Chapter III

Technology of Music Score Watermarking

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ABSTRACT

Content protection for multimedia data is widely recognized especially for data types that are frequently distributed, sold or shared in digital and via Internet. Particularly, the music industry dealing with audio files realized the necessity for content protection. Distribution of music sheets will face the same problems. Digital watermarking techniques provide a certain level of protection for music sheets. Classical image-oriented watermarking algorithms for images suffer from several drawbacks when directly applied to image representations of music sheets. Therefore, new solutions have been developed which are designed regarding the content of the music sheets. In comparison to other media types, the development of watermarking algorithms for music scores is a rather young technology. The chapter reviews the evolution of the early approaches and describes the current state of the art in the field.
INTRODUCTION

In the case of black and white (b/w) images, most of the approaches used for color images are unusable. For example, for b/w pictorial images, it is unsuitable to work in the frequency based transform domain since this implies generating an unacceptable noise for the musicians. Some other techniques proposed for watermarking can be also considered as possible approaches in music scores watermarking.

The copyright owners (the music publishers, authors and/or distributors) have in their archives high quantities of music scores. In classical music, the original music is normally stored on paper since it was produced several years ago. Presently, only new light and popular music pieces are in symbolic notation formats. Light and popular music have a limited life span in terms of time duration in comparison with classical music pieces. Publishers keep their distance from transforming their classical music pieces in digital format for e-commerce purposes since whenever distributing in this way their copyright ownership is not protected. Therefore, classical music risks remaining in the archives of publishers and libraries since its distribution is too dangerous for the future business of the copyright owners. The life of the copyrights for that kind of music is close to 60 to 80 years. Current copyright infringement is only via photocopy process. Internet distribution risks being an efficient vehicle for losing control on this material. The situation is different for light and popular music where the market life is shorter.

E-commerce for music distribution is not acceptable for publishers without the support of adequate protection mechanisms. Publishers prefer to protect their music and at the same time to allow the users exploiting content functionalities according to the permissions and prices established by the publishers. To cope with these problems, mechanisms for protecting musical objects include:

- Encryption techniques to support the transferring music objects;
- Watermarking audio files in different formats;
- Watermarking images of music score sheets;
- Watermarking music sheets while they are printed from symbolic notation files; and
- Definition of Digital Rights Management policies.

If a good and complete protection model will be developed and profitably validated, many publishers could decide to publish their classical music pieces on the Internet and this will have surely positive effects on the music sheet market. These include:

- The music should be bought in real-time.
- The distribution will not be limited to geographical areas.
- A further evolution of music software (editors, delivering systems, commercial tools, etc.) might be expected.
- Moreover, very ancient music sheets are interesting for artistic and historical aspects, especially if handwritten.

The field of music application quickly evolves, giving to the publishers, or in general to the music copyright owner, the possibility to use the new technologies in order to improve their activity.

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