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Information Delivery on Mobile Devices Using Boolean Sonification Patterns

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Abstract: Sonification is the means by which non-speech audio can be used to convey information. Existing work has produced methods for delivering information in a wide range of fields, and recent work has considered the huge potential of mobile devices for Sonification. Boolean Sonification is a method of defining two related musical patterns as boolean conditions (true/false, yes/no etc.), such that one is considered contrary to the other by the listener. The final pattern set ideally comprises of two musical events that are closely enough related as to be considered a group, yet distinct enough to be perceived as separate entities. A java user interface is under development to allow Sonification to be configured by the user on the handset itself. Live testing is currently being performed.

1. Introduction

Sonification can be defined as the use of non-speech audio to convey information [1], and so has great potential for application on mobile devices. Mobile device technologies often struggle to deliver information content within the constraints of the hardware available, and many features available on mobile phones are workaround solutions due to the physical limitations of such small devices. One of the most powerful (and popular) aspects of mobile phones are ring tones, which can be configured by users to denote different callers or groups. It is argued that the potential of such ring tones to convey more specific data is huge, with many different forms of information content being applicable for direct Sonification.

Mobile applications utilising audio have the distinct advantages of speed and efficiency over their associated visual counterparts. The far greater processing and storage overheads of visual mechanisms are also compounded by their requirement of user focus, often preventing other tasks or operations being performed. This element of focus is hands free in audio applications, allowing the user to effectively multitask in a variety of situations and environments.

2. Boolean Sonification

Using common melodic patterns as a basis, the design of Boolean Sonification pattern sets is based around some of the most obvious contrasts in western musical composition. The aim of the design is to produce a pair of musical patterns, which contain variations on a simple melody that suggest positive and negative characteristics (Figure 1).

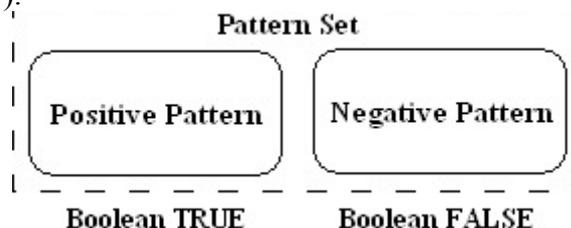


Figure 1. Boolean Sonification pattern template

Each pattern set can then be used to convey the boolean conditions of true and false, by using the emotional associations of different musical elements. All patterns are intended to be used on mobile devices via SP-MIDI [2], and so must be designed to repeat as necessary. The advantage of looping a pattern is the reinforcement of its boolean nature, allowing the listener time to determine whether a pattern is positive or negative. Previous work has produced a java application called TrioSon [3], which allows the user to configure a pattern Sonification quickly and easily. This application utilises the standard JavaSound API [4] to construct small midi file Sonifications of input data sets. The use of java for midi is equally applicable to mobile devices, which have adopted the java language as a standard for many different types of application. A test application has been constructed (Figure 2) that allows the Boolean pattern sets to be assessed in a live environment.



Figure 2: Boolean Sonification Application (Contour Icon Screen)

3. Conclusions

The development of Boolean Sonification is still very much in its early stages, and testing is currently being carried out. Application development is currently investigating the advantages of Symbian OS over Java, with a view to producing the most efficient and robust Sonification application. It is hoped that with the introduction of Boolean Sonification to mobile devices through an appropriate application a far greater user base can be accessed, and so the full potential of the technique can be better assessed.

4. References

- [1] G Kramer (ed) et al, "Sonification Report: Status of the Field and Research Agenda," International Conference on Auditory Display (ICAD), 1997.
- [2] Scalable Polyphony MIDI (SP-MIDI), MIDI Manufacturers Association Incorporated (MMAI), California, 2005.
- [3] C Cullen, E Coyle, "TrioSon: A Graphical User Interface for Pattern Sonification," International Conference on Auditory Display (ICAD), 2005.
- [4] Java Sound API Documentation, Java™ 2 Platform Std.Ed.v1.4.2, Sun Microsystems.