When “Everything” is Information: Irish Traditional Music and Information Retrieval

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Abstract

As a global phenomenon, Irish traditional music has a tremendous following, while practitioners of Irish traditional music often disagree on shared aspects of their music culture. This provides numerous challenges when organizing traditional Irish traditional music for retrieval purposes. This paper describes the music information seeking and retrieval (MIR) challenges of Irish traditional music in terms of the physical paradigm and user-centered relevance, using TheSession.org as an example. Limitations of the physical paradigm are addressed, both related to the traditional music subject matter, and how current MIR systems fall short in their attempts to manage Irish traditional music. Additional discussions of user-centered relevance contextualize the problems related to music information seeking and retrieval with traditional musics. In the future, representations of music objects connected as linked open data, combined with multiple query capabilities, may provide a robust and flexible structure for traditional music information seeking and retrieval.

Keywords: music information retrieval, Irish traditional music, non-Western music, information seeking


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1 Introduction

Music Information Retrieval (MIR) as a discipline has been primarily concerned with developing tools and methods centered around properties and characteristics of Western “common practice” musics, meaning Western Classical and Western Popular music (Byrd & Crawford, 2002; Downie, 2003; Tzanetakis et. al, 2007; Serra, 2011). More recent interest in ethnic or world musics has emerged in MIR research (Tzanetakis et. al, 2007; Doraisamy et. al, 2008; Gomez & Herrera, 2008; Gómez, Haro, & Herrera, 2009; Gedik & Bozkurt, 2010; Lidy et. al, 2010; Ioannidis, Gómez, & Herrera, 2011; Koduri et. al, 2012), which has resulted in a re-examination of how existing tools can be used for a diverse array of musics. Although interest has increased, research approaches to MIR using world musics has remained largely centered in the physical paradigm of Information Science – a grounding in the belief that physical properties and characteristics of information that make it tangible and able to be manipulated for the purposes of organization, description, and retrieval.

Most traditional practices or art forms are transmitted orally and aurally from master to apprentice, with less of an emphasis on written records or instructions. Likewise, sources of information within traditions are the practitioners themselves, as opposed to more scholarly, written sources. Because of the global popularity of Irish traditional music, the greater Irish music community is a diverse group of musicians with various demographic, geographic, and cultural backgrounds. As these Irish music practitioners exchange information within online environments, the collaborative and social nature of music information sharing, seeking and browsing creates a large, but messy information corpus. Most of the Web-based Irish traditional music communities and tune databases are user-submitted and moderated, such as TheSession.org, Chiff and Fipple, Concertina.net, and the newer social network for Irish musicians, TradConnect. TheSession.org is particularly popular, and contains a large database of traditional and composed Irish dance music, a recordings database, events, local sessions, links, and discussion boards.

Irish music information is represented in many forms online, namely in textual, visual, and audio formats. The methods for finding and extracting relevant information can involve multiple steps: multiple
searches using different aspects of music metadata like a tune title, key/mode, and tune type, viewing transcriptions, and even listening to a MIDI file to confirm the correct tune has been found. In addition, melodic-string matching queries may involve knowledge of an additional textual language, an ASCII-based representation of music notation called ABC Notation. This form of notation has become a popular method of transcribing the basic melodies of Irish traditional music, along with other types of traditional music.

This paper describes the music information seeking and retrieval (MIR) challenges of Irish traditional music in terms of the physical paradigm and user-centered relevance, using TheSession.org as an example. Specifically, the paper will address limitations of the physical paradigm both related to the traditional music subject matter and how current MIR systems fall short in their attempts to manage traditional music information. Additional discussions of user-centered relevance will contextualize the problems related to music information seeking and retrieval in systems that contain Irish traditional music content.

1.1. Limitations of the Physical Paradigm

Music information can be represented in many different ways apart from an audio signal (Downie, 2003; Liem et al, 2011). While music information retrieval systems typically house a combination of audio files and associated textual metadata, music is manifest in many diverse representations. Liem et al (2011) argue for music information retrieval to be approached instead as multimedia retrieval, noting how “…multiple other modalities hold useful information that contribute to the way in which the music is conveyed and experienced: e.g. visual information from video clips and cover art, textual information from metadata, lyrics and background articles, and social community information on listening and rating behavior. This existence of complementary representations and information sources in multiple modalities makes music multimedia content” (p. 1). The authors also emphasize a user-centered approach based upon the experiential and subjective qualities inherent in music.

