

Mobile Peer-to-peer Entertainment: Putting FolkMusic Back on the Streets Again When Peer-to-peer Goes Mobile

Mikael Wiberg, PhD
Interaction Theory Lab, Department of Informatics, Umeå University, 901 87 Umeå, Sweden
Email: mwiberg@informatik.umu.se

Abstract: This demo presents a novel mobile system called FolkMusic that supports mobile ad hoc exploration of music that is "in the air" of a community, how that music can be shared over inter-personal MANETS (Mobile Ad-hoc Networks).

1. INTRODUCTION

During the 80s it was very popular to bring a loud and big HiFi stereo along when walking down the streets downtown in the cities. The music could be heard on the streets and it was shared. However, the loud stereos were also quite annoying. When the Sony Walkman was introduced in the beginning of the 90s the music was still on the streets. However, although the Walkman solved the problem of annoying music on the streets it also meant another change. The persons became isolated from each other when it came to sharing music when everybody listen to their own music through earphones.

In the end of the 90s Napster and similar peer-to-peer technologies were developed to support sharing of music files (MP3 files) within a community. Today, almost any piece of music can be found on these networks. However, even though Napster and similar technologies offers the opportunity for people to share music it still means that the music is not shared on the streets. People are not mobile in their music sharing activities. The community members are isolated, both in terms of what other community members prefer to listen to, but also geographically.

One drawback with the loss of mobile sharing of music is that different cultures listens to different kinds of music, and that music is often associated with a particular geographic place. Bronx for instance is often associated with hip-hop music, whereas the city of Wien might be more associated with classical tunes. However, while walking down the streets of a city that cannot be experienced, all we see is persons with mobile music machines (i.e. Walkman, etc.). We are isolated and it is only our assumptions that tells us what kind of music that is popular in the community. This isolation from the community means that, even though Napster and similar technologies offer almost any music files to be instantly downloaded from anywhere in the world it might be very hard to find new interesting music to download because the search engines demands the name of the artist or the name of the song to be entered in the search field.

In this demo we have explored how to escape this isolation and bring the music back to the streets again, and enable mobile people to explore and experience the audio community of different places without annoying its surrounding. The demo builds on the idea of folk computing (Borovoy, 2001) and contributes to that strand of research by focusing on audio communities rather than text based interaction. *"Folk Computing is a new way of using technology to support face-to-face communication and community, modeled on the communicative process of folklore. Although there is an abundance of research on new technologies to support community, very little of it focuses on co-present communities whose dominant means of interacting is face-to-face"* (Borovoy, 2001).

2. SET THEORY BASED SERVICES

In this project we have explored how mobile services can be provided based on the fundamental building blocks of set theory. Basically, we have chosen to treat a user and his/her near close vicinity (i.e. 100 meters) as one set which then contains elements (MP3-files). When two persons meet a union of the two sets is automatically made. Further, an intersection between these two sets indicates which MP3-files they have in common. However, beyond the concept of proximity triggered services, which is basically the union of two or several sets, set theory allows us to explore complementary sets, chains of complementary sets, unions, intersections, and elements. Further, a set of elements (i.e. music files) belongs to a face, i.e. a community member, All these combinations leaves traces of music in the air for others to experience over WLAN based inter-personal MANETS (Mobile Ad-hoc Networks).

The concept of traces as a way of distinguish between several interaction modalities was first introduced by Sorensen (2000, p. 125). According to his work the audio traces left in the air of a community can be described as *ephemeral* and public so that other people can experience them, and *unobtrusive* to avoid the traces to be as annoying as loud stereos in the streets.

2.1 FolkMusic: Experiences audio traces of faces and places through mobile ad hoc networking

In this project we are exploring the use of persons and their relative geographical location, (i.e. if two or more persons are within 100 meters from each other), as peers in mobile ad hoc audio networks. In combination with

set theory based services this means that a user can walk down the streets in a city and experience the music that is stored on devices in the surrounding.

The basic idea underlying the FolkMusic system can be viewed as follows: As a person (A) walks down the street in a city he/she will meet or pass by several persons on his/her way. For each person met their public music files is represented to the user in a playlist of "folk tunes". When a user selects a song from the playlist the music is not downloaded as in the case of peer-to-peer clients such as the Napster client. Instead we use streaming MP3 so that the music starts instantly when the song is selected. In this way the user can easily and quickly browse through the files available to find out if there is anything interesting "in the air" of the current community of people without having to wait for the file to download.

2.2 Hardware

In the current version the FolkMusic system consists of laptop computers equipped with WLAN (IEEE 802.11b) PC cards. Earphones were used in this project to enable people to walk around and listen to music that others were carrying around.

2.3 Software

FolkMusic is a PC client integrated with Napster's music folder. The FolkMusic client consists of a personal public play list (i.e. MP3 files available for others) and a list of folk tunes displaying the MP3-files currently available in the community. The default setting in the FolkMusic client is to display every MP3-file in the union of co-located devices. However, more complex questions can be stated, e.g. to only show the elements (i.e. MP3-files) that are shared with others than the user him/herself (i.e. the intersections between co-located devices and their complementary sets which are not part of an intersection with the set that the user represents).

The FolkMusic client was programmed in Delphi and, to enable users to experience music the others carry around directly when it is selected we choose to implement this as streaming MP3 over a TCP/IP socket.

3. DISCUSSION

There have been several efforts made on using multiple mobile devices to support various kind of work related activities (e.g. Davis, et al, 1999, Lamming & Flynn, 1994, and Myers, et al 1998). However, so far there has been only few efforts made on supporting entertainment and CSCL (Computer Supported Collaborative Learning) with mobile devices and MANETs (Mobile Ad hoc Networks). One such example is Geney, (Danesh, et al, 2001) a problem solving application to help children explore genetic concepts using Palm computers.

Further, there has been a lot of research made on how to implement mobile ad hoc networks (MANETs) with several mobile devices. However, the work reported so far concerns only technical issues such as admission control, asymmetry on TCP performance, or broadcast deliveries (e.g. Pagani, 1999) without discussing or exploring new computer enabled use situations or new application domains, which was the preliminary objective for this demo. We have also considered the use of shared community mirrors to represent the dynamics of how elements are shared between sets, etc. That idea has proved to be very useful before (e.g. Borovoy, et al, 1998; Borovoy, et al, 2001). However, providing that overview would also destroy the necessity to move around to be able to experience the music of the community. As an alternative we think that the user can create that understanding of the community by just being mobile, and move around and share music.

Building on the concept of Folk Computing the demo adds to current research on MANETs, collaborative use of mobile devices, and ubiquitous computing. Technically, some future work includes a porting of the FolkMusic client to Pocket PCs with WLAN pc cards. followed by a large scale implementation and evaluation. We are planning to involve teenagers in the evaluation since they are early adopters of mobile technology, listens to a lot of music, enjoys being members of communities and might know less about the fundamental principles of set theory than adults.

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