

ON OPTICAL MUSIC RECOGNITION : USING OCR TECHNIQUES TO RETRIEVE AND ARCHIVE MUSICAL DOCUMENTS FOR WINDBAND

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PROJECT PROPOSAL MASTER THESIS - REPORT

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1 Introduction

Nowadays, more and more professional and amateur musicians use tablets instead of paper to read partitions and music scores. With this in mind, the archiving of music is more and more numeric and score editors often provide directly pdf files instead of sending a paper version of their music. We currently are in a transition period where there is still paper music that should be dealt with.

As a musician myself and software developer. I created an application to store pdfs of the archives of my windband digitally. The bottleneck, timewise, is often the acquisition of data. To get pdf files, we must scan music scores that are printed on paper and manually select or split the sheets according to the voice or instrument that they are meant for. This application also helps in the distribution of the scores to the musician. All the work that had to be done manually by distributing pieces of paper to the right musician can now be done online and two music band are currently using this software with great returns.

Here is the step where OMR (Optical Music Recognition) or at least OCR can begin its work. The first step is to have a system that can automatically recognise and split the scores in regard of the instrument, to split the files correctly. In a second time, the goal would be to extract the musical information on the sheets and get rid of the pdf format, to store only data. This would allow error correction, easy transposition and lighter storage.

In this project, a case study is performed to find a way to archive musical sheets. Prototypes will be built for wind band sheets, as this is the use case that is the most relevant for my personal use, and also have quite simple¹ music sheets.

1.1 Overview

— Need more information —

1.2 Research Questions

- At which point is the field ? What are current researches and what are the difficult aspects of OMR. [1]
— To develop —
- Can it be improved ? and if yes, how ?
— To develop —

¹Windband sheets are mainly monophonic and depict only one note at a time, in comparison to polyphonic sheets such as piano scores that are often composed of chords.

- How can we archive music with efficiency and practicality.
— To develop —
- Can we fully automatise the archiving process.
— To develop —

2 Objectives and overview of the thesis

The field of OMR is difficult to access for researchers, especially without musical background, as the notation has its codes and is not very intuitive for non-initiates. "OMR has not defined its goals with sufficient rigor to formulate its motivating applications clearly in terms of inputs and outputs." [1] But there is some "simple" problems that are close to solved. To reduce the field of research, we will focus on a specific category of music sheets, the scores for windband. This will exclude some other music notations, as guitar tab or specific symbols for strings, for example. This will also focus on monophonic music, as sheets for piano are not often found in windband literature².

3 Addressee

This study focuses on OMR for windband sheets. This should be narrow enough to achieve some results and to improve existing solutions. The canton of Fribourg has 91 windbands[3] and more than 2000 in Switzerland[2]. With each windband counting on average 30-40 members, there is a large audience that can benefit from this archiving method.

4 Proceeding and Method

With respect to ideas presented in sections above (introduction, problem statement, research question and objectives), the thesis will fall into two parts structurally. Part I will comprise of the theoretical background and related works. This part will heavily rely on literature review to present OMR theories, concepts and the state of the art.

Part II will present the application field and the use case under consideration. Discussion of the proposed method will also be presented. In this section, we will employ a combination of literature discussions and case studies in the exploration and generation of knowledge. The practical part will explore two steps. First, OCR to retrieve metadata to split the music scores, and second, OMR techniques to properly extract music data.

²More and more windband scores have a piano part but is often playable without it. Once the prototype is working for monophonic sheets, piano can be a next step.

The intended series of activities and corresponding research methods.

Step	Activity	Research method
1	Establishing background theory and overview	Literature review
2	Discussion of related work	Literature review
3	Data Preparation and analysis	Case study
4	OCR on metadata	Prototyping
5	OMR	Prototyping
6	Evaluation	Case study

5 Time Schedule

ToDo:

Phase	Task description	Progress	Plan start	Plan end	Plan days

6 Table of content of the thesis

1. Introduction
 - Motivation
 - Problem statement
 - Research questions
 - Objectives
 - Research Methods
 - Structure of the thesis
2. OMR and OCR techniques
 - Definitions and concepts
 - State of the art
 - Existing techniques
 - What can we apply to our case
3. Retrieving Metadata

- Datasets and preparation
 - Prototype
 - Results and discussions
4. Music extraction
 - Datasets and preparation
 - Prototype
 - Results and discussions
 5. Conclusion

7 References

References

- [1] Jorge Calvo-Zaragoza, Jan Hajič Jr., and Alexander Pacha. Understanding optical music recognition. *ACM Computing Surveys*, 53(4):1–35, Jul 2021.
- [2] Federal Office of Culture FOC. Wind bands.
- [3] SCMF. Liste des sections - sektionenliste.