With text-based IR forming the basis for the development of IR systems, Music Information Retrieval (MIR) is prone to several challenges, similar to those in other multimedia retrieval (Downie, 2003; Inskip, C., MacFarlane, A., & Rafferty, P., 2010). A decade ago, Downie (2003) articulated five challenges for the field’s development: the multifaceted, multirepresentation, multicultural, multi-domain, and multi-experiential challenges. Downie views music as comprising of seven facets: pitch, temporal, harmonic, timbral, editorial, textual, and bibliographic. The interaction between these complex facets, and the difficulties that ensue, are what Downie terms the “multifaceted challenge” (2003, p. 297). Irish traditional musicians—as with many traditional music practitioners—frequently disagree with one another in the areas of pitch facet (differences in tune melodies), temporal facet (meter), harmonic facet (chords that imply key/mode), timbral facet (idiomatic transcriptions that favor a particular instrument), and bibliographic facet (tune titles, composers, recordings lists, published collections containing the tune).

In addition to the multifaceted challenge, the Downie’s multirepresentation challenge speaks directly to the physical paradigm in MIR. This challenge encompasses the many forms that music might be represented symbolically, aurally, or both. Within tune databases that house Irish music, most of the representations are what Downie terms “symbolic:” ABC Notation, GIF sheet music, and MIDI audio—not considered “audio” according to Downie’s classification because it is machine generated, and therefore an aural symbol of music (2003, p. 302). True audio representations, according to Downie, are live performances or digital and analog recordings of performances.

The multifaceted and multirepresentation challenges have immediate applicability to the indexing and organization of Irish traditional music content—as well as music content from other traditions. However, the multicultural, multi-experiential, and multi-domain challenges could be viewed as embedded and inseparable from the others, as music is experienced and perceived differently across the globe and between various knowledge communities (Byrd & Crawford, 2002; Downie, 2003). While the physical
paradigm of Information Science looks for logic and consensus when organizing content for retrieval, the messy reality of musical traditions defy such expectations.

The physical paradigm emphasizes the importance of establishing what defining characteristics an information object possesses before it can be organized for retrieval, and this is regardless of format. Music, like other information objects that are “not documents in the normal sense of being texts can nevertheless be information resources, information-as-thing” according to Buckland (1991, p. 354). According to Raber (2003), the physical paradigm views information objects as possessing characteristics that “make[s] them organizable and retrievable in logical and predictable ways” (2003, p. 53). Objects cannot be organized according to meaning or individual perception, but rather one should try to establish an independent meaning for the information object. However, Buckland (1991) puts forth that the nature of information is situational and depends upon consensus over what is informative.

Raber (2003) also discusses a consensus over what is informative—what he terms “shared meaning”—something separate from cultural or social context. Shared meaning implies that there is agreement upon “objective, intrinsic properties” even if the cultural interpretation of those properties varies between the individual (Raber, 2003, p. 57). Consensus over shared meaning is unlikely due to how music is experienced by individuals and groups, as “the way music is experienced is strongly guided by affective and subjective context- and user-dependent factors” (Liem et al., 2011; p. 1).

TheSession.org’s tune database is organized based upon what—in theory—should be objective properties of the tune: tune information within the bibliographic facet such as title, key/mode, and type (meter). Downie describes this bibliographic information—what he terms “music metadata”—as the only information not derived directly from the content of the score (2003, p. 301). Ideally, bibliographic information should be the result of a group consensus that gives a shared meaning to the tune record. In a perfect world, each tune would have an agreed-upon key/mode, one unique title, and an agreed upon setting of the tune. This is rarely the case with traditional music, because, “although classification seems like an objective task, the definition of categories...is subjective in its nature” (Lidy et al., 2010, p. 1043).

Locating specific tunes within Irish music databases without knowing a title or any recording information may employ the use of an additional notation language, an ASCII-character representation of a melody called ABC Notation. This notation format is a basic text rendering of information contained in the pitch and rhythm facets—a translation of the musical score. Because ABC is based on ASCII characters, tunes in ABC can be machine processed and analyzed using algorithms for textual information retrieval (Duggan et al., 2008, p. 25). This is ideal for quick machine processing, however Irish traditional music does not necessarily lend itself to transcription in ABC or any other form of notation.

