

When Should Computers Joke?

- Concept of Emotiveness Analysis Based Timing Algorithm for Humor-Equipped Conversational Systems

Pawel Dybala

Michal Ptaszynski

Rafal Rzepka

Kenji Araki

Graduate School of Science and Technology

Hokkaido University

{paweldybala, ptaszynski, kabura, araki}@media.eng.hokudai.ac.jp

Abstract: In this paper we introduce our idea of emotiveness-analysis-based timing algorithm, aimed to detect conditions in which it is appropriate to tell a joke in a conversation. We briefly summarize existing works concerning correlations between emotions and humor and describe the outline of proposed algorithm. The concept is to be used in our research on joking conversational systems.

Keywords: humor processing, jokes, puns, timing, emotions, conversational systems

1. Introduction

The content of this paper is a part of our research on joking conversational system for Japanese. We focus on possibilities of creating emotiveness-analysis-based algorithm for detecting proper conditions for the usage of humor during conversation.

Freely Talking System with Humor

In our previous works [1] and [2] we investigated the role of humor in non-task oriented conversational systems. We constructed a joking conversational system “Pundalin” and proved that implementing a simple pun generator into a chatterbot can visibly enhance its performance. Evaluation experiments explicitly proved that humor-equipped system was seen as more human-like, easier to familiarize with and generally better than a similar system without humor [1]. Emotiveness analysis of conversation chat logs between users and two systems showed that the humor-equipped system elicited more emotions in

users, and most of them were positive [2]. Thus, we provided scientific proof for the beneficial role of humor also in non-task oriented human-computer interaction.

Timing Problem

In our research system (described above), we confronted several difficulties, one of which was the problem with joke timing. In order to swiftly use humor, the system should be able to detect appropriate situations in which it is plausible to tell jokes. As the aim of our previous works [1] and [2] was to investigate the role of humor in the HCI in general, we decided to apply a very simple timing rule: the system would tell jokes at every third turn of conversation. In other words, it responded with humor to every third user’s utterance. This allowed us to study the influence of humor on conversation – however, if we are aiming to construct more sophisticated engine, it obviously needs to be changed. In this paper we propose a concept of emotiveness analysis based timing algorithm, in

which user's utterance is to be analyzed to detect his/her emotional states, and on this basis the system would decide if it is appropriate to tell a joke.

2. Background

Timing is generally heavily neglected subfield of humor processing, and, to our knowledge, there is no existing study concerning timing features for conversational systems. Obviously, the entity called "timing" is very complex and many of its aspects have to be taken into consideration. In this research we focus on correlation between emotions and timing in order to propose to base the timing detection algorithm on user's emotional states.

2.1 Existing Literature

As mentioned above, there are not many publications directly concerning the feature of humor timing. Some of existing studies, however, do investigate the connection between humor and emotiveness. Most of them focus on the emotions elicited by humor, induced in humans after being exposed to humorous stimuli. However, more important to this research are works that investigate changes of subject's mood and emotions, triggered by humor.

There is considerable amount of research (e.g. [3], [4] or [5]) proving that humor can be used as a mean to deal with stress in life. By exposing human subjects to different stress stimuli, the stress-buffering potential of humor was explicitly proved in many experiments. Lefcourt and Martin, for example, investigated the role of humorous narration during watching a stressful movie. They proved that those subjects who used humor in the experiment reported less negative emotions and fewer indicators of distress [3].

Humor was also showed to be a countermeasure for

depression. Danzer et al. [6] proved that exposing humans to funny video can reduce the effects of laboratory induced depression moods.

Humorous contents can also be efficient in dealing with widely defined "mood disturbances", which was proved by Labott and Martin [7]. Dienstbier [8] discovered that the presence of humor can turn boring contents into interesting, which means that not only does it hold the possibility of changing negative emotions into positive, but can also be a factor that activates humans in a positive manner.

There are also some robust scientific proofs to the beneficial role of humor in medicine. It was discovered that exposing hospital patients to humorous stimuli can increase their feeling of hope [9] and even their pain tolerance [10]. Humor can also help patients and their families to deal with the difficult consciousness of illness [11].

Some of studies investigating the influence of humor on human emotions concern quite extreme cases. It was proved that the sense of humor helped concentration camps prisoners deal with the tough reality [12]. According to Hennman [13], it was humor that allowed Vietnamese camp prisoners mentally endure tortures, beating and starvation. Bonanno and Keltner [14], in turn, claimed that sense of humor can help people cope with such tragic life events as death of a spouse.

