Music Information Retrieval, Musicology, and Musical Genre

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Genre is perhaps the most popular way of describing music. It can be found in the marketing of music corporations, in the format of radio stations, in the structuring of the popularity of music (i.e. the Billboard charts), in descriptions of critics and the music media, and in the communication of fans and audiences (Brackett 2002, 68). Experimental data has shown that people are capable of recognizing genre in a fraction of a second (Gjerdingen and Perrott 2008) and that genre is the basis on which music corporations organize themselves (Negus 1999).

Genre is a complex topic with a growing body of research attached to it. The fields of musicology and music information retrieval (MIR) have both devoted research to the study of genre, though their approaches differ and are in some ways exclusive of one another at times. For MIR, genre represents a cultural set, which is problematic in that it does not fit within an essential binary categorical definition. For the new brand of musicologist, concerned with cultural readings of music, genre represents a communication, its nature existential and dynamic. How can these two approaches work with one another? Can these two disciplines find mutual ground in the study of genre? Can musicology produce a working, practical theory of genre that could provide data for queries and algorithms to locate? Can MIR provide tools for understanding the dynamic nature of genre?

This paper will be divided into three sections. The first will introduce the disciplines and methodologies of musicology and music information retrieval. The second will introduce various theories of genre. Finally, the third will discuss some potential avenues of research where the two fields have parallel interests and goals.
In the last two decades, major changes have occurred in the way music is produced, distributed and consumed. These changes have resulted in the production and availability of music on an unprecedented scale through online sources, necessitating new methods of accessing information about this burgeoning catalogue of music. The traditional methods of finding music have not disappeared, however; the radio airwaves still broadcast their signal, the music corporations have not collapsed, the Billboard charts still measure the best selling albums, critics still write reviews, and friends still offer one another recommendations.

What has changed, is that all of these means of access to music and music information have begun to incorporate on online aspect. Digital download sales have been steadily rising over the last five years, now comprising 39% of U.S. music sales and 20% of global sales (Digital Music Report 2009, 6–7). If the rate of increase continues, the majority of U.S. sales will be purchased online within the next couple of years and globally within the next decade. These downloads put money in the music corporations coffers and are tracked by the Nielson Soundscan, whose data is used for Billboards chart positions. A study by Arbitron, Inc. in 2006 found that 21% of Americans over the age of twelve had tuned-in to Internet radio within a month, but unlike industry sales, this listening did not detract from the number of hours spent listening to traditional AM/FM radio (Rose and Rosin 2006, 4–12). Online music reviews and blogs such as pitchfork.com have become very influential in the reception and consumption of certain genres (du Lac 2006) and online social networking has introduced new ways for people to find music through friends as well as strangers with similar listening habits.
A new field, music information retrieval (MIR), has developed to make sense of the massive amounts of music information available. MIR is a multidisciplinary field, drawing upon the expertise of researchers in “library science, information science, musicology, music theory, audio engineering, computer science, law, and business” (Downie 2003, 296). Futrelle and Downey have laid out a breakdown of how each of these disciplines contributes to MIR, all falling under a general agenda “to develop ways of managing collections of musical material for preservation, access, research, and other uses” (2003, 1). They position musicology’s contribution as music analysis and music representation, with the intent of answering the following questions: “how is a musical composition organized. . .[, and h]ow is it similar to, or different from other pieces?”

This description of musicology focuses on an aspect that has been with it since its beginnings as an academic discipline in the nineteenth century. Guido Adler, in his 1885 essay “Umfang, Methode und Ziel der Musikwissenschaft” (the scope, method, and aim of musicology) laid out a detailed methodology for musicology based on the scientific method, providing a roadmap for scholars in the discipline, in order to distinguish it from the music criticism, which he viewed as unscientific (1988). He placed particular emphasis on the analysis of the music itself over the description of emotional or aesthetic content, though he acknowledged that a critical examination must include both.

