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Data-driven Social Mood Analysis through the Conceptualization of Emotional Fingerprints

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Abstract

A body of knowledge shows the emerging of evidence according to a better account for the emotional spectrum is achievable by employing a complete selection of emotion keywords. Basic emotions, such as Ekman's ones, cannot be considered universal, but are related to with implicit thematic affairs within the corpus under analysis. The paper tracks some preliminary experiments obtained by employing a data-driven methodology that captures emotions, relying on domain data that you want to model. The experimentation consists of investigating the corresponding conceptual space based on a set of terms (i.e., keywords) that are representative of the domain and the determination. Furthermore, the conceptual space is exploited as a bridge between the textual content and its sub-symbolic mapping as an "emotional fingerprint" into a six-dimensional hyperspace.

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1 Background

Cultural, political, social, and economic events have considerable, direct and peculiar effects on *public mood*, in all its dimensions. Microblogging, such as Twitter, can be considered as a kind of fine-grained evidence of *public mood* state. Tweets may express information about their author's mood status, no matter of their content and conscious use. Systematic and large-scale mood analysis could suggest collective emotional tendencies for existing social and economic indicators.

Collecting tweets in a given time window can expose changes happening in public mood state at a macroscopic scale and over the time. For instance, [5] discuss the *forecasting* power of real-world phenomena through social media analysis, showing how a Twitter sentiment analysis prototype can measure both the sentiment and the emotions expressed in posts broadcasted on the Twitter. The platform tested on different *hot trend* stories (i.e., *consumer electronics*, *public health* and *politics*) shows the plausibility of adopting computational intelligence to infer

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real-world phenomena through social media sentiments and emotions analysis.
However, if even a more-and-more increasing number of attempts take place, daily, to design and implement sentiment analysis platforms, able to capture the *collective mood* from social media, *emotion modelling* seems to gets methodological and technical cotributions from a variety of approaches to analyse *personal* and *social mood* which, not always, are useful for practical purposes. For instance, in their work, [3] extract six dimensions of mood (i.e.,*tension*, *depression*, *anger*, *vigor*, *fatigue*, *confusion*) using a version of the Profile of Mood States (POMS), then comparing the results obtained to fluctuations recorded by stock market and crude oil price indices and other events, such as the U.S. Presidential Election of November 4, 2008 and Thanksgiving Day. Findings show that the monitored events do have a relevant effect on the various dimensions of *public mood*. [2], on the other hand, in their work, propose an approach according to people transmitting their understanding of emotions through the language they employ, which surrounds mentioned emotion keywords. The methodology considers emotions as *conceptualised acts*. In other words, they can be interpreted in the same way as color, that, as known, despite it is a spectrum of visible light, they are categorized and communicated by human beings as discrete colors, employing the schemes offered by language, with all its expressiveness but also with its limits. Following this conceptual framework, the authors have been able to discriminate a set of eight basic emotion keywords, rather than Ekman's six (i.e., *anger*, *disgust*, *fear*, *joy*, *sadness*, *surprise*), that performed better in all semantic tests than all of the basic emotion models analysed. It seems to emerge an evidence according to a better account for the emotional spectrum is achievable by employing a detailed selection of emotion keywords, just as it does in the case for the color range mentioned above.
From what has been discussed above, a body of knowledge, albeit briefly treated, claims that basic emotions, such as Ekman's ones, cannot be considered universal, but are related to with implicit thematic affairs within the corpus under analysis. Furthermore, it also emerges that emotions should be regarded as domain-dependent. Then, if these issue are read, all together, in the light of different domains, where emotions seem to play a key role to capture social trends, as briefly mentioned before, it can be drawn the need of a more fine-grained *emotion modelling*, depending on the domain data available; in other words it is claimed a data-driven *emotion modelling*.
The purpose of the investigation, which this paper only tracks some preliminary experiments, is precisely the design and implementation of a methodology that captures emotions, relying on domain data (i.e. data-driven) that you want to model. To this end, a viable route, which is explored below, and based on what has been discussed so far, consist of investigating the corresponding conceptual space based on a set of terms (i.e., keywords) that are representative of the domain. As known, *conceptual spaces* consist of "quality dimensions", often are derived from perceptual mechanisms [7], that can represent various kind of information and how they can be used to describe concept learning, such as the *emotion modeling* task.
In this sense, in the following it is adopted a *constructive* approach, because the aim is to build an *artifact* that can get to a precise cognitive task (i.e. *emotion modelling*).

2 Description of the system

The proposed system starts from the words contained in a well-known lexical dataset and uses them to retrieve tweets. The retrieved tweets, as well as other words and document artifacts, are used to build a data-driven conceptual space. The procedure allows mapping tweets into a six-dimensional emotional space, which constitutes the "emotional fingerprint" of the tweet. The whole procedure is illustrated in detail in the following subsections.