Studies listed above focus on changing negative emotional traits into positive ones under the influence of humor. The opposite direction – humor's influence on positive emotions – still needs to be explored scientifically.

To summarize this section – it can be stated, that:

- 1) Humor can help us deal with negative emotions and mental states;**
- 2) It holds the potential to change negative**

emotions into positive and generally elicit positive emotions.

Basing on these conclusions, in following sections we propose an idea of emotiveness-analysis-based joking timing algorithm for humor-equipped conversational systems.

3. Timing Algorithm

As mentioned above, joking conversational system presented in our previous works [1] and [2] tells jokes (puns) at every third turn of dialogue. We propose to replace this rule with the timing algorithm, based on emotiveness analysis of users' utterances. To perform the analysis, we decided to use Ptaszynski's et al. Emotive Elements/Emotive Expressions Analysis System (ML-Ask) [15], that detects users' emotional states from the textual layer of speech.

3.1 Emotiveness Analysis System

ML-Ask system performs utterance analysis in two general steps:

- 1) Determining its general emotiveness (emotive/non-emotive);
- 2) Specifying types of found emotions (in emotive utterances only).

As a result of step 2, it can be stated if the emotions in user's utterance are positive, negative or neutral. At its current shape, the system recognizes emotions at the level of 65 % [15].

3.2 The Concept of Algorithm

The flow of proposed timing algorithm continues as follows (see also Figure 1):

- 1) During conversation with the humor-equipped talking system, each user's utterance will be analyzed with ML-Ask System;
- 2) Basing on the analysis results, the system will decide if it is appropriate to tell a pun.

The decision about appropriateness of pun telling

will be made basing on conclusions drawn from researches described in section 2:

- 1) If user's emotive state is **negative** (stress, depression, anxiety etc.) – a pun can be told to help him/her deal with it.

For example, if the user says:

“- You know, I'm feeling kind of under the weather today...”

-the system, after detecting negative emotion (sadness), could tell a joke to make user's mood better.

- 2) If user's state is **neutral** – a pun can be told to induce a good mood.

These rules, however, should be limited to situations in which it would be no risk of inducing negative instead of positive reaction (non-aggressive jokes?).

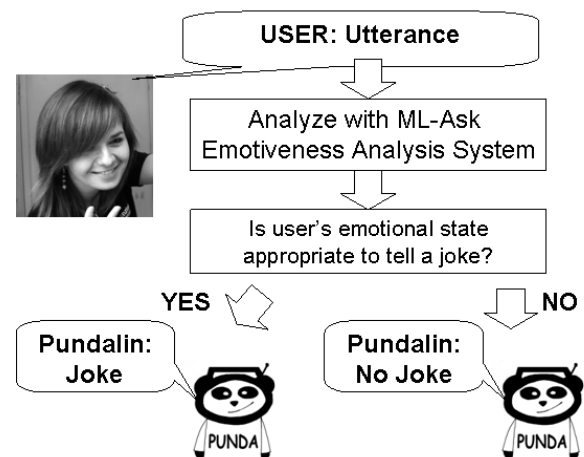


Figure 1. Concept of emotiveness-analysis-based joking timing algorithm for humor-equipped conversational system “Pundalin” – outline.

3.3 Need for Experiments

Applying above two rules is obviously not enough. The rules are too general and must be specified. It is especially important to determine which emotions are NOT appropriate to tell jokes. For there is very little literature on this subject, it is necessary to conduct preliminary experiments in

order to study users' reactions to jokes, said in response to various emotive states and moods. Obviously, not all negative emotions can be reduced by humor – therefore, rules described above must be specified for each type of emotion.

In addition, we presume that the degree of emotional arousal (activation/ deactivation) can also be of high importance here – this hypothesis, however, still needs to be verified experimentally.

4. Conclusion

In this paper, we introduced the general idea of emotiveness analysis based joke timing algorithm for humor-equipped conversational system. Although the concept is very innovative, still much effort needs to be made, especially in order to specify the rules of making decision about “appropriateness” of user's emotional state for pun telling. Necessary experiments investigating this issue are to be conducted in the near future. When succeeded, the results will not only allow us to construct a functional timing algorithm, but will also provide us with important data about correlations between emotion types and humorous stimuli. Therefore, the research on this subject can be seen as an important contribution to the fields of humor processing, natural language processing, human-computer interaction and psychology in general.

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