Many types of traditional musics, including Irish traditional music, did not evolve in transcribed form. They evolved aurally and have continued to change and be shaped through a natural process of oral transmission. This means that there is not one correct or authoritative version of the information object, but rather many objects can be seen as representations of the same whole information object. A single setting, or version, of a tune cannot be considered the “correct” one; all settings of a tune should be considered equal in importance and should have the opportunity to be deemed the most relevant to a query.

Duggan et al. (2008) notes that “MIR in traditional Irish music has an additional difficulty in that traditional musicians rarely play tunes as transcribed in books. In fact...a good traditional musician will almost never play a tune twice, identically” (p. 26). This makes queries using strings of ABC notation problematic. Tunes can have numerous versions, and even transcriptions from the same player’s performance can be heard or notated differently according to a user’s own preferences and knowledge (Duggan et al., 2009). In traditional musics, this means that sometimes the physical and cognitive paradigms are inseparable.

Having one authoritative version of the tune for retrieval purposes denies the individuality, uniqueness, and personalization that is a part of Irish traditional music. Group consensus as to the correct
setting of a particular tune is impossible, as practitioners often disagree about large and small elements of their shared culture, making the perspective of one practitioner potentially equal to the perspective of another. Also, in a traditional music culture, any and all information could be considered informative. Buckland’s (1991) theoretical grappling with the physical paradigm actually applies directly to Irish traditional music and the information systems built to house it: “If anything is, or might be, informative, then everything is, or might well be information” (p. 356). Especially in the case of traditional music, everything is considered information and should be accessible to the information seeker.

1.2. Information Seeking Challenges

TheSession.org is an example of what Downie calls a Locating MIR System, a system “designed to assist in the identification, location, and retrieval of musical works” (p. 309). Users of Locating MIR systems generally have the end goal of performing the musical works they retrieve from the system. The tunes database of TheSession.org contains individual tunes, and the recordings database houses recordings with track listings hyperlinked to the individual tune records. The information seeking and retrieval process within TheSession.org, for example, involves performing queries by combination of tune key/mode, tune title, tune meter, or by following hyperlinked tune titles listed within album tracks in the recordings database.

The options for searching the Tunes section within TheSession.org allows the user to input or leave blank combinations of music metadata such as tune type (jig, reel, hornpipe, etc.), key/mode, and either the tune title or an ABC string, for example: ABA A2E ~G. The system returns all results matching the query text, meaning any of the terms queried are included in the search results but not all words are present in every item the system retrieves. For ABC string searches, the system returns ABC results irrespective of octave—called “octave normalization,” present in other MIR systems—making searches not as precise (Duggan et al., 2008).

There are a number of system limitations that appear when searching the Tunes database within TheSession.org. As Uitdenbogerd and Zorbel (2004) discovered, query mismatch between user and system can be the result of differing keys or modes, sung or hummed queries and pitch inaccuracy, and tune arrangements obscured through variation and ornamentation. A search by key/mode and tune type can be problematic, as traditional tunes can be played in several keys and meters. In addition, the text-based retrieval system cannot compensate for ornamentation in neither the query nor the result, nor can it transpose an ABC string to match tunes in other keys/modes from the initial query.

Some MIR scholars continue to argue that text-based systems that retrieve basic metadata will successfully meet the needs of information seekers. Inskip, MacFarlane and Rafferty (2010) articulate this assumption: “…Known-item searching for music can be dealt with by searching metadata using existing text search techniques.” Again, this assumption has its foundation in the Western Classical approach by MIR scholars, and has limited application to musics with different characteristics like Irish traditional music. With a corpus of over 7,000 tunes (Duggan et al., 2008), a user cannot expect to find the correct tune reliably within TheSession.org or any other repository of Irish traditional music without also knowing one of its titles.

