Can you feel it will you tell me. Encouraging sentiment expression on the web

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Abstract

In a recent trend in web communication, news outlets and blog platforms allow readers to express opinions about what they have read by choosing an associated feeling, or *sentiment expression*. This emerging trend, fitting between *liking* and full text comments, has not still found the popularity it should. The thesis of this paper is that this is also due to the way the sentiment choice is presented to the user. In order to test this hypothesis we have devised a pilot experiment; results confirm that a simpler way of choice increases sentiment expression and yields result that are more aligned with ground truth.

Keywords: sentiment expression; emoji

Introduction

A recent trend in web communication, aimed at improving engagement of newspapers and blogs readers and favouring the expression and exchange of feelings between them, is emerging: a number of news outlets and blog platforms now allow readers to express opinions about what they have just read by indicating what kind of feeling – and in some instances how intensely – they felt during perusal of the article or news piece (examples of this can be seen e.g. at the bottom of every article published by Corriere Della Sera website, the most read Italian newspaper). Expressing sentiments about a web text sits in the middle between *liking* (Hampton, Goulet, Rainie, & Purcell, 2011) and full textual comments (Perticone, D'Aleo, Rizzo, & Tabacchi, 2015).

In liking users can express their support for content posted by other users – be it an image, post, short text, video or any other multimedia artefact – by pressing a specific button, usually placed under the aforementioned content. The naming is due to Facebook using the term like to label the button, but under different nomenclatures (e.g. +1 for Google Plus) the same function exists in almost any currently used SN. Liking enjoys an immense popularity, and can certainly be pinpointed as a fundamental feature of a truly social internet context (Hampton et al., 2011), but has a notable limit: the lacks of correspondence between the syntactic level (liking in its specific, linguistic meaning) and a semantic level (the expression of a specific feeling, that can be positive or negative, idealistic or utilitarian). Liking expresses just a general sense of support toward the content or the person writing it. This situation has been exacerbated by SN's association of intrinsically positive terms with the act of liking, up to the paradoxical situation of expressing linguistic pleasure for other people's misfortunes in order to support them. Facebook tried to alleviate this shortcoming of the liking system by introducing stickers (or cartoonish pictograms), but such system does not allow unambiguous expression of feelings, as there is no pre-shared agreement about the meaning of each sticker, and furthermore selection of a sticker is cumbersome and loaded from a cognitive standpoint. Full comments allow a gamut of expressions, limited only by the time at disposal and the linguistic proficiency of the writer. But it is not usually a cursory affair: written comments require a high cognitive load and skills, while liking is just the pressing of a button, as an atomic operation as it can be on the web.

As such, sentiment expression on the web fits a nice niche exactly where it is needed: simple enough to be really appreciated by users' ephemeral attention, but better adept at describing and categorizing feelings toward multimedia material than the simple liking. Despite this, the emerging trend has not still found the popularity it should.

The thesis of this paper is that sentiment expression is not yet widely adopted in lieu of liking (also) because the typical GUI means employed to deploy it are not simple enough on the user; to test this hypothesis we have devised a simple pilot experiment, based on the idea of simplifying user choice to just one emotion at a click distance (the others being still available at a two-clicks distance) with the help of automatic classification techniques.

Elements

In this section we give a concise, general description of the basic elements used to build our experiment. The following section will describe in more detail the implementation techniques of such elements as used in the experiment.

Sentiment analysis

Sentiment analysis is a set of techniques through which it is possible to find, in an automatic fashion, the general sentiment (or the opinion) expressed within a text. (McKee, 2003) In particular sentiment analysis methodologies allow to find the polarity of the text to which they are applied. Given an input text, sentiment analysis methodologies provide as output its polarity, which could be thought of as a class label. In fact, sentiment analysis is a specific instance of the more general class of classification problems, usually solvable through machine learning algorithms (Buche, Chandak, & Zadgaonkar, 2013).

Sentiment analysis is employable in various application fields. In marketing, for example when a new product is launched in commerce; the producers, analyzing the opinion of the users, can understand its popularity, if it is appreciated by the users or not, and why. Moreover, sentiment analysis can be important during elections; is possible to find if voters prefer one candidate over another through the opinions that they express, and so on.

The term opinion mining and sentiment analysis are often used interchangeably, and with the same meaning intended; but, as explained in (Liu, 2010), "the concepts of emotions and opinions are not equivalent although they have a large intersection". It is clear that the emotional state of a person affect his opinion, but the two things does not overlap completely. It can be said that opinion mining methodologies are used to recognize the opinion polarity expressed in a text, while sentiment analysis methodologies try to guess the emotional state of the writer. However in this work we focus our investigation on the sentiment orientation of the readers.