Joseph Kerman has critiqued this type of musicology, which saw resurgence in the mid-twentieth century, for its positivist methodology. This process according to C.G. Collingwood, set about in its first stage to ascertain facts and then to discover laws in its second stage, only in practice it usually didn’t get around to the second part (quoted in Kramer 1985, 44). This methodology also saw the musicologist as principally a historian
in the role of “chronicler or archaeologist, rather than as a philosopher or interpreter of cultures of the past” (Kerman 1985, 43). The position against this type of musicology Kerman was developing would lead to a “new musicology,” which was based on the principles of postmodernism, and rejected many of the essentializing and absolutist notions of postivism. Kofi Agawu summarizes Kerman’s later arguments as follows:

We should now accept that there are no nuggets of identity, no positivisms, no irreducible essences. There are no invariant first principles, no God or universal reason, no single grand narratives by which human history can be conceptualized. Our epistemologies are constructed and situated. Everything is fragmented and discontinuous; all truths are partial and provisional. Nothing is ever objective, nothing is ever "new," and nothing can be taken for granted. (Agawu 1997, 301).

These ideas would come to bear great influence in musicology as new ideas from other disciplines were folded into its study. Gender studies, queer theory, post-colonial theory, cultural theory, and critical theory, among others would be incorporated into a musicology that not only looked at the music itself, but at its place in culture as well as the cultural impact upon the creation, dissemination, and interpretation of music.

As musicology has experienced a pendulum swing towards a more interpretive approach to music over a focus on textual analysis during the past two decades, MIR has developed in the last decade with an emphasis on the content and a desire to deal with “objective” data in determining similarity. Tim Crawford, in his essay, *Musicology and Music Information Retrieval*, finds the connection between musicology’s and music information retrieval’s goals in the question, “what do we mean by similarity?” (2005, 2).
Musicologists approach this question when analyzing a piece of music, determining style, or delving into intertextuality.

The main idea behind MIR’s approach to this problem has been trait based. Downey has laid out a multi-faceted approach, whereby, the objects of analysis are divided among seven facets: pitch, temporal, harmonic, timbral, editorial, textual, and bibliographic. Most of these, except bibliographic, have to do with the actual content of the music. Accordingly, much work in MIR has been done in the area of content analysis, including work into extracting timbre, rhythm, tempo, melody, harmony, and other basic musical traits, but this work is largely beyond the scope of this paper. It is in the area of genre that an interesting intersection of musicology’s and MIR’s goals occurs.

The two facets of musicology mentioned above are textual analysis, referring to the music and musical text, roughly correlating to the MIR term, content, and interpretive analysis, which involves a number of factors external to the music itself, mainly cultural factors. Musical genre encompasses both the internal musical features and the external social features that effect music’s creation, performance, and consumption. This notion of genre draws on different historical ideas of genre, which deserve further elaboration.

Genre as class and category is probably the most widely understood description. The linguistic root terms, \textit{genre} and \textit{gignere}, mean “to beget and (in the passive) to be born” (Cohen 1986, 203). Ralph Cohen describes this meaning as referring to both a class and an individual, and he further postulates that the “connection of ‘genre’ to ‘gender’ suggests that an early use of the term was based on division or classification” (1986, 203). In this concept of genre, certain traits distinguish objects from others. These traits provide an essential characteristic for the definition of the class. This approach to genre
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derives from Aristotle and is described by Julie Cumming in her book, *The Motet in the Age of Du Fay* (1999) as classical. She uses the example of a box: “It has a clear boundary, so objects belong either inside or outside, and there is no opportunity for gradation within the box. Features are binary: an entity either possesses the feature, or it does not” (Cumming 1999, 9).

Franco Fabbri notes that the discourse related to this approach has centered around “whether the distinction amongst genres is based somehow on human nature, or if genres are concepts defined by convention, hence subject to change” (1999, 8). This notion concerns Jacques Derrida as well in his discussion of genre. Derrida draws on the work of Gérard Genette to point out the artificial nature of what is called natural:

The history of genre-theory is strewn with these fascinating outlines that inform and deform reality, a reality often heterogenous to the literary field, and that claim to discover a natural ‘system’ wherein they construct a factitious symmetry heavily reinforced by fake windows” (Genette “Genres, ‘Types,’ Modes,” 408, quoted in Derrida 1980, 60)

In this conception of genre, the class rearranges its components to fit an artificial definition, an essentialization of its features, which is then passed as “natural” and used to categorize future texts.

