

# TiMers: Time-based Music Recommendation System based on Social Network Services Analysis

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**Abstract**—Due to the explosive popularity of diverse social network services such as Twitter and Last.fm, they have become a practical and crucial source of information production and sharing it for a large number of users. For instance, Twitter is one of the biggest social networking services where a massive amount of instant messages have been published every day while Last.fm is a social music discovery service that provides personalized recommendations based on the music people listen to. In this paper, we analyzed several popular social network services (SNS) website for generating the music playlist based on the recommendation factors in terms of mood, genre and time. We performed as a case study for evaluating user satisfaction in music recommendation.

**Index Terms**—Music Recommendation, Social Network Service

## I. INTRODUCTION

Recently, with the proliferation of social network services such as Twitter and their explosive popularity with users, they are able to express their thoughts and feelings about the media such as movie and music. In particular, people can access the SNS via the web or mobile devices and post the messages called tweets about the hot topics, interesting contents or the music they are listening to. Over the years, there have been increased researches in social media recommendation based on people's profiles and tags [1].

In music recommendations, some researchers [2, 3] have been considered the music preferences of the user's social contacts and the textual documents from the Internet bulletin board instead of using user's listening habits like typical music recommendation systems. However, due to the flood and popularity of various contents on the social media websites, effective discovery for appropriate media contents has become an essential part for user satisfaction on the recommendation.

Therefore, in this paper, we propose a scheme that extracts

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the general and personal tastes of music by analyzing current music playback that are collected from the popular radio stations and social network services during a specific time period and generate a list of songs for recommendation by emotion and genre. To do this, we firstly remove the noise data such as username (start with the '@' character in order to send their messages), URLs and some special characters (\*%!?>\$^&<{ }) from the tweets in our previous research [4]. Then we collected the music related keywords from the tweets such as the singer name and the title. Finally, we perform the data mapping of the song titles extracted from the Twitter and the radio program with the genre/mood categories classified by the Musicoverly [5] and the Last.fm [6].

## II. SYSTEM OVERVIEW

### A. System architecture

In this paper, we present a music recommendation system called TiMers (**T**ime-based **M**usic recommend**ER** **S**ystem) which consists of two main parts as shown in Fig. 1. Firstly, the genre of the music played on the radio and the posted tweets regarding the mood/genre of the music during a specific time period were collected. Then, the hourly music playlist by genre and mood is obtained by time mapping.

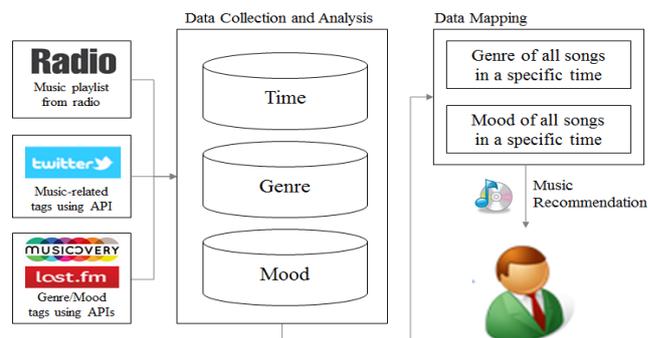


Fig. 1. System architecture

### B. Radio Collection & Analysis

Typical radio program in music broadcasting station usually have distinct moods or atmospheres which are determined by many factors such as time, target listeners, song requests from the audiences, and program purpose. The atmosphere of the radio program is recognized by the songs played during the program. Overall, there is some consistent

trend or tendency in the selection of the songs in each radio program and people may like to listen to certain genre of music in a specific time.

Therefore, we collected song list on the popular radio stations in Korea – SBS (SBS LOVE FM, SBS POWER FM), MBC (MBCFM 4U, MBC Standard FM), KBS (KBS COOL FM) – and then classified all songs into 21 genre categories.

### C. Twitter Collection & Analysis

In this paper, we utilize the Twitter in order to collect massive music listening history data in a specific time period. By filtering music related messages from Twitter, we can collect various music related information such as artist name, song title, genre, mood and the published location. To do this, we searched tweet containing music-related hashtags such as (“#mtvhottest”, “#nowplaying”, “#np”, “#soundcloud”, “#music”, “#mp3”, “#musicfans”, “#listenlive”, “#hiphop”, “#happy”, “#itunes”, “#newmusic”, and so on) using Twitter search API. We collected 12,000 public tweets posted from Korea contain our target hashtags which were collected about one week period (from Jan. 5 to Jan. 11 in 2015) from Twitter.