Searching by ABC string—or by title, or key, or meter—implies a stability that is not present in any of the information objects, as these are based in traditional practice. Traditions are carried on by the people that practice them, and instability in information objects is expected. Raber (2003) summarized the user-centered view of relevance by stating that at its heart, information needs are unstable. This means that relevance itself is unstable and cannot be neatly translated into a search query (Raber, 2003). Hjørland (2007) considers the instability of information to be rooted in the subjectivity of what can be considered informative. Traditional music is inherently subjective, making user-centered relevance even more important when designing MIR systems to accommodate such diverse viewpoints.
1.3. User-centered relevance.

User-stated relevance is challenging within TheSession.org because of the geographic and linguistic diversity of its users, as well as their range of expertise in Irish traditional music. To formulate the initial query, a user has to have some knowledge and must be able to identify which items will be relevant or not relevant to it (Baeza-Yates & Ribeiro-Neto, 1999). Novice to expert users are thought of in terms of comfort and depth of knowledge in Irish traditional music. A novice user might be limited by inability to think beyond his or her instrument or by insufficient knowledge about the music to make advanced search decisions. The idea of expert versus novice user relevance judgments is also problematic when trying to consider what defines someone as an expert.

In the actual information seeking and retrieval process, the limitations of the physical paradigm may result in a number of problems for TheSession.org users when determining relevance of music information. Some of these problems derive from the differences between the written physical object and the actual musical performance of the written object (Uitdenbogerd & Zobel, 2004). Others are based upon the various levels of knowledge of the users creating the objects and the users seeking those objects. These limitations, described in greater detail below, are divided into the following sections: title, meter, ornamentation, key or mode, and relevance feedback.

The musical background and proficiency of the user becomes central to the success or lack of success with MIR queries (Bainbridge, Dewsnip, & Witten, 2005; Lesaffre et. al, 2008). Some Irish traditional music practitioners may be exclusively aural learners, while some may also read sheet music. Those users that cannot read sheet music or ABC notation cannot recognize the correct tune among the query results without hearing a MIDI rendering, however site-wide updates to TheSession.org in 2012 deliberately removed the auto-generated MIDI files. Users responded within discussion threads with mixed reactions, for example: “I miss the MIDIs” and “Agree re midis, I find them useful sometimes just to get a quick sense of what’s notated to see if it matches the tune I’m thinking of. But it’s easy to find another utility to paste the ABC in and do that - just a bit fiddly” (TheSession.org, 2012).

Those users who read sheet music but are new to Irish traditional music might not have the necessary musical skills, or knowledge of ABC notation, to transpose ABC search strings to find a tune submitted in a different mode or key. As Bainbridge, Dewsnip, and Witten (2005) observe of user-submitted melodic queries, “absolute pitch is not in general practical because it is key-dependent, and pitch contour requires too many query notes to be useful” (p. 55). These users might also not know which tune type to provide for the initial query if they first heard a tune in a session context, live performance, or from a recording.

1.4. Title.

Irish traditional tunes can have Anglicized or Irish titles. Baeza-Yates and Ribeiro-Neto (1999) note that problems with relevance occur when terms are misspelled, during cross-language information retrieval, and with a vocabulary mismatch between system and user. An example of this is the jig Hag with the Money, known also by its Irish song titles as Sí Do Mhamó Í (She Is Your Granny) or Cailleach An Airgead (The Hag With Money). Irish Gaelic can be misspelled or provided without the necessary accents by users not fluent in the language. Even if users can locate the correct tune, if they are not Irish speakers, they may not know which version of the Irish title to use among all of the versions submitted.

Tunes might also have titles that use vernacular terms, such as “Peeler” for policeman, “Tinker” for tinsmith (and traveling musician, usually), or even “Aisy” as vernacular for “Easy” and “Ha’Penny” for “Halfpenny.” Users searching for “My Mind Will Ne’er be Aisy” may not find the tune they are seeking, submitted as “My Mind Will Never Be Easy.” Searching for pieces of the title instead, such as “My Mind Will” may yield irrelevant results with the word “Mind” in it, such as the jig “Round the House and Mind the Dresser.” TheSession.org’s algorithm does not use the sequence of search terms “My Mind Will” to find
a match with the first three words “My Mind Will,” it simply searches for tunes containing any of those words.

