

Ask a Librarian: The Role of Librarians in the Music Information Retrieval Community

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Abstract

Participation from music librarians has been sparse in the first six ISMIR conferences, despite many potential areas of common interest. This paper makes an argument for the benefit to both the library and Music IR communities of increased representation of librarians at ISMIR. An analysis of conference programs and primary publications of two music library organizations to determine topics from the library literature relevant to Music IR research is presented. A discussion follows of expertise music librarians could potentially contribute to Music IR research and the ways in which Music IR research could further the work of music librarians, in each of the topics represented in the library literature.

Keywords: Music librarians, ISMIR.

1. Introduction

Since its inaugural conference in October 2000, ISMIR has provided a forum for exploring the topic of music information retrieval from a variety of perspectives. In a 2003 review of the proceedings of the 2000 and 2001 ISMIR conferences, Futrelle and Downie [1] outline several Music IR research communities—computer science and information retrieval, audio engineering and digital signal processing, musicology and music theory, library science, cognitive science, psychology, philosophy, and law—and point out that dialogue among the communities is both enhanced and impeded by the fact that each community has its own methodologies, jargon, and philosophies.

Although common sense suggests that practicing music librarians, who have historically managed music collections and assisted users in finding music information within them, would participate actively in the conferences, a review of the ISMIR proceedings from 2000 through 2005 reveals few papers or posters authored by members

of this group. Contributions include overviews of digital library projects [2][3][4], standards for digital image capture of musical scores [5] and metadata [6]. Admittedly, we could increase the perception of librarian participation by including papers and posters on library-related issues that were presented by technology staff in digital library programs or faculty and graduate students in schools of information science. We could also argue that more music librarians have attended ISMIR conferences than have presented papers or posters. But we decided to focus on librarian participation as measured by conference presentation partly because presentations are central to discourse at ISMIR conferences, but also because institutional support for attendance tends to be greater for presenters. The first task seemed to be to attempt to identify topics and styles of presentation that resonate with music librarians but also fit into the research agenda of ISMIR.

Building on the model employed by Futrelle and Downie, we surveyed the conference programs as well as the primary publications of two organizations that represent music librarianship—The Music Library Association [7] and the International Association of Music Libraries Archives and Documentation Centres [8]—hoping to identify topics that both engage music librarians and intersect with the research agendas of other Music IR scholars. Full-length articles from *Notes: Quarterly Journal of the Music Library Association* [9], and *Fontes artis musicae, Journal of the International Association of Music Libraries, Archives and Documentation Centres* [10] as well as public presentations from the Music Library Association Annual Meetings [11][12][13][14][15][16] and the IAML Annual Conferences [17][18][19][20][21][22] covering the years 2000-2005 were examined and broadly classified according to the topics listed in Table 1.

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Table 1. Distribution of major topics identified in MLA and IAML conferences and publications 2000-2005

Topics	Descriptions	MLA Annual Meetings	<i>Notes</i>	IAML Conferences	<i>Fontes artis musicae</i>
Music history and literature	Research in the historical and cultural aspects of music including repertoire	17%	8%	9%	8%
Print collections	Descriptions of print collections and historical printing and publishing methodologies	18%	41%	24%	49%
Reference and user education	Questions users ask; how we teach users to find information; usability of standard music databases	16%	12%	13%	0
Digital libraries	Descriptions of digital libraries, digital collections, and digital preservation	9%	5%	15%	0
Cataloging and metadata	Various schemas for organizing information	10%	5%	7%	0
Copyright	How does copyright affect our ability to create and provide access to digital collections?	1%	1%	4%	0
Librarianship	Professional and methodological issues related to music librarianship	18%	25%	19%	40%
Other	Miscellaneous topics	11%	3%	9%	3%
Total percentages		100%	100%	100%	100%

The results, also shown in Table 1, present a snapshot of the kinds of issues that interest librarians enough to inspire them to write articles or prepare conference papers. Not surprisingly, music librarians, as practitioners, tend to focus much of their energy on performing the day-to-day duties of their jobs as effectively as possible. “Librarianship” topics involving library management, library facilities, and “how we do it well in our library,” provide core information and a sense of community for the practicing music librarian and represent an average of 25.5% of the conference presentations and articles examined. While these topics, in themselves, are not appropriate for ISMIR, some understanding of the difference between those whose primary focus is research and those whose primary focus is practice would undoubtedly help to build necessary bridges between librarians and those from other disciplines.

