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Usability and Music Information Retrieval (MIR)

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Introduction

This paper gives a brief literature review on usability and music information retrieval (MIR).

Background

Usability is a combination of factors that affect the user's experience with a system. These factors include but are not limited to: the ease of learning, the efficiency of use, memorability of a system (e.g. how effective a returning user can perform an old task without re-learning the system), error prevention (i.e. how effective a system prevents problems from occurring in the first place), and aesthetic and minimalist design. A problem with many of today's online systems is that they do not meet the quality requirements of user. The literatures presented below attempt to examine factors and possibilities that can further improve the quality of MIR systems.

Usability and MIR

A recent work on visual collaging of music in a digital library (Bainbridge and Downie 2004) explores how the role of visual browsing can play within a digital music library. The work is a proof-of-concept prototype implemented in Greenstone (open-source digital library tool-kit). The idea of using the technique of visual collaging is to provide leisurely and undirected interaction with music collection by fading in and out images of music recordings at regular intervals. The authors believe that laid back browsing reduces recall, thus minimize the user's memory load. The actual usability and effectiveness of the technique, however, has not yet been examined and needs to be further studied.

The work of Blandford and Stelmaszewska in 2002 (Blandford and Stelmaszewska 2002) evaluates four web-accessible music libraries, focusing on features particular to music libraries, i.e. music retrieval mechanism. The four collections studied were: the NZDL Music Library, JC's ABC Tunefinder, the Folk Music Collection, and the NZDL Music Video Collection. Areas of retrieval mechanism specifically evaluated included browsing, text-based searching, tune matching, how to retrieve scores, melodies, and other information, and how the collections interface with other systems. Different areas of strength and weakness were discussed accordingly for each one of the collections studied. The authors specially noted the tension between "notational" ease of use and usefulness and "actual" ease of use of the systems evaluated.

An analysis of music information needs, uses, and seeking behaviours based on 427 user responses to a web-based survey questionnaire was presented in the paper "Survey of

music information needs, uses, and seeking behaviours: preliminary findings" (Lee and Downie 2004). 10 areas of findings were identified in the paper including findings on music information needs, reasons for searching music information, music-related material sought, and more. The findings can be insightful for future applications and studies on usability of MIR systems.

Logan's paper in 2004 (Logan 2004) introduces a music recommendation system based solely on acoustic features from groups of related songs called 'song sets'. To be more specific, the system recommends a similar song given a song set. The technique used for recommending songs from song sets involved first building a single model to represent all the songs in the set and then recommending similar songs according to distance model of either average distance, median distance, or minimum distance. For timbre-based similarity, best recommendation is by ranking using minimum distance. Inclusion of this work as part of the usability literature review is to show that the strategy presented in this work can be integrated into music recommender systems and further improve the quality of MIR systems.

Work by Kim and Belkin on "Categories of music description and search terms and phrases used by non-music experts" investigates people's perception of music, thus their information needs (Kim and Belkin 2002). The study involved 22 participants and 7 pieces of classical music. 11 participants were asked to write words descriptive of each piece; the other 11 participants were asked to write words they would use for searching for each piece. 7 categories of music description and search terms were generated based on participant responses. These included movements, neutral concepts (e.g. ambivalence, simplicity, transformation), emotions, nature (e.g. trees), objects (e.g. Spy), occasions or filmed events, and musical features. The work is only a preliminary study, but the findings can be valuable and applied to the future design of MIR systems in consideration of those who cannot, or do not wish to express their needs in musical terms.

Another work on user music information needs is called "Music information retrieval systems: why do individuals use them and what are their needs?" (Taheri-Panah and MacFarlane 2004). The work presented issues of music seeking behavior through examination of user lifestyle. The study found that lifestyles have significant impact on user need for music. The authors made an important note that the behavior of users in the over 40 group will change when those with more advanced IT skills move into the group. The findings of the work are interesting, but the significance of this paper is not discussed.

Another work on visualization of MIR systems is by Torrens et al. in 2004 who proposed new graphical visualization options to allow users to better organize personal music libraries and ease of their music selection. Three geometric expressions were used: disc visualization, rectangle visualization, and tree-map visualization. Differences among the options were contrasted and illustrated. The author believed that advanced yet simple visualization is highly probable of supporting and improving the process of exploring and re-discovering music collections.

The most constructive and comprehensive study on usability of MIR among the literatures presented in this paper is the work on "A review of factors affecting music recommender success" (Uitdenbogerd and Schyndel 2002). The authors examined factors and design criteria that affect the success of music recommender systems. Two common techniques used in recommender systems were discussed in detail: collaborative filtering and content-based filtering. The authors recommend use of knowledge from music psychology research to inform choice of features to aid music selection, thus incorporate factors that have not been used in most MIR system today to improve music recommenders.

Conclusion

Although much work has been published on musical taste and a substantial research on technical aspects of musical digital libraries has been presented, there have been relatively little studies and reviews on usability of MIR systems up to date. Some of the directions that researchers have begun to look into include:

- User studies focusing upon real-life music information needs and issue of music seeking behavior
- Non-expert user language for music information seeking
- Advanced visualization possibilities
- Usability evaluations on existing digital music libraries
- Techniques for music recommenders system

Many challenges on usability of MIR remain. For examples, a standardized evaluation method still needs to be developed and adoption of findings from various usability studies to be incorporated into the MIR system designs has not yet been put into good practice. The MIR community, however, is moving toward promising directions; as a general good design principle, people are beginning to be aware of the importance of performing needs assessment before system implementation.

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