Pusic* : Musicalize Microblog Messages for Summarization and Exploration

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ABSTRACT

Micro-blogging services provide platforms for users to share their feelings and ideas on the go. Desiging to produce information stream in almost micro-blogging services, although are capable of recording rich and diverse senses, still suffer from a drawback of not being able to provide deeper and summarized views. In this paper, we present a novel framework, Pusic, to musicalize micro-blogging messages for terms or users. Pusic can be used to (1) summarize users' messages into certain expression of emotions, (2) explore the emotions and senses and transform them into music, and (3) serve as a presentation of crowd net art. We generate the music from two aspects: emotion and harmony. The former is tackled by emotion detection from messages while the latter is estabilished by rule-based harmonic heuristics according to the detected emotions. Pusic has been announced online for people's experience and further investigation.

Categories and Subject Descriptors

H.3.5 [**Information Storage and Retrieval**]: Online Information Services—*Web-based services*; H.5.5 [**Information Interfaces and Presentation**]: Sound and Music Computing—*Systems*; J.5 [**Computer Application**]: Arts and Humanities—*Music*

General Terms

Management, Design, Human Factors.

Keywords

Micro-blogging, Music, Emotion, Summarization, Exploration.

1. INTRODUCTION

Micro-blogging services are platforms allowing users to publish and share with friends some short but instant messages. People join the micro-bloggers to follow and response their friends' messages. Some popular micro-blogging services include Twitter, Plurk, Jaiku, and etc.

For micro-blogging, one of the significant properties is real-time messaging. This property indeed causes so many messages or information in each user's homepage and it would be not convenient for users to read these messages. On the other hand, the real-time property provides us a source of crowd intelligence to investigate the common feelings or the potential trends about certain news, ideas, or terms. These two points motivate us to develop an automatic and intuitive Web application for micro-blogs to help users experience their friends and to understand the crowd senses for some key terms. Moreover, we think this kind of real-time crowd senses can also serve as a new presentation form of Web-based art piece.

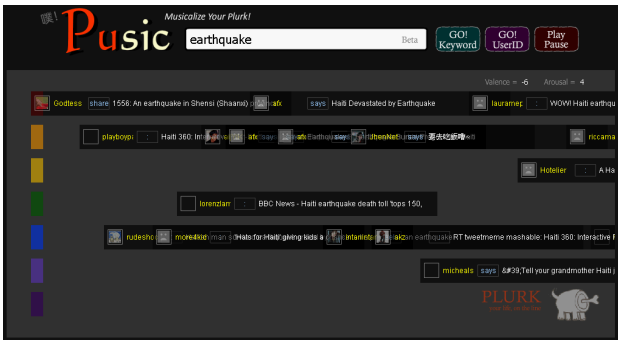

Figure 1: System Interface of Pusic.

One important property for micro-blog services is that it reflects the information, feeling, or ideas instantly. This property indeed can lead to a significant amount of messages to appear in a short time, and when that happens, it could be non-trivial for users to absorb all the messages in a short time. On the other hand, such property provides us a source of crowd intelligence to be investigated, such as the common feelings or the potential trends about certain news, ideas, or terms. These two observations motivate us to develop an automatic and intuitive Web application for micro-blogs that allows users to feel or even understand the crowd senses in a novel way. Moreover, we think this kind of application can also serve as a brand-new presentation form of Web-based art piece. In this work, we propose a novel framework, Pusic (a snapshot is given in Figure 1), to be a kind of music-based information summarization and exploration platform for micro-blogging services as well as a fresh audible presentation of art. Inspiring from music box, where music is played according to pre-burned ticks for tones, we devise Pusic as a message-driven music generator for any given user or term. The burned ticks for tones will then

*Pusic Demo Site **http://mslab.csie.ntu.edu.tw/pusic/**

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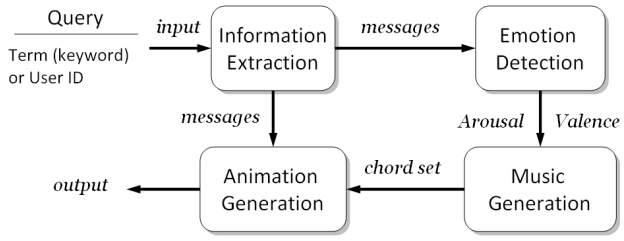

Figure 2: System Architecture

be determined based on the learned emotion. Heuristics of chord sets are employed to design the music generation rules.