Many of the other subject areas suggest opportunities for collaboration and dialogue. In the remainder of this paper, we will briefly explore these topics and make some practical suggestions about ways in which each community—music librarians and Music IR researchers—can benefit future work.

2. Music history and literature

2.1 Librarians’ potential contributions to MIR

Many academic music librarians hold graduate degrees in music and possess the skills to contribute scholarly research to the corpus of writings on music history and literature. Our brief survey of MLA and IAML

conferences and articles reveals that an average of 10.5% of the submissions fell into this category. Specific titles frequently reflected either the author’s research interest or the locale chosen for the conference and focused on a broad range of musical styles including classical, world, jazz, bluegrass, and musical theatre. Music librarians could help to add to the general Music IR knowledge about types of music, notation and its interpretation across cultures and historical periods, and musical style. They could also help Music IR researchers identify core repertoire for study.

2.2 MIR benefits to librarians

Some of the tools being developed by Music IR researchers to automate musical analysis, classification, transcription, and theme extraction will provide invaluable assistance to musical scholars, including those who are practicing music librarians. These tools, when well designed, will allow the scholar to easily perform tasks that required hours of tedious work when performed manually. This is an area where dialogue between developers and scholars could be particularly productive. Developers can help music librarians stretch their imaginations while librarians can help developers define real problems to solve.

3. Print collections

3.1 Librarians’ potential contributions to MIR

Music librarians have historically acquired, collected, managed, preserved, and provided access to collections of physical items related to the study of music: books,

manuscripts, printed musical scores and, more recently, sound and video recordings. An average of 33% of the presentations and articles found in our survey shared information about unique, interesting, or special collections in music. These collections, as well as the depth of knowledge about them, can provide a corpus of material with which Music IR researchers can work. Music librarians could ostensibly add value to ISMIR conferences with presentations about unique and special collections.

3.2 MIR benefits to librarians

As libraries strive to transform physical collections into digital ones, Music IR research can provide the means. Recent ISMIR presentations have investigated standards for scanning and processing of digital scores, optical music recognition, and music transcription. All of these issues address the nontrivial problem of transforming print music collections—including hard-to-read manuscripts and a variety of notational systems—into true digital collections that can be searched, manipulated, and read.

4. Reference and user education

4.1 Librarians' potential contributions to MIR

While only about 10% of the articles and presentations reviewed in our study were directly related to reference and user education, most librarians spend at least some of their time on these tasks and can offer their perspectives on usability of databases, wishlists for automated reference functions, and ideas for further study. This is another area where close communication between librarians, with their day-to-day experience with users, and Music IR researchers, with their knowledge of the possibilities offered by technology, could result in exciting new services for library patrons.

4.2 MIR benefits to librarians

Although many of these concepts will be discussed in more detail in the following sections on digital libraries and metadata, we want to emphasize that reference and user education continue to benefit greatly from advances in Music IR research. Among the possibilities for enhancement to current services are 1) advanced searching capabilities to include genre, instrumentation, similarity, mood, tempo, rhythmic and melodic patterns, and performer; 2) more sophisticated document retrieval that return results in ways that are meaningful to individual users; 3) audio retrieval-by-example; 4) audio matching where all instances of the same piece can be located via an audio search; 5) improved cross-database searching capabilities; 6) more personalized user interfaces, including those designed for persons with special needs; and 7) automatic extraction of metadata.