Emoji

Emojis are iconic representations enjoying a vast popularity on the web, especially since the rise of mobile platforms and instant messaging tools.

Emoji became available in 1999 on Japanese mobile phones, and, according to the Unicode Consortium, "represent things such as faces, weather, vehicles and buildings, food and drink, animals and plants, or icons that represent emotions, feelings, or activities". In 2007 Google completed the conversion of "enhanced emoticons" to Unicode private-use codes, and in 2009 a set of 722 Unicode characters was defined as the union of Japanese emoji characters. More pictographs were added in 2010, 2012 and 2014. (Davis & Edberg, 2014) In November 2013, a survey revealed that 74 percent of people in the U.S. and 82 percent in China stated that they have used pictographs or cartoonish images in non-verbal communications with their relatives or friends while on SN. (Sternbergh, 2014) This suggests that emoji can be usefully employed to express feelings or emotions in absence of elements such facial expressions or voice cues. (Wallbott & Scherer, 1986) The appearance of emoji can vary significantly in shape, and emoji do not have to look the same on all devices: for a given emoji, any pictorial representation based on both the name or the representative glyph is considered an acceptable rendition. In Table 1 an example of emoji representing basic feelings is given.

Table 1: Representation of feelings through emoji pictograms from different character sets

(a)	(b)	(c)	(d)	(e)	(f)
					
					

As an example of the deployment of pictographs in sentiment expression, in January 2013, the popular social network Facebook allowed users to post what they were feeling, watching, reading, drinking, eating, and more. Using a drop-down menu, Facebook allowed users to express related feelings through a sentiment list containing many elements, such as happy, excited, loved, sad, crazy, blessed, perplexed, amused, hopeful, and so on.(Constine, 2013) This functionality has been limited to update status and is not applicable for comments or shared links. Furthermore, some Italian online newspapers (such "Corriere della Sera" and "Il Secolo XIX") and opinion blogs use software that measure audience sentiment. Commercial products such Vicomi allow readers to comment multimedia content with one type of reaction such "funny", "worried" or "angry". (Ken-Dror, 2014) This manual selection is heterogeneous for classes and their associated icons.

As already discussed in the introduction, what is gained in depth and information retrieval is lost in terms of simplicity, and the latter systems have not gained the universal acceptance that liking has. Choosing among different pictograms is no more a strictly atomic process, and requires direct action and a modicum of thinking, which makes it transforming into an habit a more difficult endeavour. While liking has become a sort of automatic reflex, sentiment expression still has to really catch on due to users' general laziness and lack of concentration or interest (Chen & Lee, 2013).

Expressing feelings through text

Emotions play a central role in everyday interactions. (Perakyla & Sorjonen, 2012) Among researchers there is still not a set of agreed basic emotions. (Ortony & Turner, 1990) However Ekman and Friesen list six basic emotions (happiness, anger, disgust, fear, sadness, surprise) (Ekman & Friesen, 1971). They are not the only one to list basic emotions, but also (Parrott, 2001) list another six primary emo-

tions (love, joy, surprise, anger, sadness, fear), which partly overlap Ekman's classification. Parrott also asserts that such primary emotions are not mutually exclusive when associated to an opinion, but they may have a different strength relative to the same opinion. In 1990 Ekman expanded the list of basic emotions from six to seventeen, including the likes of contentment, embarrassment, guilt, relief, satisfaction and shame (Ekman, 1999). While this expanded classification is more detailed and nuanced, the original six basic emotion are still favoured in many instances, and among them automatic classification and web sentiment expression.

In (Strapparava & Mihalcea, 2007) the authors focuses on the classification of news headlines in terms of emotions and polarity. The dataset analysed in the paper uses headlines extracted from information web sites and labelled with a predefined six emotion labels (anger, disgust, fear, joy, sadness, surprise) and with a valence indication (positive/negative).

Method

Participants

The experimental subjects panel was constituted by 48 degree students from CS faculty, enrolled by presence. Data were collected during March 2015. Participants were recruited on a voluntary basis and they were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 1992). Gender distribution and mean age are shown in Table 3.