### D. Data Mapping

In order to determine the mood of the songs, we used Tag Playlists API in Last.fm and get the mood tags of the songs tweeted that is defined as 13 emotional adjectives in the Thayer’s model [7] as shown in Fig. 2. Thus, in this paper, we collected about 7,000 songs from the radio program in every 2 other hours and classified every song into 21 genres and 13 moods, respectively.

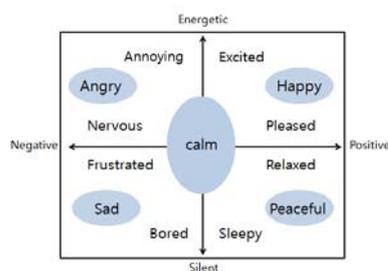


Fig. 2 Thayer’s 2-dimensional emotional model

As we can easily assume, we observed that the song playback frequency was high during the specific time period. For instance, mostly the ballad/sad music were playing between 12 AM and 2 AM where the dance/excited were playing at noon as shown in Table 1. Thus, our proposed system finally generates the music recommend list based on the high playback frequency from the songs with certain genre/mood categories.

### III. IMPLEMENTATION

We implemented a music recommendation system – TiMers – whose recommendation result can be seen in Fig. 3. To collect music-related tweets, we gather tweet streams from the Twitter server in real time, collect music information from twitters. During one week (from Jan. 5 to Jan. 11 in 2015), we collected 3.41 million tweets that had the music-related hashtags (See II-C) in every countries. After filtering the tweets by reducing the noise, 0.42 million music

TABLE I  
TOP 3 RANKED GENRE AND MOOD IN SPECIFIC TIME PERIOD.

Time	Rank	Genre	Mood
AM 12~2	1	Ballad (31.3%)	Sad (31.8%)
	2	Rock (20.6%)	Excited (24.3%)
	3	Pop (9.7%)	Pleased (16.8%)
...	...	...	...
AM 10~12	1	Pop (21.1%)	Excited (27.8%)
	2	Rock (20.6%)	Sad (23.5%)
	3	Ballad (19.7%)	Pleased (19.1%)
...	...	...	...
PM 12~2	1	Dance (26.9%)	Excited (33.9%)
	2	Ballad (22.6%)	Pleased (24.1%)
	3	Rock (12.6%)	Sad (17.9%)
...	...	...	...
PM 6~8	1	Ballad (23.0%)	Excited (27.4%)
	2	Rock (21.6%)	Sad (19.0%)
	3	Dance (12.4%)	Pleased (18.4%)

keywords were collected.

As shown in Fig. 3, the system automatically generates the recommended song list based on the user’s access/login time. When user moves the mouse over the thumbnail album image, it shows the detailed information including singer, title, genre and mood and the list of the recommended music with similar moods/genres on its right-hand side.

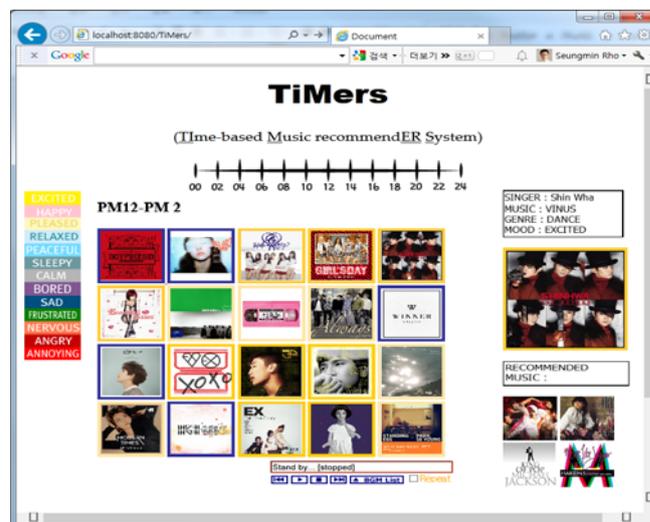


Fig. 3 Screenshot of the system

### IV. CONCLUSION

In this paper, we proposed a scheme for recommending music based on the high music playback frequency with genre/mood in certain period of time by using SNS analysis.

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