EVALUATION IN THE VISUAL PERCEPTION OF MUSIC

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Abstract
This chapter is about the need to evaluate the recognition performed by (i) Optical Music Recognition (OMR) systems, and also by (ii) counterpart on-line systems that directly recognise handwritten music input through a pen-based interface. It presents a summary of reviews that have been performed for commercial OMR systems and addresses some of the issues in evaluation that must be taken into account to enable adequate comparison of recognition performance. A representation language [HEART (HiErARchical Text-Based Representation)] is suggested, such that the semantics of music is captured (including the dynamics of handwritten music) and, hence, a target representation provided for recognition processes. Initial consideration of the
range of test data that is needed (MusicBase I and II) is also made. The chapter is motivated by the outstanding need for (i) a greater understanding of how to evaluate the accuracy of music recognition systems, (ii) a widely available database of music test data (potentially automatically generated), (iii) an expression of this test data in a format that permits evaluation (for OMR and online systems) and (iv) the proliferation of representation languages — none of which captures the dynamics of handwritten music.

**Introduction**

There are a number of commercial systems, as well as research systems, that are designed to perform recognition of music notation, chiefly from a scanned image of music notation (OMR). There are also developmental systems that seek to recognise handwritten music input directly to a computer from a pen-based interface. In both these instances the need for evaluation arises so that the system can be assessed for its recognition performance. However, the subject of evaluation has been hardly addressed in the music recognition literature and it is difficult to assess the success, or otherwise, of music recognition systems.

This chapter begins by providing a summary of some commercial OMR systems, reviewing their scope and providing examples of the recognition that was attained with a system called Smartscore. Since there are currently no commercial systems for recognising handwritten notation dynamically input with a pen, we cannot make a review of these systems here, but focus on the off-line OMR situation. The examples of recognition obtained from the Smartscore system highlights some of the difficulties in evaluation — pointing to the need for a deeper consideration of evaluation and how it might be made in music recognition.

The chapter continues with a general review of the issues in evaluation considering the different criteria with which a system may be evaluated — in its accuracy, usability, efficiency, and other. A consideration is given of the specific challenges of music recognition compared with other document processing tasks and pen-based recognition endeavours. A special focus is made on the issues concerning measuring the accuracy of recognition in music, culminating in a discussion of the need for an adequate range of test data and truth representation for that data (ideally automatically generated) so that accuracy can be evaluated.

The chapter then contributes discussion of a representation language [HEART (HiErARchical Text-Based Representation)] that seeks to represent both (i)
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