Nameless tunes can be a problem too, usually submitted by a novice user who doesn’t have a large tune repertoire or by a user transcribing from an album. A practice among some bands – starting with The Chieftains and continuing today with some bands such as Lúnasa – is to give a title like “The Dingle Set” to a medley of several tunes on an album, making it more difficult to locate any of the tunes individually by title. Gan Ainm (without name) is traditionally used when musicians either cannot think of the name or have never learned a name for a tune. Users unfamiliar with this practice may wonder why so many tunes are called Gan Ainm, or they may see the name on a recording track and attempt to locate it using this phrase as the tune title. Using the name of the person from which the tune was learned or associated is another common practice for naming tunes when musicians do not have a name for it.

Additional problems with Irish tune names and MIR involve the use of identical or nearly identical names for different tunes. This is especially true with polkas and slides, as they are named either after a musician or after towns or geographic areas within the Sliabh Luachra region in Ireland, meaning there are multiple tunes using the same or very similar names: Dennis Murphy’s, Ballydesmond #1 and Ballydesmond #2, just to name a few.

The problem of names that apply to more than one tune and/or tune type also occurs outside of polkas and slides. Some tune names apply to two tunes that are of different tune types, or have different keys/modes. For example, “The Boys of Ballisodare” is a G Major reel, whereas “The Boys of Ballisadare” is a G Major hop jig. The melodies are not connected, however the two spellings are frequently confused and mis-assigned to the other. Other examples are tunes of the same type, but differing in key/mode, melody, and number of parts. Examples of this include two jigs that both go by the name “King of the Pipers,” two jigs called “Pipe on the Hob”— one in A Dorian and the other in D Mixolydian – and the two jigs named “The Gold Ring” – one with four parts in D Major and one with six parts in G Major.

For novice users, this traditional practice of assigning similar or identical names for different tunes makes MIR challenging. Also, given that musicians frequently discover new tunes from one another at in-person sessions, users attempting to find and learn a tune from a session may not remember that particular tune’s key/mode, or number of parts. With only a memory of the tune and the title given by the musician playing it, the user is faced with a dilemma over which “Gold Ring” is actually the one relevant to his or her query.

1.5. Meter.

Adding to this naming challenge is that some tunes are derived from a common melody and are manifest in several types of tunes. This is common with slow air melodies that are turned into either hornpipes, set dances, or jigs. An example is “The Blackbird” slow air, hornpipe, and set dance derived from the same melody. Other derivatives are from the old harp repertoire of the 17th and 18th centuries. The harp piece “Molly McAlpin” turned into the hornpipe “Poll Ha’penny” or “Paul Halfpenny.” A user would need to query each individual tune type and would have to know that they relate to one another. Unfortunately, there is not a way within TheSession.org’s system to link the melodic derivatives together except by using the comments section.

Slow airs and harp pieces, such as those by O’Carolan, along with marches are all tune types that cannot be classified by meter/time signature like other tune types. Reel, jigs, slip jigs, and hornpipes are all written in the same meter across the tune type, however marches are either in 2/4 or 6/8, harp pieces are in 4/4 or 3/4, and slow airs are unmetered. Because slow airs are unmetered, this makes them difficult to transcribe and represent within a metered framework such as ABC notation. Users have submitted harp pieces, marches, and slow airs under the incorrect tune type in order to represent them within a metered framework they feel is appropriate. All clarifications as to the actual tune type—march, air, harp piece— are
contained within the comments section, and, because comments cannot be queried, users might never find a harp piece among the reels section without knowing the tune title.

Submitting airs, harp pieces, and marches are only one way to confuse users seeking tunes by meter, key/mode, title, or via ABC string search. Some tune types can be transcribed with various fractional note values, such as polkas, represented both by quarter and eighth notes or by eighth and sixteenth notes. Sometimes users who are not adept in transcription will use even smaller fractional note values like sixteenth and thirty-second notes, rendering an ABC string search useless. If the ABC-string search could compensate for differences in fractional note values, key/mode, and octave, it would be more valuable to users.

