

# A MIDI Track for Music IR Evaluation

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## ABSTRACT

The Musical Instrument Digital Interface protocol can provide Music IR researchers with a stable, robust and widely available standard that will allow the creation of testbeds appropriate for precision and recall evaluation in relevance based MIR experiments. MIDI presents many inherent advantages to researchers that our community must not overlook. In addition it presents an opportunity to solve one of the most vexing problems MIR researchers have encountered: Intellectual Property Rights.

## 1. INTRODUCTION

The Music IR community has now entered a phase of greater maturity and development where many experiments and projects are beginning to open up serious avenues of inquiry. The MIR field has also received serious recognition from the IR community at large as well as from funding and granting institutions worldwide. Because of this tremendous growth it now faces the quandary that the text IR community faced in the past: that of creating standardized tracks, testbeds and tools to measure the effectiveness of competing methodologies and techniques. The Cranfield model, which served text-based IR so well, particularly in its implementation at TREC, is now discussed by the MIR community with interest. Although much has happened in the world of technology since the original Cranfield experiment, the need for standardized testing and measuring is still as essential. This a logical step for MIR researchers wishing to evaluate the many different methods, algorithms, and techniques that have been recently developed. In this paper I wish to propose the use of the Musical Instrument Digital Interface protocol as the standard for one such track. Despite the fact that many in the music performance community have criticized MIDI as an obsolete and incomplete tool, it still remains ubiquitous and easy to use. Most quality music schools and academies have a music lab with MIDI facilities. Many professional musicians and composers use MIDI as an every day tool for performance and recording. Even untrained amateur musicians and composers often have good quality MIDI equipment. MIDI interfaces and instruments are available worldwide, and because they have been the standard for so long the price of professional quality tools, is not excessive. For MIR researchers MIDI is an interesting creature, as it lies at the crossroads of symbolic music representation, audio generation, and performance recording

## 2. Wielding Occam's Razor

As mentioned earlier, IPR has been a knotty problem for MIR researchers. This is perhaps the single most important reason why standardized MIR databases are not available. Perhaps our community has overlooked an obvious idea. Our research is not about listening to great music, but rather, about creating great

MIR systems. A great MIR system must be able to retrieve works of poor quality as well as great works. The methodology I propose is the following: issue a worldwide request to all musicians and composers to contribute their MIDI files. The creator would not relinquish his or her IPR, but would allow the use of their work as long as it is for research. Perhaps some requirements could be imposed, say works that are at least 30 measures but not longer than 500; or works that are at least 30 seconds but not longer than 5 minutes. The goal would be to collect 10,000 MIDI files for testbed creation. These in turn would become a standard database for all researchers.

## 2.1 A MIDI Track governing body

Perhaps an MIR "MIDI Track" curatorial or governing committee will be needed to assure contributors that their works will not be commercially distributed or misappropriated, but will only be made available to recognized researchers. This committee could act as an overseer that would define the parameters of works that are acceptable, including the definition of a common terminology to be used, and appropriate metatags for file identification. They would also be responsible for procuring appropriate storage space and for the creation of a standardized CD version of the testbed. This committee would also be responsible for distributing these materials.

## 2.2 Creation of a secure website for this track

A website containing the testbed, or an appropriate subset, should be created for experiments in online music retrieval. Contributors should have the choice of contributing to a non web-based collection, as well as to the online collection. The net based subset would allow for standardized online retrieval experiments. The curatorial committee would be responsible for obtaining secure web hosting for this collection.

## 3. The many faces of MIDI

Byrd and Crawford (2002)[1] have written about the three basic domains of music representation: time-stamped events, digital audio and common music notation. MIDI is the most important example of the first and is closely related to the other two domains. It can also serve as the basis and/or source for the generation of real-time audio recordings. In addition, common music notation (cmn) scores, albeit crudely, can be derived from a MIDI file.

## 4. MIDI is practical

The MIDI protocol is truly cross-platform. MIDI tools and instruments can be used from any computing platform. Also, it is open source code that has been widely available and publicized. The creation of MIDI applications, tools and interfaces can be accomplished with many programming languages. As just one example, Sun's Java provides support for MIDI and audio programming through the JavaSound API [2]. Many other Java

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open source API's provide support, including Tritonus [3], JMusic [4], DixStix [5], and Project Xemo [6], among others. Many professional quality commercial notation programs, such as Finale and Nightingale, allow MIDI files to be imported and exported. Thus allowing the creation of common music notation files. Another important advantage of MIDI is its small file size, which makes these files extremely efficient for storage, transmission and retrieval. A testbed composed of these files may be quite compact. Because the protocol has been around since 1983, and is supported by the MIDI Manufacturer's Association, musicians, composers and researchers are guaranteed that professional quality instruments and interfaces are widely available.

## 5. A useful research paradigm

Although MIDI files are encoded in binary form, parsers that render a MIDI file in such a form as to be readable by humans are available. This would allow the use of natural language retrieval techniques on the encoded information. Perhaps permitting comparison of natural language methods versus methods that are specific to music. Another important element is the fact that many MIDI collections already exist. Perhaps the weakest point of many of these collections is that they have not been carefully curated and may include many amateurish or low quality works. It would not be too difficult to create a collection of sufficient size and depth as to be of research quality. This collection could be limited to a specific genre or it could be agnostic about style. Such a collection could then be made available to researchers wishing to work with this track. This same collection can also be made available in audio file format, and as common music notation scores. My group, OMRAS [7], is actively seeking a curated collection of standard classical piano music in the form of MIDI files with their audio file equivalents to continue

experiments that involve polyphonic retrieval and audio retrieval. Any such experiments that use MIDI as a source could, in theory, be replicated.

## 6. A final thought

We should be open to any work that is not constrained by IPR. This means that sequenced works of great composers are also acceptable as long as they are legitimately in the public domain. However, the idea of testbeds created by artist donated works does not have to be limited to MIDI files. The same methodology could be applied to audio, mpeg, and video, or any desired format, so as to facilitate the creation of standardized testbeds. I propose MIDI as it seems to be a natural starting point for our purposes.

## 7. ACKNOWLEDGMENTS

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## 8. REFERENCES

- [1] Byrd, D. & Crawford, T. (2002). Problems of Music Information Retrieval in the Real World. *Information Processing and Management* 38, pp. 249–272.
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- [3] <http://www.tritonius.org/>
- [4] <http://jmusic.ci.qut.edu.au/>
- [5] <http://dixstix-midi.sourceforge.net/>
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