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Joint User-interest and Social-influence Emotion Prediction for Individuals

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Abstract

Emotions are playing significant roles in daily life, making emotion prediction important. Since emotions are highly subjective for users, we focus on emotion prediction for individuals instead of for the masses. Existing works on emotion prediction for individuals either focus on media content or social-influence alone, which are incomprehensive in predicting users' emotions. In this paper, we design a joint user-interest and social-influence emotion prediction framework for individuals, in which user-interest in multimodal media content and social-influence in social relations are both considered. To address the issue that for different users, the impacts of these two factors are different, a probabilistic graphical model is proposed to combine these two factors together, where a set of parameters are used to measure their importance in influencing the user's emotions, and they are learnt from the user's historical behaviors. We conduct experiments using real social media network to verify our algorithm and evaluate its performance. The results demonstrate the effectiveness of our approach and show that our approach can substantially improve the emotion prediction performance.

Keywords: Emotion prediction, social-influence, user-interest, social network.

2010 MSC: 00-01, 99-00

1. Introduction

Emotions affect people's behaviors and contribute to plenty of fields, ranging from social economy to individual decision-making[1]. [2] has shown public mood states have large correlation to stock market. What is more, emotions also show effective roles in influencing customers' purchase intentions [3]. The significant roles emotions play in daily life make the study of users' emotion an important issue.

Recent years have witnessed increasing research efforts on emotion detection or sentiment analysis from multimedia aspects [4][5][6][7]. However, just finding out what kinds of features express emotions well is far from enough. We are eager to learn users' emotions in advance so that we can provide real-time recommendation service, which makes emotion prediction more important. To date, most works in emotion prediction focus on predicting emotions for the masses [8][9][10], discovering the general emotions media have expressed. These are similar to sentiment analysis, finding out the representative features and turning the problem into classification problem in machine learning. Since the emotions are highly subjective for users,

emotions predicted from the masses cannot present individual emotion effectively, making emotion prediction for individuals more targeted.

The success of many large-online social networks has made users' behavior in social network available for further study of individual emotions [11]. However, it is still a challenging problem due to the following reasons:

- **Complexity and subjectivity of individual emotion.** Individual emotion is a subjective, conscious experience characterized by multiple factors. Besides the diversity of emotion influence factors, the uncertainty of their roles in influencing different users' emotions make emotion prediction for individuals a challenging task.
- **Heterogeneous multimodal media in emotion prediction.** The prevalence of digital photography devices has caused the proliferation of heterogeneous and multimodal media in social networks. Different media domains may raise different emotions for users. How to integrate these heterogeneous media to find out the correlation between multimodal media in emotion prediction is also an unsolved problem.

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