

OMR for Mensural Notation: Looking at a Guatemalan Music Manuscript

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Dissertation Project

- Preservation of the colonial musical heritage of Guatemala
- Collection of 6 choirbooks written in mensural notation
- Increase access to these sources through:
 1. Digitization
 2. OMR
 3. Automatic transcription (into modern values)

GuatC 1: Guatemalan Choirbook 1

- January 2019: Digitization stage
- Summer 2019: Working on the other two stages























Optical Music Recognition (OMR)

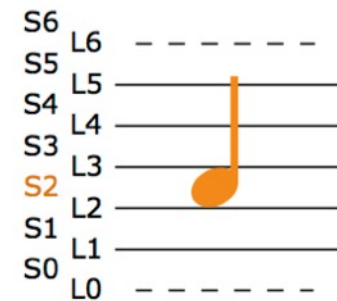
Test an End-to-End OMR Approach
(Jorge Calvo-Zaragoza and David Rizo)

End-to-End OMR Approach

- Convolutional Recurrent Neural Network (CRNN) model
- Staff level
- Extracts two pieces of information for each symbol:
 1. Category of the symbol
 2. Category of its vertical position within the staff

Group	Symbol			
	Note	Semibrevis	Minima	Col. Minima
				
Rest	Longa	Brevis	Semibrevis	Semiminima
				
Clef	C Clef	G Clef	F Clef (I)	F Clef (II)
				
Time	Major	Minor	Common	Cut
				
Others	Flat	Sharp	Dot	Custos
				

(Pacha and Calvo-Zaragoza, 2018)



(Pacha and Calvo-Zaragoza, 2018)

End-to-End OMR Approach

Reasons:

- a) Efficiency
- b) Model already trained on Spanish mensural notation
 - Seventeenth-century manuscript
 - Corresponding to a complete mass (a 12)
 - From the Cathedral of Zaragoza

MuRET (Music Recognition, Encoding, and Transcription)

The screenshot displays the MuRET web application interface. At the top, the browser address bar shows the URL `muret.dlsi.ua.es/muret/#/documentanalysis/2784`. The application header includes the MuRET logo, the text "Agnostic / Document analysis", and navigation links for "Logout as martha", "Training sets", "Report an issue", and "About". Below the header is a toolbar with icons for search, zoom, and other functions. A filter bar is visible with the following options: Filter, Pages, Undefined, Staff, Title, Text, Author, Empty staff, Lyrics, Multiple lyrics, and Other. The main content area shows a scanned page of a musical manuscript with four staves of music. Each staff is highlighted with a green rectangular box. The lyrics for the first three staves are: "E ne dicitur qui venit, qui ue", "in no mi ne Do mi ni, //", and "in nomine Domini". The lyrics for the fourth staff are "in nomine Do mi ni,". The page number "2784" is visible in the top right corner of the manuscript image. At the bottom left of the application, it says "No part assigned". At the bottom right, the image ID is "2784 - 29v.jpg".

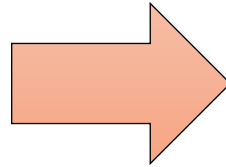
Automatic Transcription of Mensural Notation

Translation Problem:

Graphical encoding (OMR) → Musical meaning

Translator: Agnostic to Semantic

Agnostic Sequence
token = symbol + line/space



Semantic Sequence
token = symbol + pitch

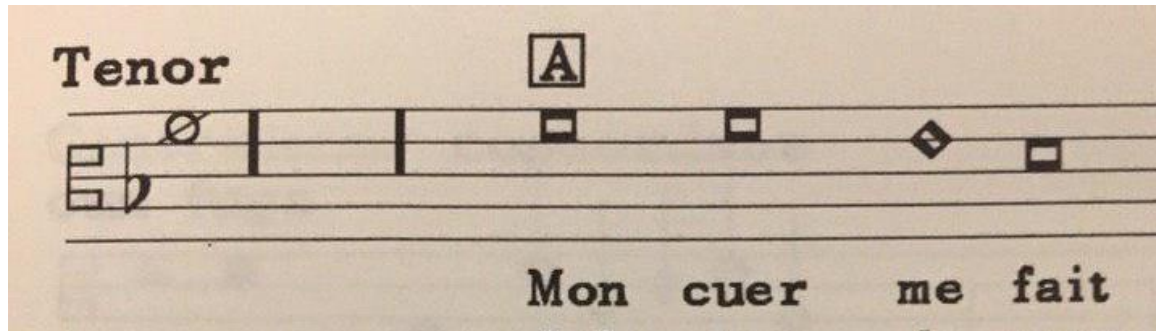
clef.C-L2 note.half-L3 note.quarter-S2

clef.C2 note-E4_half note-D4_quarter



Translator: Agnostic to Semantic

- Note shape (i.e., symbol class) is not enough to convey the duration of a note in mensural notation

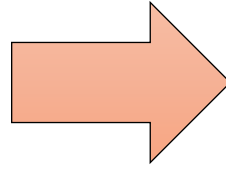


Translation: Agnostic to Semantic

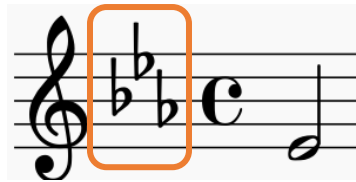
- Machine learning based model (sequence-to-sequence model)
 - Training set: pairs of agnostic and semantic sequences
 - Not enough training data for mensural notation (yet)
 - Test the implemented translator:
 - **PrIMuS** (Printed Images of Music Staves) dataset
 - Set of 87,678 real-music incipits
 - In common Western music notation
- <https://grfia.dlsi.ua.es/primus/>
[\(Calvo-Zaragoza and Rizo 2018\)](#)

Translator: Agnostic to Semantic

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Semantic Sequence
token = symbol + pitch

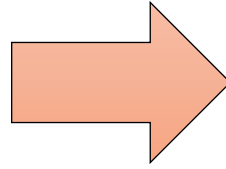


clef.G-L2 accidental.flat-L3 accidental.flat-S4 accidental.flat-S2 **metersign.C/-L3** note.half-L1

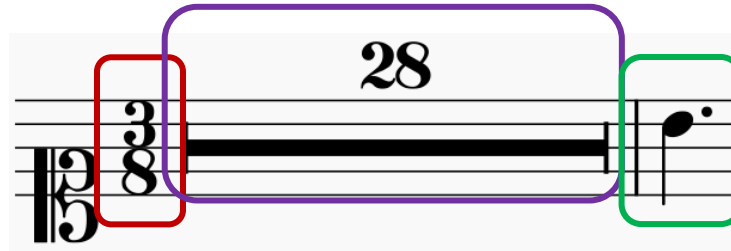
clef-G2 keySignature-EbM **timeSignature-C/** note-Eb4_half

Translator: Agnostic to Semantic

Agnostic Sequence
token = symbol + line/space



Semantic Sequence
token = symbol + pitch



clef.C-L1 digit.3-L4 digit.8-L2 digit.2-S5 digit.8-S5 multirest-L3 barline-L1 note.quarter-S4 dot-S4

clef-C1 timeSignature-3/8 multirest-28 barline note-C5_quarter.

Future Work

- Finish performing OMR on the whole GuatC1 manuscript
- Obtain the training data for testing the translation model on mensural notation
- Compare the machine learning based approach against a heuristic one (MA thesis)

Thank you!

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Graduate
Mobility
Award



Fonds de recherche
Société et culture

Québec



SIMSSA

: Single Interface for Music
: Score Searching and Analysis



Social Sciences and Humanities
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Sequence-to-Sequence Model with Attention

