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Opinion Mining in Social Media: Unimodal to Multimodal Sentiment Analysis

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Abstract: The "social web" provides new tools to efficiently create and share ideas with everyone connected to the World Wide Web. Forums, blogs, social networks, and content-sharing services help people share useful information. Capturing public opinion on diverse topics has garnered increasing interest from the scientific community, and from the business world. The resulting emerging fields are *opinion mining* and *sentiment analysis*. With more than 10,000 new videos posted online every day on social websites such as YouTube and Facebook, one crucial challenge for the coming decade is to be able to harvest relevant information from this constant flow of multimodal data.

Keywords: Social Web, Opinion Mining, Sentiment Analysis, Unimodal, Multimodal.

I. INTRODUCTION

Subjectivity and sentiment analysis focuses on the automatic identification of private states in natural language. While subjectivity classification labels data as either subjective or objective, sentiment classification further classifies subjective data as either positive, negative or neutral (polarity classification). Much of the work to date on subjectivity and sentiment analysis has focused on textual data, and a number of re-sources have been created including lexicons or large annotated datasets .Given the accelerated growth of other media on the Web and elsewhere, which includes massive collections of videos (e.g., YouTube, Vimeo, Video Lectures), images (e.g., Flickr, Picasa, Facebook), audio(e.g., podcasts), the ability to address the identification of opinions and sentiment for diverse modalities is becoming increasingly important.

II. STATE OF THE ART/ EXISTING RESEARCH AREAS

Several tools such as SenticNet, Luminoso, Factiva, Attensity, Converseon Et al. already exist tohelp companies extract and analyze information from blogs about large scale trends in customers' opinions about products. Most existingtools and research, however, are limited to polarity evaluation or mood classification according to a limited set of emotions. Such methods mainly rely on parts of text in which people explicitly express emotional states, and therefore the tools can't capture a reviewer's implicitly expressed opinion or sentiment.

Currently, opinion mining and sentiment analysis rely on vector extracti onto represent the most salient and important text features. In some unsupervised learning approaches, a *sentiment lexicon* is generated and later used to determine the text unit's degree of positivity or subjectivity. Some researchers used segment-level opinion analysis in their work to segment sections of a document by subjectivity. In another study, Peter Turney, in [1] proposed a naïve unsupervised machine learning algorithm (PMI/IR) for classifying a review as *recommended* or *not recommended.* He classified items based on fixed, syntactic phrases used for expressing opinions. M. Hu and B. Liu in [2] adopted an aspect-level approach, wherein an opinion consists of targets and the sentiments associated with them. Further, Koppel, M. [3] emphasized the importance of neutral reviews in analyzing sentiments. In [3] Namrata Godbole Et al. classified items by *bootstrapping*—using a small set of seed opinion words and a knowledge base such as WordNet and then used polarity scores for subjectivity. In [5] Fazel Keshtkar Et al. used Support Vector Machines (SVM) for mood classification in blogs. Some researchers have also used *valence shifters* based on distance between positive and negative words, available in a review database.

Building upon these or other related resources, while difficult problems such as cross-domain or cross-language portability have been addressed, not much hasb een done in terms of extending the applicability of sentiment analysis to other modalities, such as speech, gesture,or facial expressions. Stephan Raaijmakers [6]and his colleagues fuse acoustic and linguistic information, but that information is based on the transcript of the spoken content rather than on automatic speech recognition output. This previous work, however, did not address other modalities such as visual cues, and did not addressthe problem of sentiment analysis.

Also, a novel algorithm is defined by M. Wollmer and others, based on a combination of audio-visual features for emotion recognition. In addition to this research, Louis-Philippe Morency in [7] and his colleagues combine acoustic, textual, and video features to assess opinion polarity in 47 YouTube videos. They demonstrate significant improvement in leave-one-video-out evaluation using Hidden Markov Models for classification. To my knowledge, there are only few previous works analyzing sentiments using all three modalities: textual, audioand video.

Further, most sentiment analysis datasets are created by the researchers in the scientific environment. In real world data, however, there are many additional difficulties to overcome.

III. CHALLENGES

The video data can be a good source for sentiment analysis or opinion mining but it also comes with many challenges that need to be addressed before using the freely available video opinions. The expressiveness of emotions and communication pattern varies from person to person. A generic model should be able to adapt itself based on each user and give a consistent result. Another challenge is the noise that is often present in such online, multimodal data. Both these conditions result in difficulties that need to be addressed in order to effectively extract useful data from these sources.

IV. FUTURE WORK FOCUS

The study of human verbal and nonverbal behaviors when interacting with social medias such as YouTube and Skypeis a trending research topic. Much needs to be analyzed to completely understand the influence of these technologies on human multimodal interactions. The goal of this research is not only to create technology to automatically classify sentiments but also to gain a better understanding of how nonverbal cues accompany positive and negative sentiments. Till now, most researchers have relied on transcripts to analyze the text and not the actual spoken word. Multimodal sentiment analysis hasn't been fully explored, but holds great promise as an application. For example, it might be extremely valuable when a textual transcript is unavailable, and we need a performance point of view for synergy effects and fail-safeness. In the latter respect, it will be particularly interesting to see further modalities involved—such as physiological and brain signals, along with the use of contextual knowledge. We will then need to investigate analyses of robustness against disturbances in individual (or all) modalities alongside audiovisual confidence estimation.

V. CONCLUSION

Engineers and computer scientists use machine-learning techniques for automatic affect classification from video, voice, text, and physiology. Recent approaches aim to better grasp the conceptual rules that govern sentiment, as well as the clues that can convert these concepts from realization to verbalization in the human mind. Future opinion-mining systems need broader and deeper common and commonsense knowledge bases. More complete knowledge must be combined with reasoning methods that are more deeply inspired by human thought and psychology. This will lead to a better understanding of natural language opinions and will more efficiently bridge the gap between (unstructured) multimodal information and (structured) machine-processable data. Blending scientific theories of emotion with the practical engineering goals of analyzing sentiments in natural language text will lead to more bio-inspired approaches to the design of intelligent opinion-mining systems capable of handling semantic knowledge, making analogies, learning new affective knowledge, and detecting, perceiving, and "feeling" emotions.
Textual emotional classification is done on basis of polarity, intensity of lexicons. Audio emotional Classification is done on basis of prosodic features. Video emotional Classification is done on basis postures, gestures etc. In fusion, we can integrate the results of all these modes; to get more accuracy. Future research could be dedicated to these challenges. So we are moving from uni-modal to multi-modal.

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BIOGRAPHY

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