Related Works. Music accompaniment has been investigated for some applications. Lshizuka et al.[3] generates variations on a theme music fitting to the impressions of story scenes represented by texts or pictures. Kaminskas[1] aligns music with user-selected points of interests of diverse objects for recommendation. Li et al.[2] produces painting slideshows with music accompaniment by detecting emotion as the connection medium. To the best of our knowledge, Pusic is the first attempt to generate harmonic music for social media such as micro-blogs using affective analysis.

2. THE DESIGN OF PUSIC

System Architecture. Out system architecture is shown in Figure 2, which can be divided into four parts. First, if the input is a keyword, the Information Extraction part will dynamically crawl query-related messages from the microblog (here we utilize Plurk). If the query is a user id, we will retrieve messages of the corresponding user. Second, these messages are fed into the Emotion Detection component, which aims at extracting some emotion-related features and transforming these features to an arousal value and a valence value to represent the emotion of the input. Arousal stands for the intensity of the emotion while valence indicates the extent of positive or negative for the emotion. Third, in the Music Generation stage, our system takes advantage of the valence value to decide which chord sequence is most suitable, and utilizes the arousal value to determine the rhythm of the music. Finally, the messages together with the determined chord set will be fed into the Animation Generation part to produce the animation to appear with music synchronously. The animation will be shown as messages passing the goal line one by one. We will elaborate the Emotion Detection and Music Generation components as below.

Emotion Detection. We use messages' body and responses to identify the potential emotion most users possess about a given query. We apply keyword matching for emotion detection. The six-class affective keywords proposed by Strapparava et al. [5] are employed as our English emotion dictionary. Since we focus on both English and Chinese messages, these affective keywords are translated into Chinese via Google Translate to construct the Chinese emotion dictionary. In addition to the affective keywords, we also manually label several hundreds of terms to enlarge the affective vocabulary size. Through matching terms in message contents with ones in dictionaries, for each message an affective score vector will be generated. The affective vector consists of an arousal and a valence value, which is adopted from the Russell' model [4]. The emotion classes with corresponding basic affective vectors are given in Table 1.

Table 1: Affective Vector

Emotion Class	Affective Score Vector
Anger	(-1, 1)
Surprise	(1, 1)
Disgust	(-1, 0)
Fear	(-1, -1)
Joy	(1, 1)
Sadness	(-1, -1)

Music Generation. To generate the corresponding music for the query, we design some rule-based heuristic to determine the mapping from the emotions to music pieces. Music generation can be divided to two parts: chord set selection and rhythm determination, where the former is controlled by the valence value while the latter is decided by the arousal value. For chord set selection, we first exploite nine basic chord sets as {A, Am, Bm, C, D, Dm, Em, F, G}, where each chord set consists of some basic notes. These chord sets are used to compose twenty chord sequences, half of them are for positive emotions and the other half for negative ones. The valence extent shifts gradually from positive to negative. These chord sets ensures harmonic listening for the resulting auditory presentation. For rhythm determination, we normalize the arousal values to five levels to decide the speed of the music. That is, the valence and arousal control which chord sequence is used and the overall speed, respectively. Finally, during broadcasting, we randomly picks a chord set from the determined chord sequence to play.

3. CONCLUSION AND FUTURE WORK

We introduce a novel framework, Pusic, to musicalize micro-blogging messages for a user or a query keyword. Taking emotions detected from messages as the mediator, we generate emotion-accordingly and harmonic music clips. Pusic captures and displays the crowd senses for terms or users in auditory form. It can be seen as a micro-blogging art. Ongoing work focuses on employ learning techniques to enhance the accuracy of emotion detection and develop an unsupervised mechanism to generate the harmonic music.

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