PROJECT REPORT

A COMPARATIVE ANALYSIS OF PRE-PROCESSING TECHNIQUES FOR OPTICAL MUSIC RECOGNITION: ASSESSING THE EFFICACY OF STAFF-LINE REMOVAL

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ABSTRACT

Standard Optical Music Recognition (OMR) systems use staff-line removal as part of the pre-processing step to improve detection accuracy for the symbols. However, with the emergence of deep learning, this step started to seem somewhat unnecessary. In this study, we present a comparative study of three pre-processing scenarios, namely, staff-line removal via Projection Profile Analysis (PPA) subject to morphological operations (morphological), Run-Length Encoding (RLE), and no staff-lines removal. In order to assess its effects on recognition performance using Symbol Error Rate (SER), a CNN+LSTM model was trained on the PrIMuS dataset—a collection of 87,678 high-quality monophonic score images—under each of these circumstances. In this study we found that the scenario without removing staff lines leads to the lowest validation SER (0.62) compared with PPA+Morphological (SER: 0.75) and RLE scenarios (SER: 0.82). Although staff lines removal approaches such as PPA (0.01s/sample) and RLE (0.1s/sample) decreased computational costs, they were associated with artifacts resulting in more degraded models. The results make a case for prioritizing symbol integrity over pre-processing efficiency in deep learning-based OMR systems, and may help mitigate pre-processing issues in future work towards streamlined workflows and model optimization.

Keyword: Optical Music Recognition, Staff-Line Removal, CNN+LSTM, Symbol Error Rate, Pre-processing Techniques