1.6. Ornamentation.

Other transcription problems come from whether or not the user submitting the tune chose to do so with ornamentation. Irish music can be ornamented differently according to instrument type, and a user may choose to submit a transcription suited to one instrument in particular. Any presence of ornamentation within a tune transcription makes searching by ABC string very problematic, and requires a high level of knowledge from the user as to how to formulate ABC strings that contain similar figures or with different ornaments or note durations. Idiomatic transcriptions—those transcriptions suited to a particular instrument—can vary widely in ornamentation types, melodic figures, and even notes of the tune (Duggan et al., 2009). Idiomatic transcriptions base the notation and ornamentation on what suits a particular instrument’s strengths and limitations, as well as generally-accepted performance practices. For example, accordions use treble ornaments in place of rolls as on the fiddle. Also, wind instruments can roll on every note except the lowest D, whereas fiddles cannot roll on open strings (EADG). A fiddler may search for a jig using the ABC string “ABA GED DED GED” instead of “~A3 GED ~D3 GED,” but if the tune was transcribed and submitted by a pipes or flute player using the latter example, the query will yield no results.

Hornpipes are a tune type that may be transcribed with straight eighth notes, or as dotted eighth and sixteenth notes to imitate the rhythmic swing in performance. Hornpipes are played differently than they are notated, but some users submit hornpipe transcriptions that contain ornamentation as well. Experienced players will add ornaments without needing them represented on paper, so when a tune is submitted with embellishments, it complicates retrieval by obscuring the basic tune melody. Phrases that sound equivalent to a traditional player might be notated in a number of ways, with triplets, cuts, rolls, or melodic variation to complicate the process.

1.7. Key or mode.

The previous examples demonstrate the limitations of using ABC-string searches with any number of combinations of notes, fractional note values, and various forms of ornamentation that may be present in tune transcriptions. Differences in key/mode are more commonplace in the modern Irish tradition, further complicating information seeking and retrieval. Some bands like Dervish and Lúnasa tune instruments up to Eb instead of the traditional D Major. Certain performers, fiddlers John Carty and Martin Hayes being notable examples, perform personalized versions of tunes that are sometimes transposed to a different key from the original tune. Performers may also record tunes played on instruments tuned in various keys of concertinas, accordions, and whistles. Fiddlers in the past and in the present continue to make use of cross-tuning—which changes the standard tuning of the instrument to one designed to give a drone-like effect—as well as tuning the fiddle strings down incrementally to give a more viola-like sound. Uilleann pipes also come in lower keys, such as low pipes in B Major, instead of the typical D Major. Transcriptions made from recordings by atypical key instruments means the identical melodic lines in other keys would not match the transcription unless a system could transpose melodies and match the melodic line shape.

Users may submit tunes with a key or mode based upon a recording using an atypical instrument tuning or a performer’s personalized version in another key/mode from the original. This scenario would apply to the user who has perfect pitch and transcribes a tune based upon the alternate key/mode, not
taking the instrument into account. Even if the user doesn’t have perfect pitch but simply compares the
recorded sound to his or her instrument, he or she would discover the key used in the recording. A tune
played on the low pipes, for example, might be fingered in D Mixolydian but would sound in B Mixolydian—an
extremely rare mode for Irish traditional music.

Some tunes are traditionally played in two different modes, usually Ionian (Major) and Mixolydian
modes. The slip jig “Gusty’s Frolics” is played both in D Mixolydian, using C naturals, and in D Major,
using C sharps. Sometimes a performer mixes the two modes by switching between a C natural and C sharp,
what O’Canainn terms note “inflection” (1978, p. 30). Tunes can also have multiple keys/modes for different
parts, called “multi-modal” tunes. An example of a multi-modal tune is one with an A part in G Major and
B part in D Mixolydian. For multi-modal tunes, it might be difficult for a user to know which key/mode to
select when formulating a search query. Likewise, tunes that appear in multiple modes, like the “Gusty’s
Frolics” example, will not be retrieved if the tune was submitted in D Mixolydian and the user selects D
Major for his or her slip jig search.

1.8. Relevance feedback.

Ideally, the MIR system would also employ some form of relevance feedback. Saracevic (1975) describes
relevance as “a measure of the effectiveness of a contact between a source and a destination in a
communication process” (p. 325). This “communication process” is one between the user (source) and the
system’s contents (destination), where the user establishes what is relevant by providing feedback to the
system. TheSession.org’s MIR system cannot perform well enough without much effort and input from the
user, however no formal type of relevance feedback is employed. Users need to interact with the system in
order to allow this communication process to occur, otherwise the MIR system might not be very effective
at performing its function.

