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The use of MIDI data for Music Therapy Research

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Introduction

Data collection for the analysis of music therapy sessions can be achieved through various methods. A literature review presents that a significant proportion of studies are qualitative in nature, documenting the dynamics of sessions through observational approaches supported by music therapy assessment scales (Moriá and Sampaio, 2021).

The use of music as a therapeutic tool stimulates the production of para-musical, musical, and extra-musical elements (Bruscia, 2016). Music therapy assessment is defined as a musical analysis that "articulates the musical aspects produced by the patient with their life history, clinical history, and/or their current moment" (Barcellos, 2016).

There is a scarcity of publications in Brazil that employ quantitative methods for data collection and analysis in music therapy, particularly studies utilizing digital equipment for data collection. For example, there is a notable lack of research incorporating musical instruments that transmit MIDI (Musical Instrument Digital Interface) information into their methodologies.

Objectives

Given the vast potential for the collection and analysis of musical data from music therapy sessions using MIDI, through Music Information Retrieval (MIR) techniques, there are challenges in advancing technological methodologies and assessing subjective aspects of the therapeutic process.

This research project aims to identify factors that hinder access to this wealth of data, explore ways to make these tools more accessible for music therapists in Brazil, and investigate opportunities for the ongoing development of platforms that utilize MIDI technology for research.

Methods

Research articles on the concept of MIR in Music Therapy, the use of MIDI data for research, and the use of technological tools in Music Therapy (2023 – 2024);

Development of programming languages such as MAX/MSP (Cycling '74) and Python for processing MIDI data and creating visual and statistical analysis (2021 – 2025);

Advancement of an intuitive visual interface to ensure accessibility for all users and researchers (2024 – 2025);

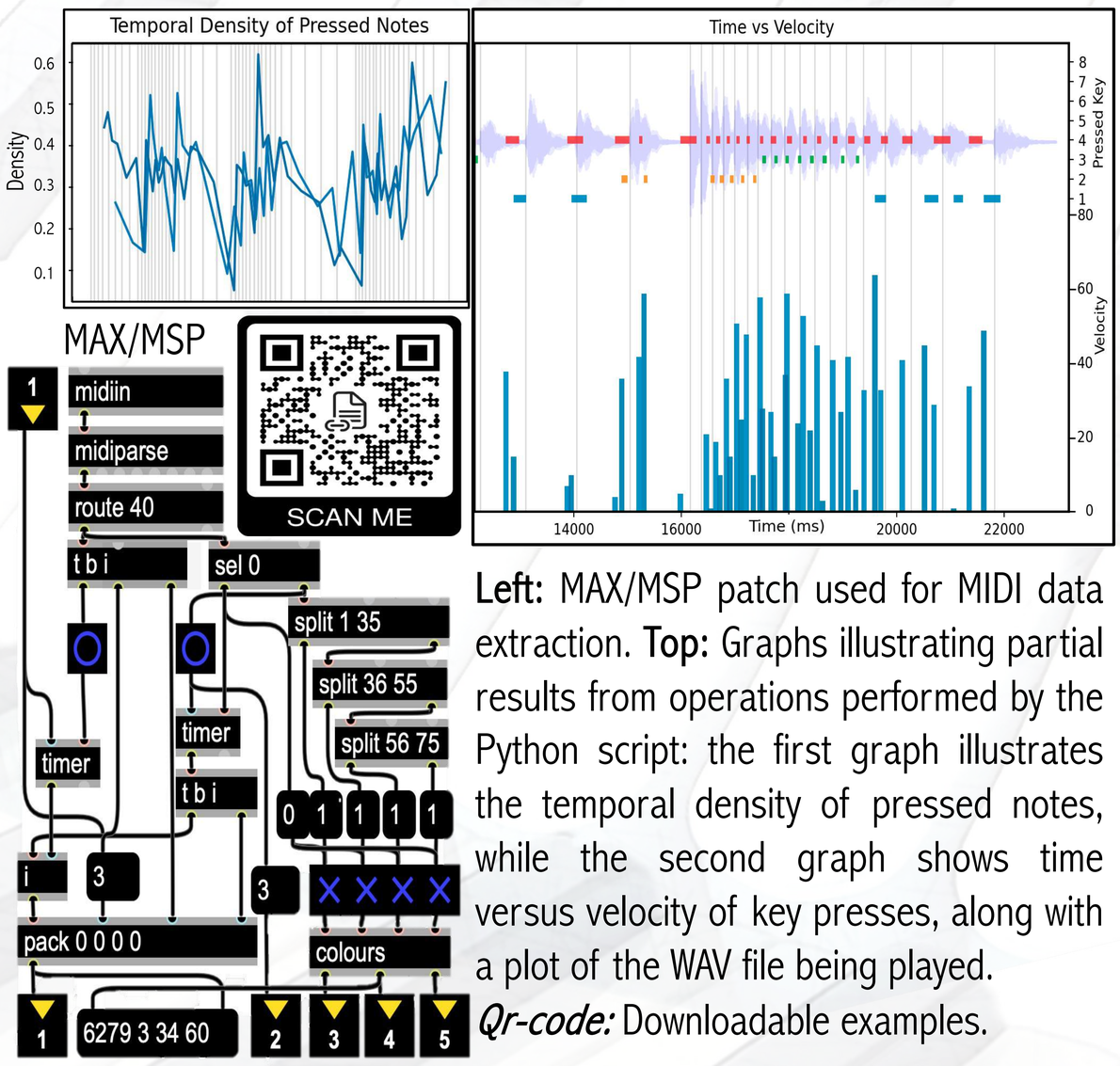
Interviews with experts in music therapy to explore their use of technological tools and collect evaluative feedback on this ongoing research) (2024 – 2025).

Partial results

Many existing studies utilize expensive software such as MATLAB (MathWorks Inc.), which is mainly inaccessible to most music therapists who usually do not have regular training in these tools. For example, the Music Therapy Toolbox (MTTB) for MATLAB, developed in Finland between 2003 and 2006, analyzes MIDI data from music therapy improvisations for quantitative analysis (Erkkilä, 2007).

In this research, we developed patches using accessible software such as MAX/MSP, to collect information on timing, force density, note duration and inter-onset intervals.

This data was analyzed through a rhythm perception test where participants followed an adaptation of Brazilian rhythms in Mozart's "Turkish March" (from Piano Sonata No. 11 in A major, K. 331). The analysis was performed using Python code, which is widely available and free for all users, and included accuracy and error prediction, response expectation calculations, and other relevant metrics. Further statistical analysis may be done using R.



Left: MAX/MSP patch used for MIDI data extraction. **Top:** Graphs illustrating partial results from operations performed by the Python script: the first graph illustrates the temporal density of pressed notes, while the second graph shows time versus velocity of key presses, along with a plot of the WAV file being played.
Qr-code: Downloadable examples.

References

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