5. Digital libraries

5.1 Librarians' potential contributions to MIR

Librarians possess skills that transform a simple pool of content into a true library in the online environment as well as in the physical one, and they have played key roles in the implementation of a number of digital music library systems. Many of these systems serve to increase access to notable library collections beyond a library's local users, as for example the numerous online sheet music sites developed by libraries, including those from the Library of Congress [23], Johns Hopkins University [24], and Indiana University [25] and the recently-launched Cylinder Preservation and Digitization Project from the University of California, Santa Barbara [26]. Many librarians in academic environments have made their audio course reserves available to students online. Other librarians have served as valuable contributors to the design of systems that take one step further and use content from the library as the core of digital music library systems with more advanced technologies layered above. The Harmonica project, funded by the European Commission's TAP Libraries Programme, produced a large number of documents outlining potential areas of implementation and further study for fostering networked access to music library materials [27]. The Variations2 system from Indiana University, well represented at ISMIR conferences, is one example of a fully implemented system, intended to support music teaching, learning, and research [28]. The success of these projects indicates librarians' skills can provide similar benefits to new technologies being developed in the Music IR community.

In addition to functionality in digital library systems already implemented, librarians can contribute many ideas for how to improve these systems in the future. Specific and appropriate genre, style, and instrumentation terms chosen and maintained by librarians could be used to provide high-level browsing of library collections, a method of access that has historically received little attention. Knowledge of musical works and their relationships to one another could be used to improve search results [29]. Librarians' understanding of music literature and how users move between secondary and primary sources could be used in the high-level design of digital library systems. As systems evolve, librarians can help to continually push functionality to new levels.

5.2 MIR benefits to librarians

Innovations in the Music IR community provide many opportunities for digital music library systems to improve end-user search and discovery beyond what librarians alone have envisioned. Developing technologies promise to allow easier integration of controlled vocabularies for names, titles, and subjects into search interfaces, shifting the responsibility for knowing the "right" version of a term

in this situation from the user to the search system. Optical music recognition could greatly increase the amount of encoded score content available for our users. Audio identification algorithms could improve the speed in which libraries can connect appropriate metadata to digital audio. Content-based, by-example, and similarity searching algorithms could be added to systems that previously only used metadata-based searching to produce more robust and flexible discovery for our users. The possibilities for integration of Music IR research techniques into digital music library systems are nearly endless.

Finding music is not an end unto itself. Discovery is the first and perhaps even least interesting (to him) step a user takes in his path towards his final goal—putting that music to use. This use can take a variety of forms. In academic music libraries, the primary uses of materials from library collections are classroom assignments, research, and performance. Tools from the Music IR community for harmonic and formal analysis, for use with audio, score images, and encoded scores, can help students complete classroom assignments and more fully understand compositional styles. These same tools provide music researchers with unprecedented methods for performing quantitative analysis. Automated audio and score alignment methods, instrument artist identification algorithms, and many other Music IR techniques can simplify many music history and theory classroom assignments.

No matter what use a library patron makes of the music he finds, he must have some method for managing the materials in which he is interested. Music IR tools frequently present innovative methods for user interaction with materials that could supplement existing tools in libraries.

6. Cataloging and metadata

6.1 Librarians' potential contributions to MIR

Music IR research has historically focused heavily on content-based retrieval methods. These methods show great promise for improving access to music; however, they cannot by themselves meet every user's searching need. Instead, it is likely that a combination of content searching and "traditional" metadata searching can be used to provide improve access to music; neither method must operate in isolation. The aforementioned Variations2 project is one proof-of-concept example of how the two methods might operate in concert [30].

Librarians have developed a number of techniques to aid metadata-based access to their collections, many of which date from the days of printed catalog cards. Most of these methods focus around the idea of "collocation"—grouping together like materials either on the shelf or in the catalog. One such technique is called "authority control," which seeks to describe people, corporations,

titles, and subjects with the same label every time they appear in the library catalog. A user can then find every item by a given person, all instances of a given work, or all works on a given subject with a single search, rather than having to dream up all possible versions of a name or synonyms for a subject. Variant names, titles, and synonyms for subjects are then cross-referenced through the library catalog to the preferred form that appears in the catalog records. Subjects, which in library cataloging, include such important user access points as genre and instrumentation, are pre-arranged into a hierarchical structure so that users may broaden or narrow their search as desired. These goals, if not the specific mechanisms librarians currently use to achieve them, are essential for next-generation music retrieval systems.

