Chapter 8

Expressiveness in Music Performance: Analysis, Models, Mapping, Encoding

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ABSTRACT

During the last decade, in the fields of both systematic musicology and cultural musicology, a lot of research effort (using methods borrowed from music informatics, psychology, and neurosciences) has been spent to connect two worlds that seemed to be very distant or even antithetic: machines and emotions. Mainly in the Sound and Music Computing framework of human-computer interaction an increasing interest grew in finding ways to allow machines communicating expressive, emotional content using a nonverbal channel. Such interest has been justified with the objective of an enhanced interaction between humans and machines exploiting communication channels that are typical of human-human communication and that can therefore be easier and less frustrating for users, and in particular for non-technically skilled users (e.g. musicians, teacher, students, common people). While on the one hand research on emotional communication found its way into more traditional fields of computer science such as Artificial Intelligence, on the other hand novel fields are focusing on such issues. The examples are studies on Affective Computing in the United States, KANSEI Information Processing in Japan, and Expressive Information Processing in Europe. This chapter presents the state of the art in the research field of a computational approach to the study of music performance. In addition, analysis methods and synthesis models of expressive content in music performance, carried out by the authors, are presented. Finally, an encoding system aiming to encode the music performance expressiveness will be detailed, using an XML-based approach.

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INTRODUCTION
The meaning of musical experience and how it can be described is extensively debated issue. According to Hanslick (1854), music consists of forms related to each other, but without a precise meaning; the content of music are moving sonic forms and any other meaning is a subjective interpretation of some music cues which are culturally significant. Nevertheless, many evidences support the idea that music can communicate information intended by a producer (composers or performers) to a listener, by means of a (more or less) shared code (Campbell & Heller, 1981).

The results of studies on emotional response to music (see, e.g., Juslin & Sloboda, 2001) showed that subjects can describe their listening experience by means of emotional categories and the statistically significant similarities in the subjects’ answers imply that this experience is shared at least in a given cultural context. The power of music to induce in listeners different affective states or moods is a well known characteristic, but music experience is not evidently limited to emotions. Music experience is a complex issue, that can be analyzed from different points of view. A piece of music can interest a musicologist, because of its historical and stylistic relations with the cultural environment in which it has been composed. At the same time, another listener can be attracted by the same piece of music, because of the emotions or the sensations induced by that music or that performer. Even for the same person, the experience can vary depending on the musical aspects on which he is focused. Another issue is how music experience can be described: linguistic descriptions can capture only partial aspects of the musical experience and non-linguistic metaphors are used to represent other features that cannot be conveyed verbally.

The aim of the present chapter is to summarize empirical findings from Sound and Music Computing research field that are relevant to the analysis and representation of musical experience. Attention is paid to the aspects related to the way a performer can convey expressive intentions by means of music.

The pages that follow have been organized as follows. In the next section, the authors provide broad definitions and discussions of the understanding and modelling of music performance carried out in the last years. In the section Models of music performance, the methodology employed to obtain insight into the phenomena of the expressiveness in music performance will be described. Some examples of the experimental methods that yield them will be detailed in the section Analysis of music performances. Finally, in the section Encoding: The representation of music performance features, an encoding system aiming to encode the music performance expressiveness will be detailed, using an XML-based approach.

Since 2005, the term Web 2.0 has gradually become a hot topic on the Internet. Users’ participation is the core of Web 2.0: open, shared, communication and growing-up together, as its primary characteristics, has been an inspiration to everyone. In this scenario, the authors firmly believe that the future of the audio interaction in a Web 2.0 scenario will be the use of expressive content: an interaction should allow a gradual transition (morphing) between different expressive intentions. Starting from a technologically oriented point of view, a computational model of human expression by means of music will be proposed in the section Future trends. This model is incorporated in a Web 2.0 framework that allows expressive processing, collaborative creativity and sharing of music content. Such a model is useful for multimedia/multimodal interaction systems (rhythms games and a new social interaction music-based platform, such as freesound or soundpedia), that could be integrated in the browser engines of the music community services.
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