As Saracevic (1975) alludes, employing relevance feedback requires a multi-step process involving
explicit feedback from the user to further refine queries. The relevance feedback process evolves as the user
interacts with the MIR system, and in some cases the user finds that his or her information need evolves
during contact with the items retrieved by the system (Baeza-Yates & Ribeiro-Neto, 1999, p. 178). For
instance, a user searching for what he or she thinks is a jig may input an ABC search string that pulls up
only slip jigs and reels. The user may examine these results to determine the relevant result was, in fact, a
slip jig and not a jig. In this way, users might also have a stronger sense of their information need after it
has been affected by the retrieval process, contributing to a change in the user’s concept of what is relevant
(Froelich, 1994).

1.9. Current and Future Research

Understanding more about how users interact with MIR systems, especially in the area of non-Western
common practice music, is essential for their future development. In 2003, Downie listed non-Western MIR
as one of ten important areas for future development in the field (p. 328-829). A decade later, the field is
still in beginning stages of exploration of using non-Western music as the subject for MIR research. Duggan’s
work in MIR and Irish traditional music will likely benefit those working with other traditional musics, as
issues of ornamentation, rubato, transposition, breathing on wind instruments, and octave normalization
are not unique to Irish music. Other traditional musics employ non-Western common practice scales, tuning
systems, and unique methods of improvisation and will require additional MIR tools as well (Uitdenbogerd
& Zobel, 2004; Tzanetakis et. al, 2007). As with Irish music, many non-Western common practice musics
resist precise and standardized methods of transcription, making them similarly problematic to query.

Flexible and intelligent search capabilities are also needed to accommodate diverse backgrounds of
users and the somewhat unpredictable nature of representing and transcribing Irish traditional music.
Played or sung queries for known-item searching, ABC-string searches, natural language queries, musical
feature queries, and even those based on traditional musical metadata could be used in combination to make
searches more robust and more accessible to users of all backgrounds seeking many different kinds of music information. Haus, Longari, and Pollastri (2004) describe a similar—though more Western Classically aimed—system as a “cross score/audio integrated database environment in which one can find any kind of information by singing, playing, and writing score excerpts” (p. 1046). While a notation-centered retrieval system falls short with orally-centered traditions like Irish music, the varied approach to user query input is helpful.

Researchers like Lidy et al. (2010) are beginning to explore whether “current MIR approaches can also be applied to collections of non-Western and, in particular, ethnic music with completely different characteristics and requirements” (p. 1032). Bainbridge, Dewsnip, and Witten (2005) emphasize the importance of approximation and flexibility in user-centered MIR systems, which has particular applicability to the challenges of Irish traditional music and other world musics: “Approximate matching is a necessity for melody retrieval. There are many opportunities for errors to be introduced into queries: poorly remembered tunes, pitch and duration errors (if queries are hummed or sung), and errors introduced by the transcription process (again, if queries are hummed or sung). These errors have dire consequences on the performance of the exact algorithms, and this makes exact algorithms unsuitable for melody retrieval. Also, approximate algorithms allow users to find tunes that are similar to a query” (p. 55). The shortcomings of sung or hummed queries would likely extend to those played on instruments, as the user’s proficiency and musical background are also factors in an instrument performance.

TunePal, a MIR tool for Irish traditional musicians, is a recent development designed to query Irish music databases such as TheSession.org using sung or played queries on traditional instruments (Duggan, et. al, 2008). TunePal derives from the earlier MATT2, or Machine Annotation of Traditional Tunes, the “first attempt to adapt MIR to the specific characteristics of traditional Irish dance music and to support queries played on traditional instruments” (Duggan et al., 2008, p. 27). Audio input from an Irish traditional musician playing his or her instrument is transcribed into the ABC notation language, and then that transcription is matched among tune corpora in several databases. TunePal accounts for rubato (variation in performance speed), breathing for wind players, and employs octave normalization, along with an additional step to remove ornamentation from the player’s performance of the tune query to improve melodic contour representation abilities (Duggan et al., 2008).