The library community has recently developed new models aimed at more clearly structuring bibliographic information. The most influential of these models is known as "FRBR"—a report from the International Federation of Library Associations and Institutions entitled *Functional Requirements for Bibliographic Records*, which applies entity-relationship modeling to bibliographic information. [31] The FRBR structure and current technologies represent a great deal of potential for search systems based on high-quality, structured metadata. FRBR-like metadata models have been implemented in such systems as Variations2 from Indiana University [32], the British Library Sound Archive [32], and MusicAustralia [34].

Librarians who work with these techniques on a daily basis can and should provide expert input to leverage them in today's environment. Music librarians possess the in-depth understanding of metadata-based searching needed to effectively integrate these technologies and data sources into our search systems. The data itself generated from the traditional library approach can also be of use to the Music IR community. The current *Amadeus* (Authority Multicultural Archive Description Effective Universal Search) project, a collaborative effort centered in the Italian Castalia music center, is one example of how library data might be used to enhance retrieval systems [35].

In addition to thinking about how library approaches to metadata can be expanded in the networked environment, librarians and library organizations have embarked on a number of studies to analyze the music metadata environment and make recommendations for the role of libraries in a collaborative metadata future. MLA has provided an organizational home for two working groups studying music metadata issues [36][37], and the IAML Information Technology Committee has sponsored at least two conference sessions devoted to examining the potential application of emerging technologies to the library music metadata environment [38][39].

6.2 MIR benefits to librarians

Innovative research coming out of the Music IR community offers unprecedented opportunity for the implementation of systems that shift the burden of vocabulary control from the cataloger and the user to the system, to integrate authority lists and subject thesauri into cataloging and search systems, transparently assisting catalogers in assigning appropriate names, titles, and subjects and users in finding material described with these terms.

Metadata-based searching has been represented at ISMIR, most notably through a special session on metadata at ISMIR 2002, which featured one librarian and four representatives from various aspects of the music industry. Librarians can learn from Music IR's example that valuable and useful metadata is not just available from libraries. Demonstration of how differently-structured and unstructured metadata can be used for searching will broaden librarians' perspectives of how search systems can work. Similarly, taxonomies and ontologies developed outside of libraries can show how different approaches can be effective for retrieval. Using innovative Music IR techniques together with industry data sources and library data using traditional authority control mechanisms can vastly improve access to music materials.

The lessons Music IR has to teach librarians about the value of content-based searching also cannot be underestimated. While metadata-based searching has a solid role in Music IR systems, librarians can learn from the demonstrations in the Music IR community of the effectiveness of content-based searching, and better understand how the two approaches can work together in systems.

7. Copyright

With regards to copyright issues, librarians and Music IR researchers share a common core of issues and needs. Neither has special knowledge unknown to the other; rather, an understanding of copyright laws affecting the ability to copy, use, and distribute musical works, scores, and recordings is necessary to the work of each of these domains. Individual experts in copyright matters in a variety of countries are active in the library and Music IR communities, for example Charles Cronin at Columbia Law School [40]. Each community can benefit from the experience and expertise of the other, especially in the application of creative solutions for meeting user needs for access to music in legal and ethical ways.

8. Conclusion

We have suggested some of the ways in which the expertise, style, and interests of music librarians will be able to contribute to the advancement of research in music information retrieval. We have also acknowledged the many contributions Music IR research can bring to the

practical realities of daily life in the music library. Hopefully both communities will be able to discover new ways of communicating with each other, seek to merge the theoretical with the practical, and enhance the musical discovery process for all types of users.

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