Materials

In order to have a base to which compare the results of our test, we employed the Italian Sentiment Emotion Expression database (I-SEEdb)(Tabacchi, 2015). The database is comprised by 1200 short snippets of text taken from newspaper. Each snippet is between 200 and 400 characters long, and belongs to one out of six different categories: Tech, Politics, Economy, Culture, News and Health; 200 snippets belong to each category. The snippet have been classified by human subjects from university background using internet questionnaires. Subjects were required to perform sentiment expression on it by selecting among Ekman's six basic emotions the one that mostly approximated their feelings, and to grade such emotion on a five level Likert-like scale from "un poco" (a little) to "molto" (a lot). Each snippet was rated at least ten times, and in order to grade each snippet, a final score is computed using the following:

$$s' = argmax_{s:s\in S}\left(\frac{\sum\limits_{i_s\in I_s} i_s}{|I_s|}\right) \tag{1}$$

$$i' = \frac{\sum\limits_{i_s\in I'_s} i_s}{|I'_s|} \tag{2}$$

where $S\{$anger, disgust, fear, happiness, sadness, surprise$\}$ is the set of emotions and $i_s \in I_s$ are the intensities gathered for the sentiments. s' and i' are the emotion extracted and his associated intensity.

In order to perform our experiment we selected the twelve most polarized (i.e. highest scored) snippets, two from each category. A sample snippet is shown in Table 2.

Table 2: Example of a snippet in I-SEEdb, translated in english, along with its score.

It was a complex restoration operation the one done on "La Fornarina" by Raphael Sanzio. A number of scientific and imagining experiments have been carried out, using technical methodologies such as x-rays, false-colour and reflectography snapshots.
Category: Tech
Score: $\{$happiness$\}$, 4.0

Procedure

The experiment is fully computer assisted. All the software is developed in house. Experimental subjects are introduced into a secluded room where the experiment takes place. They are seated in front of a computer screen and, after statistic data gathering (age, gender) the mechanics of the experiment is explained to them, aided by written instructions whose screenshot is shown in Figure 1.

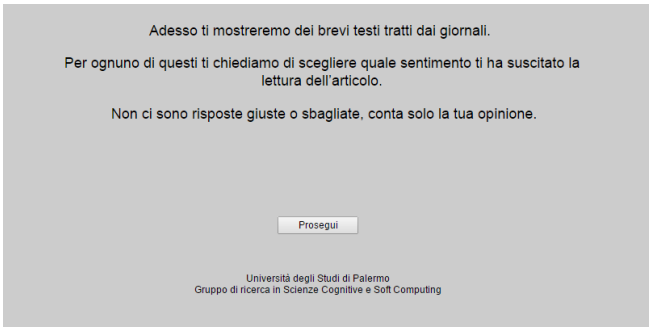

Figure 1: The instructions.

Each subject is randomly assigned to one of the two possible experimental conditions, with the software taking care of the right balance between genders and age:

- H_0: after each snippet, six emojis representing the six basic Ekman's emotions are shown, in random order, plus one button labelled "Prosegui" (Next question). The subject can press on one of the emojis or on the button.
- H_1: after each snippet, one emoji representing the emotion associated with the high I-SEEdb score is shown, plus a small pop-up button and the "Prosegui" button. The subject can click on the emoji, on the pop-up (in which case a list comprising the other five emotions, again espressed as

emoji, plus a sixth emoj representing indifference will be shown) or on the button.

Screenshots from the two conditions are given in Figure 2-4. In Figure 4 the extended dropdown menu (invoked when the subject presses the triangle pop-up) is shown.

As soon as the subject chooses an emotion (or skips the choice by pressing the "Prosegui" button, an option he is explicitly given in the instructions), another snippet is presented on screen. Each user is presented with the twelve different snippets.

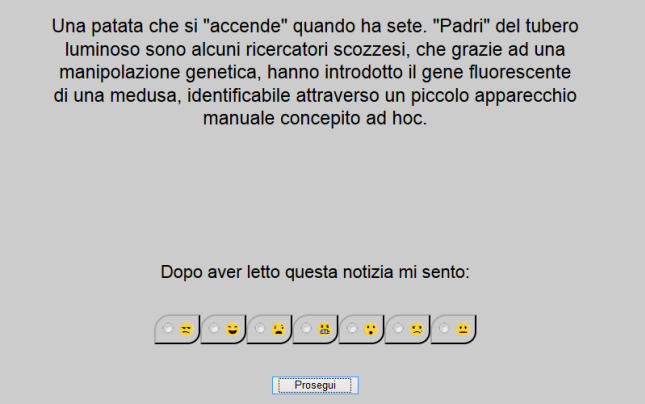

Figure 2: Condition H_0: all emojis are shown together.

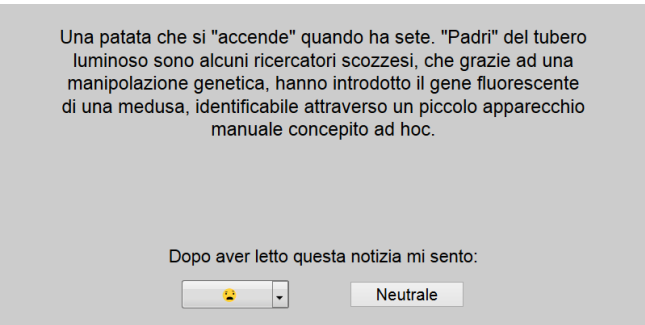

Figure 3: Condition H_1: only the ground truth emoji is directly shown.

