TwitterRadio: Translating Tweets into Music

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Abstract
TwitterRadio is an interactive installation designed to explore the social world of Twitter through music. The idea behind this project is to access the musical domain to display information about the latest trends and news. The system automatically generates tonal compositions that are supposed to match the emotional contents of the tweets, as well as their frequency. TwitterRadio, being an audio-only interactive system, offers more passive enjoyment compared to traditional Interactivity demos. However, the interaction with TwitterRadio can span across a couple of levels, according to their involvement degree. Visitors can limit themselves to listening to the generated music and experience the tweets mood, or enter new hashtags.

Author Keywords
Musical interface, artistic installation, user-experience

ACM Classification Keywords
H.5.5. Sound And Music Computing: Systems
H.5.2. User Interfaces: Input Device And Strategies

Introduction
The Web 2.0 has dramatically affected the way people interact with web-based contents. Every minute, thousands of multimedia elements are generated, for the purpose of sharing life experiences and feelings.
with friends, and voicing personal opinions on trending topics. These data are usually explored through a visual approach, involving the use of pictures, videos or graphs. The main idea behind TwitterRadio was to actually exploit music to express these data, as music is one of the most powerful means of expressing moods [1]. There is also a markedly social connotation to music, as it enables people to communicate their feelings on a deep, pre-semantic level and to empathise with each other [2].

The ultimate purpose of this project is to convey public opinions on the world trending topics through suitable musical form. The adopted datasource, Twitter, numbers 200 million active users, who constantly share their thoughts and feelings on personal and social issues. The visitors of TwitterRadio can explore themes they are interested in by typing in theme-related hashtags. The system collects all recent associated tweets and retrieves information about their emotional valence (positive vs. negative), their frequency and re-tweet frequency. These features are then mapped into music, trying to create compositions that match the tweet mood and the intensity. A rarely mentioned hashtag, for instance, will result in a slow, flat melody, while a trending hashtag will result in intense sounds.

**TwitterRadio**

This installation rests on the idea of an analogy with traditional radios. By tuning in to their favorite station, visitors can to listen to a musical translation of the opinions of people from all over the world about a specific topic. During the conceptual design phase, we envisaged three different scenarios that vary according to the involvement level of the visitor: (i) The visitor simply enjoys TwitterRadio, listening to the music; (ii) The user actively contributes to drawing up the list of the next stations by adding her their desired hashtag; (iii) The user directs the music orchestration by selecting the instruments they want to hear in the composition. Lastly, a mechanism of system supervision was also implemented: potentially inappropriate hashtags can be easily removed.

**System Architecture**

The architecture of TwitterRadio is composed of three main modules - GUI, Server and Robin – that manage user interface, information processing and gathering and music generation respectively (Figure 1).

![System Architecture Diagram](image)

**Figure 1.** Architecture of TwitterRadio.

**GUI**

The GUI (Figure 2) displays information about the system status and notifies the server about user interactions (proposed hashtags) and changes the settings of Robin (orchestration change). The interface was designed to allow users to intuitively browse through the interaction options: they can enter new hashtags and select the preferred orchestration. Another function of the GUI is to display information about the playing station and the list of successive stations. In addition, the interface displays feedback on the current state of the system, which can be “playing”, “loading” or “waiting”. Given the simplicity of described
interaction, the traditional GUI set-up was chosen: we used a 24" monitor to display the GUI, and a mouse with a keyboard to get user input.

SERVER
When the user proposes a hashtag (i.e. requests a new radio station), the Server queries Twitter and gathers all the tweets labeled with the hashtag, which were posted within the previous 5 hours. If the hashtag is unpopular and has less than 50 associated tweets, Server stops processing and asks the user to choose a more popular hashtag. Otherwise, the Server processes the tweets and extracts information about the tweet emotional valence, tweet frequency and re-tweet frequency. The valence of tweets is computed by the means of the MPQA Subjectivity Lexicon [3]. This lexicon describes the polarity (from very positive to very negative) of 8221 English words. The valence of the tweet is computed by summing up the valence of single words and normalized by the number of tweets. The frequency of the tweets is defined as the number of tweets per minute. The last employed parameter, re-tweet frequency, refers to the ratio of re-tweets to the total amount of tweets. The three values are then forwarded to Robin, which starts playing music. The status of the system is sent to the GUI, which updates accordingly.

ROBIN
The music is generated by Robin, an algorithmic composer that automatically creates original music with an emotional connotation [4]. Robin is taught a series of basic compositional rules of tonal music, which are used to drive a number stochastic processed that create original compositions in Western music style. The choice of tonal music is consistent with this installation that targets an untrained audience, that usually do not understand complex or experimental compositions. The tweet moods are fed to the system and then translated into musical parameters (Table 1). The mapping between emotion and musical parameters is grounded on the related literature and on ad-hoc experiments [2,5]. Through the GUI, users can select orchestration among strings, brasses and piano.

First exhibition
TwitterRadio was first exhibited in September 2013 in Trento at the demo session of CHItaly 2013, the ACM biannual Conference of the Italian SIGCHI Chapter. The installation took place in a small lecture room and it lasted about two hours in total, spread over two consecutive days. Around 40 participants tried the installation. On the occasion of the event, the
generated music was complemented by some visual feedback: images related to the playing hashtags were projected onto a screen mounted in the room. The images were automatically collected by querying Bing for the playing hashtag.

To assess the visitors’ experience, we invited them to express their opinion about the installation both during and after the experience. In general, TwitterRadio met with enthusiasm: in particular, users appreciated the musical output and the way the music matched the hashtags. By contrast, we received a number of negative responses regarding the consistency of the projected images with both the hashtags and the music. A possible reason is that tweets reflect very recent events, whereas the Bing image search algorithm relies heavily on image popularity in a more distant past. Several visitors complained about the visual feedback being very intense and overwhelming, which completely distracted them from listening to the music.

Conclusions
TwitterRadio provides a novel environment for an artistic experience of tweet-based content. As well as being able to successfully engage users, TwitterRadio showed how properly music could convey information on world trends. On the occasion of CHI 2014, we plan to showcase an updated version of TwitterRadio. The changes are mainly inspired by the comments collected during the evaluation phase, which revolved on the idea that we should exclusively focus on the auditory experience. Also, we removed the functionality of orchestration selection. A more limited interaction would result in a less-intrusive and passive experience that should help reflecting on the themes played by Twitter Radio.

Acknowledgements
We would like to thank the whole HCI team for their invaluable and constant support. In particular, we owe the deepest gratitude to Ms. Cristina Core, who designed the GIU. Finally, we wish to acknowledge the contribution of Ms. Costanza Vettori, who edited the paper.

References