Fabbri, Cohen, and Cumming find that this simple structure for genre does not adequately work for their subjects. Cohen sees genre as a process rather than category: concepts of genre theory and practice change over time; each work added to a genre changes the genre; and the process itself involves interrelation as well as distinction (1986, 204). Cumming draws on Wittgenstein to describe a “family resemblance”
category where a set of features is shared between group members, but each individual member does not necessarily share each and every feature. Implicit in this approach is an acknowledgment of “genetic” relationships between members, suggesting common ancestry (1999, 10).

Cumming suggest another structure for genre, which draws on Eleanor Rosch’s cognitive psychological prototype theory. She describes Rosch’s theory positing how “categories in the mind are internally structured, moving out from central prototypical members toward marginal and less typical members” (Cumming 1999, 11). This approach is not separate from Wittgenstein’s “family resemblance.” In fact, Rosch is quoted as saying that “items viewed as most prototypical of one category will be those with least family resemblance to or membership in other categories” (Rosch quoted in Cumming 1999, 11). Fabbri also draws on Rosch’s theory in his research to support other findings that demonstrate weaknesses in classical categorization (1999).

Fabbri proposes a definition of genre based around a social dimension, but connected to underlying musical features. He defines genre as “a kind of music, as it is acknowledged by a community for any reason or purpose or criteria, i.e., a set of musical events whose course is governed by rules (of any kind) accepted by a community” (1999, 7). Genre is placed as a creation of social groups in contrast to style, which is of more musical origins: “a recurring arrangement of features in musical events which is typical of an individual (composer, performer), a group of musicians, a genre, a place, a period of time” (Fabbri 1999).

An understanding of style is somewhat relevant in understanding genre as the two are often confused or the terms used interchangeably. As Fabbri noted above, the
difference is mainly in the level of conception; genre coming from the larger social consciousness and style coming from the low-level musical practitioners and the musical features. Leonard Meyer conceived of a framework of laws, rules, and strategies that govern styles: laws are transcultural constraints and universals of music; rules are intercultural and of a certain time period; and strategies are compositional choices made within the possibilities established by the rules of the style (1989, 13-20).

There are conventions underlying genre as well, which go beyond the musical features. Fabbri developed what is probably the most sophisticated theory of musical genre, which has been referenced by scholars in both musicology and music information retrieval (Frith 2006, Brackett 2002, McCay and Fujinaga 2006). He divides genre into five sets of genre rules: formal and technical rules, semiotic rules, behavior rules, social and ideological rules, and economical and juridical rules (1982). Formal and technical rules describe musical form and sonic characteristics (Frith 2006) and content-based features of music (McKay & Fujinaga 2006). Semiotic rules are abstract concepts that are communicated (McKay & Fujinaga 2006) and describe the way “meaning” is conveyed (Frith 2006). Behavior rules describe performance rituals (Frith 2006) and how composers, performers, and audiences appear and behave (McKay & Fujinaga 2006). Social and ideological rules describe the image of musicians, the relationship of a musical community to the rest of the world (Frith 2006) or the links between genre and demographics: age, race, sex, political views (McKay & Fujinaga 2006). Economical and juridical rules describe the means of production of a genre (Frith 2006), i.e. record contracts and performing locales (McKay & Fujinaga 2006). Fabbri adds:
No specific hierarchical order is given to the rules presented here. On the other hand, in the description of each single genre some rules are more important, and a few much more important than others, to the point where these others can sometimes be considered marginal and ignored. In this case the existence could also be claimed of a sort of ‘hyper-rule’ which establishes this hierarchy; to this hyperrule we can easily attribute the name of ‘ideology’ of that genre. Other cases will involve the difference in the strength of codification. (1982, 55).

Some examples could elaborate the idea of this “hyper-rule.” Take the genre of “glam rock.” The style of the music is generally 1970’s retro-rock, but can vary. The semiotic and economical rules are similar to other forms of retro-rock and 1970s rock, including arena rock among others. The definitive rules in the genre are the behavioral rules, mainly male performers with long hair or wigs, who dress up in women’s clothes and makeup or perform an androgynous gender role. This, in turn affects the image of the performers and the social rules of the genre. Another example can be seen in “indie rock” or “alternative rock.” In these genres, the actual forms and music are quite diverse and overlapping, though generally within the realm of “rock.” The semiotic rules and behavior rules are very much tied into firstly, the economic rules, mainly groups and artists signed to labels not associated with the major music corporations, and alternately to the ideological rules that accompany such a positioning as “alternative” or “independent” to the mainstream.

