminary experiment designed to check how successful an SMT system can be in the translation of affective words. We matched the exact affective word from our reference English translation in our MT translation output for each Spanish test sentence. Accuracy is defined as number of words that appears on the MT translation of each sentence divided by the total number of affective words in the reference translation. Number of affective words in the test set is 1699 of which 1030 appear correctly in the output. For simplicity, we consider this preliminary experiment as the first step of designing new types of machine translation metrics that are able to consider affective words. One might show that finding the accuracy of SCFGs related to affective words can be a better measure. Thus, our accuracy is 61%, showing that there is room for improving the translation of affective words in SMT.

Discussion

This is ongoing work and we aim to introduce features specific to the translation of affective words and a new metric for evaluating quality of translation, that can be used for tuning.

Of particular interest is relating our affective MT work to what is been reported in the literature about disparities between the number of affective terms in different languages (cf. Pavlenko, 2008, p. 147), and developing solutions to this anticipated difficulty with translating affective words. Our manual translation of the English affect seed words confirms that Spanish has fewer affective terms than English, which gives rise to human and machine translation issues when an English term has no translation equivalent in Spanish. There will also be issues when the meaning in one language is conveyed via multiword expressions in the other.

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