Towards building a context-based laughter model

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Abstract

Laughter is a significant social cue that contributes to a meaningful interaction. It is a known regulatory mechanism in the expression of emotion (Mesquita and Frijda, 1992). As such, we would like to answer the questions what are the different types of emotions expressed through laughter, and how can these laughter be distinguished from each other?

In our previous study on laughter (Suarez et. al.), we built a multimodal laughter corpus to study how different emotions are expressed through laughter. As in Urbain et. al. (2010), we gather acted data from 2 professional actors (one male and one female). The actors were asked to express five emotions through laughter (rough English equivalents are given, but in actual data collection, emotion label is given in the local language to dispel semantic misinterpretation) and these are *natutuwa* (happiness), *kinikilig* (giddiness), *nasasabik* (excitement), *nahihiya* (embarrassment), and *mapanakit* (hurtful). According to local linguists, these five labels typically describe the emotions carried by laughter in natural interactions. Each actor was interviewed at the end of each enactment to explain the motivation for their expression. These served as contextual information which psychologists relied on to label the emotion. We also collected induced laughter (as in Nachami and Santhanam, 2008) from three subjects who were watching funny videos or comic strips. In this case, subjects were asked to label their own emotions using the five labels and using the valence-arousal dimensions through FeelTrace. Volunteer annotators who have a high empathy quotient score also provided discrete and dimensional labels. From these clips, we extract audio features and facial features to build laughter models.

Based on our findings, we learned that we can better distinguish the different types of emotions in laughter though the audio information rather than the facial information. However, these models were not robust. The mapanakit (hurtful) laughter was not elicited properly and it was difficult to properly distinguish natutuwa (happiness), kinikilig (giddiness), and nasasabik (excitement) laughters from each other . We also found that contextual information is significant to correctly identify the type of emotion expressed in the laugh. This concern was evident when the psychologists were annotating the acted data and when the volunteers were annotating the induced data.

Although these are acted and induced data, we notice that there is a masking phenomenon that occurs when the subject is laughing. We label this as restrained laughter. In restrained laughter, the person is holding back his expression of laughter because he/she could be hiding something or suppressing the expression of another emotion. Whatever this emotion is, we cannot determine because our basis is the audio and face only. However, given the context and background information why this person is laughing in a particular way helps us determine this specific emotion. We believe that this phenomenon can be related to cultural influences and display rules. Greater suppression is found to happen among those who live in cultures that highly endorse the expression of positive emotions (Matsumoto et. al., 2008; Safdar et. al., 2009).

To understand the difference between restrained and unrestrained laughter, we plan to build a model that will consider contextual information when interpreting the emotions expressed through laughter. To do this, we need to study laughter in a more natural setting. We will collect laughter samples of subjects engaged in a spontaneous interaction with another subject or with a group of people. However, the spontaneous interactions will have to be done in a controlled environment where we can still capture clear audio and video from the subjects. We will annotate the clips with additional information to form the context, which includes the following: the type of interaction (dyadic or multiparty interaction), profile (age and gender of the subject), role of the speaker (leader or peer), relationship of the subject to the other (friends, co-workers, boss, etc.), topics being discussed (family, work, politics, relationships, etc.), number of times the subject is laughing, description of laughter (duration, intensity, volume), direction of laughter (laughter at self or at others), purpose of laughter (to convey emotion, to punctuate a statement, to change the social atmosphere, etc.), collective mood of the interaction, type of laughter (voiced/unvoiced, restrained/unrestrained, overlapping/sequential, etc.).

With these contextual information, we will investigate the use of appraisal theory in building the context-based laughter model. There were several existing appraisal models (Becker-Asano, 2008; Marsella and Gratch, 2009;

Marinier, Laird, and Lewis, 2009) that has been successful in incorporating contextual information to determine a person's affect. We will use knowledge-driven rules and data-centric probabilities to map contextual information into discrete laughter emotions. Specifically, seven appraisal variables introduced by Scherer will be used to derive the laughter emotion, which are suddenness, intrinsic pleasantness, goal relevance, unpredictability, outcome probability, discrepancy from expectation, and goal conduciveness. The model will be evaluated based on the annotated spontaneous laughter clip collection.

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