Fabbri actually conceived of this rule system in a somewhat computer-science oriented way. He described the method for placing a genre inside this system as follows:
“A system so examined would appear like a matrix with rows of rules and columns of genres, in which each single element $a_{ij}$ would indicate the value of the rule $i$ for the genre $j$. What could be potentially very useful about Fabbri’s system is that it presents an abstract framework in which relations between genres can be determined by their skeletons without actually delving into the details or essence of the underlying details themselves.

Another remarkable aspect of Fabbri’s system is that it exposes and attempts to address what is a common issue with genre and with genre taxonomy in general: mainly semantic ambiguity in vocabulary. The above example of multiple meanings for the term “indie” in “indie rock” highlights this. Fabbri provides an excellent example of this occurring in a survey of music consumption and interest:

Interviewees were presented with a list of 88 genres, with the suggestion to indicate those they liked or were interested in, and (if any) those they despised. Problems arose when designing the list for classical genres, as some... were more basic-level categories, like ‘opera’ or ‘electronic music’, and others needed reference to subordinate, more detailed taxonomies. So—probably aiming at excessive detail—the ‘Lieder’ category was split into ‘classical Lieder’ and ‘romantic Lieder’. The result was that ‘classical Lieder’ (a category that was intended to cover Lieder of the Classic Age, that is the not so widely known Lieder by Mozart and Beethoven) received many more favourable responses than ‘romantic Lieder’, that is Schubert’s, Schumann’s etc., which is what interviewees most probably meant when they said they liked ‘classical Lieder’. Common musical competence sees ‘classical’ as a predicate for all Western art music, while the notion of a classic age
and style. . . pertains to specialists’ taxonomies. (Fabbri 1999, 11–12)

Taxonomies are systems of organization, usually in a hierarchical from, providing strong labeling and a structured and fixed vocabulary for categorization (Lamere & Pampalk 2008, 16). The relationship between levels of hierarchy is important in taxonomy and also where inconsistencies emerge. Pachet and Cazaly in attempting to create a taxonomy explored many of these types of links including: genealogical, geographical, aggregation, repetition, historical period, and specific links (2000). Aucoutourier and Pachet also note these “semantic confusions,” but the consensus among these researchers is that these problems do not impact the average human being’s ability to navigate taxonomies; however, it greatly complicates the work of MIR researchers (Aucoutourier and Pachet 2003; Pachet and Cazaly 2000).

Taxonomies and system developed by Fabbri have been criticized by Keith Negus (a musicologist) and Simon Frith (a sociologist) for their rigid structures. Negus notes “genres are often experienced as dynamic and changing rather than rule-bound and static” (1999, 26). Fabian Holt (an ethnomusicologist), referring to the complexity of “communication and signification” in genre networks, has stated that “it is impossible to distill this totality into a single theory and model of analysis” (2007, 22).

To the issue of dynamism of genre, one can easily see how in the case of “indie rock” and “alternative rock” that accounting for the changes in the genres as they became popular themselves is not easily attained. An independent label is gobbled up by major music corporations, an “indie” artist signs to major label, and the nature of the rules underlying the genre lose their heavily economic basis, but retain the ideological and
semantic values that went along with such positioning. David Brackett presents another prominent example of ideological change over time:

during the 1950s in the US, the musical characteristics of rock ‘n’ roll connoted hedonism and rebelliousness; by the 1980s these same musical characteristics might be found in the songs of country musicians or oldies groups, and would have connoted nostalgia, or at least a relatively wholesome form of hedonism, ceding ‘youthful rebelliousness to other genres. (2002, 67).

The factors of time and change are hard to deal with in a static system.