There are limitations to TunePal’s abilities to match ABC transcriptions of played tunes with ABC-notated tunes contained in databases like TheSession.org. Because TunePal translates the user’s audio query into text-based notation for matching purposes, it falls prey to the previously discussed shortcomings when Irish music is transcribed. TunePal cannot transpose ABC transcriptions and search for matches in other keys/modes. Altered keys and multi-modal tunes render an ABC string search useless, as the ABC matches exact pitches and rhythm, not by melodic contour or relative fractional note values, and it cannot transpose to other keys. Users would have to be expert enough to guess other possible keys, and transcribe melodic ABC fragments accordingly. A more useful MIR system could account for differences in key/mode, and transpose strings of ABC notation to locate relevant results.

In addition, Duggan’s tools cannot process multiple tunes in quick sequence played as a medley (Duggan et al., 2008). Irish traditional musicians almost always combine tunes into medleys of two or more, so this limits the sources from which TunePal can match queried versions played by traditional musicians. If both systems could detect and differentiate between tunes in a medley, future developers could use large numbers of commercial and archival recordings of tunes as data to enhance matching capabilities and account for the diversity and uniqueness present in Irish traditional music performance.

An ideal MIR system for Irish traditional music might incorporate the organization principles of linked open data to connect a diverse array of information objects from cultural institutions, individuals, scholars, and music practitioners. This information might include: image representations of sheet music, ABC notation and other transcriptions, metadata of tune recordings, sound files in MIDI, archival and
modern recordings, anecdotal information of musicians strongly associated with specific tunes, geographic
information, regional style information, alternate titles, historical context, known composers, melodic
variants and/or derivatives (such as The Blackbird example mentioned earlier), and other contextual
information. Linked data may provide the means, but those involved with the construction of such
meaningful information connections should include music practitioners in addition to more scholarly sources.

2 Conclusion

TheSession.org is an example of an environment where information, description, and organization is user-
created, like a folksonomy. As with a folksonomy, the diversity of users’ submissions and comments enriches
understanding of the information at hand, yet this makes it difficult to organize effectively for retrieval. All
user contributions are valuable because they can all be potentially informative, which makes everything
within TheSession.org “information” according to Buckland (1991). Irish traditional music resists the idea
of a single, authoritative information object. Because any item of text, hyperlink, or other type of
contribution by one practitioner of traditional music can be considered equally informative from the next,
it is essential that these be accessible to users via flexible search techniques and integrated query results.

While the technicalities of developing music information retrieval systems flexible enough to meet
the demands and uses of user communities like traditional music practitioners is enough of a challenge, the
greater challenges are in the areas of access and collaboration. Large stores of recordings and other
traditional music information lie in archives and personal collections across the globe (Seeger, 1996;
Jorgensen, 2004; Proutskova, 2007) – an access challenge outside the scope of this paper, though noteworthy
all the same. Music information retrieval researchers are also hindered in their development of new
techniques and tools by availability of audio data sets, either due to copyright restrictions or inaccessibility
within archives or other cultural institutions.

Van Kranenburg et. al (2010) argues that Computational Ethnomusicology would allow an
unlocking of large musical data sets by extracting and processing relevant melodic and musical feature
information. While access remains a looming concern, the description and processing of such information
might not depend as critically on automating such processes as much as on collaboration and involvement
with practitioner communities and those that study them. MIR systems suited to the particular instabilities
inherent in non-Western music will develop through: an increased interest in this area by MIR researchers
and system developers, increased collaboration between the MIR research community and cultural heritage
organizations; and collaboration between the MIR research community and ethnomusicologists, folklorists,
and anthropologists working directly with traditional music practitioners; and particularly between all
entities and the music practitioners themselves.

Music is more than the sum of its various representations – it is both culture and information.
There are numerous traditions embedded in musical practice and understanding that practitioners bear.
Without harnessing this specialized knowledge, the full extent of musical information latent in every audio
file remains locked to those without insider perspective. Future research and developments in non-Western
common practice music information retrieval depend upon better understanding the information needs and
uses of traditional music practitioners, as well as better understanding representation and organization
problems specific to those musics. When “everything” is information – as with Irish traditional music –
access to, description of, and organization of world music by, or in collaboration with, practitioners becomes
a defining factor in how the music information retrieval field will advance with such music.

3 References

Processing & Management, 41(1), 41-56.


workshop on music information retrieval with user-centered and multimodal strategies (pp. 1-6).

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