Results and Discussion

Results from the experiment are shown in Table 3

Looking at the results of the two text we can see a considerable difference, in condition H_0 the user tend to mix similar emotion, occasionally because of misunderstandings about the correspondence of a specific emoji to the associated emotion (as verified by post-experiment interviews), but more often because sentiment could not be mutual exclusive and could "overlap" each other. (Parrott, 2001). This may be not the only reason for such result: Plutchik argues in (Plutchik, 1980) that we can consider emotions like the colour wheel

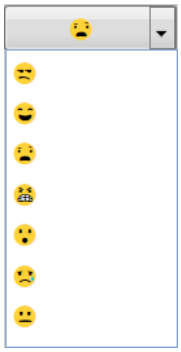

Figure 4: Condition H_1: the drop-down menu.

Table 3: Results from the experiment. *gt* is the percentage and absolute value of matches between the emotion chosen by the experimental subject and the *S* value from I-SEEdb. *ne* is the number of times the subject choose to express no emotion, either by skipping or choosing the neutral emoji.

	H_0	H_1
# Sample	24	24
Gender	M:18 F:6	M:15 F:9
Age (st.dev.)	23 (2.44)	22 (2.82)
gt	18.7 5% (15)	50.35% (15)
ne	19%	13%

with in particular eight primary emotions (that includes joy, anger, disgust, sadness, fear and surprise) who can be combined to obtain other feeling, for example the combination of anger and disgust will produce contempt. Izard (Izard & Izard, 1977) also suggest that new emotions are formed from a mixture of basic emotions. For these reasons we can exclude that people that feels sentiment that are combinations of emotions, fails to associate with a single emoji when they are allowed a multiple choice.

In the condition H_1 the vast majority of subjects choose the suggested emoji despite having the possibility to select another one using the drop-down menu (at a one-click distance). In our opinion this is because, unlike in condition H_0, showing only one isolated emoji helps the subject to more accurately recognize the feeling aroused by the reading of the article, and such emotion in most of the cases corresponds to that expressed by the suggested emoji.

Moreover, if we consider the number of neutral classifications of the snippets, H_0 presents more neutral classifications WRT H_1. This fact may be a consequence of what was already said before about emoji's misunderstanding plus the non-mutual exclusivity of sentiments. As a partial confirmation, subjects that are not able to clearly make a choice prefer to remain neutral, and choose the neutral emoji. This phenomenon is less pronounced in condition H_1, where the showing of just one emoji may be of help in order to recognize the appropriate feeling and express it.

In synthesis, results shown that presenting only one pre-classified emoji instead of the whole gamut (which is always an option, albeit it requires a bit more effort to be exercised) produces results that are more in line with ground truth, and, what is more important for the correct deployment of such a system in the real world, increases significantly the number of times users effectively express the emotion, leading to a better engagement of the user and to more data gathering for the system to work on.

As presented in this pilot experiment, the system is not directly implementable in a real world application: pre-classification of the articles is obviously impossible in social networks or news outlets where big data are produced and published. In a real application this problem could be solved in at least two different ways. One approach would be to use automatic classification algorithms to derive a ground truth to use in lieu of the human pre-classification. Even sub-optimal solutions, as the ones readily available today, would give a good headstart to initialise the algorithms, and the missing information could be gathered by the sentiment expression choices of the first users. Another solution would be to adopt an hybrid system, where the first classifications would be done using a condition similar to H_0, and as soon as sufficient data is gathered to form some sort of ground truth the system would switch its interface to a single-emoji-plus-dropdown mode. In the context of SN we also need to consider the previous interactions between users, as strong feelings may slightly alter the meaning of the expressed emotion. Furthermore the readers that habitually does not contemplate liking can be encouraged by the system to express themselves, and as such an eventual risk of uniformity given by the use of a restricted set of feelings would be balanced by the increase in feeling expression. Further improvement of this methodology could be obtained by employing fuzzy techniques that treat degrees of emotion as Fuzzy Sets. (Tabacchi & Termini, 2014; Termini & Tabacchi, 2014; Seising & Tabacchi, 2013; Tabacchi & Termini, 2013, 2012)

Further research work will be devoted to increase the cardinality of the experiment and to a better integration of automatic and manual pre-classification of texts, in order to further improve the quality of ground truth and to build toward a real-world implementation of the system.

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