The notion of linearity in genre has been addressed by a number of scholars in literary theory as well as the musicology. Ralph Cohen argues that “genre concepts in theory and practice arise, change, and decline for historical reasons. And since each genre is composed of texts that accrue, the grouping is a process, not a determinate category” (1986, 204). Cohen’s essay is a response to Jacques Derrida’s 1980 paper entitled “The Law of Genre.” Derrida sees genre classification as a somewhat futile endeavor, but acknowledges that “every text participates in one or several genres, there is no genreless text; there is always a genre and genres, yet such participation never amounts to belonging” (1980, 65). Derrida further discusses the idea that once the rules have been set for a genre, the genre ceases to encompass that which it has classified, it “excludes itself from what in includes. The clause or floodgate of genre declasses what it allows to be classed” (1980, 65).

Brackett has highlighted another issue, which relates to time’s effect on genre. He starts by pointing out the “confusion between different levels of genre” (2002, 68). He notes that Billboard charts, marketing categories of music corporations, radio formats and
media-fan genres all share terminology, i.e. “country,” “R&B,” and “pop,” but also differ. He positions marketing categories as “supra-genres,” by comparing the Billboard charts with the playlists of radio and MTV/VH1 during a particular moment in time, noting “one can become aware of an ever-shifting hierarchical assemblage of genres that form the mainstream ‘supre-genre’ during that period” (2002, 68).

Another factor that confuses the notion of genre over time is the fact that the communities surrounding a genre also change. Fabbri does not seem to be oblivious to these facts either. In his later essay, he points out that the rules of a genre are decided by the genre community: “what someone sees as the most significant regularity within a certain genre may not be what the community that constituted that genre in the first place saw as its essence (in Aristotelian terms) (Fabbri 1999, 8). Brackett notes this in the wide sweep of styles that the genre R&B encompasses over a 60 year period, but finds continuity in the representation of the genre as “black music” (2002).

A new view of community as it relates to music has begun developing on the Internet in the form of music social networks sites (SNS) and the social tagging of music. Social tagging has emerged as a collaborative feature of many SNS as well as traditional collaborative filtering sites like Amazon.com. Paul Lamere and Elias Pampalk describe social tags as “the aggregation of individual sets of. . . short, free text labels applied to content.” They have “no structure, no vocabulary limits” and are “typically applied by the generator or the consumer of the item being tagged” (Lamere & Pampalk 2008, p. 14). They have also called social tags “‘folksonomy’—a user-created bottom-up categorical structure development with an emergent thesaurus”.
In folksonomy, the relationship between tags is nonexistent until users create one by assigning different tags to a single object. This is in contrast to traditional taxonomy where certain relationships are pre-ordained by different hierarchical levels.

Music SNSs like Last.fm rely mainly on these tags. Julian Knowles describes this central aspect of Last.fm as a ‘wiki,’ “a web content management system that provides all registered users the authority to contribute and edit content” (2007, p.13). Last.fm also uses a service called Audioscrobbler to track what its users are listening to. Last.fm has made these tags accessible to other programmers through an application programming interface (API) open to registered developers free of charge.

There are issues with folksonomy, however. Only a small number of artists and songs have actually been tagged, which is a form of the cold-start problem commonly effecting collaborative data, whereby it takes a long time for data to be entered and become useful for searches, and even longer (if ever) for the fringes or margins (the less popular objects) to be tagged (Lamere and Pampalk 2008, Bertin-Mahieux, et. al. 2008). In addition, they note that there is the issue of lack of transparency where a recommender can only tell a user that “people who listen to X also listen to Y.” There is also still semantic confusion, even though the relationships between tags have been flattened.

Another issue that Holt has brought up is that personal and portable technologies of reproduction multiply the possibilities for individualized consumption… [allowing] affluent people [to] have all sorts of opportunities for customizing their music consumption according to their individual tastes and lifestyles, somewhat independently of music collectivities. (2007, 28).
Holt as an ethnomusicologist takes a view of genre that is based around “center collectivities:” those “recognized as authorities and experts. . . distinguished. . . from outsiders and the general public. . . [including] influential fan communities, critics, record producers, and above all artists whose iconic status marks them as ‘leading’ figures.” Holt’s view is perhaps too localized for the purposes of MIR, and perhaps too granular even by Fabbri’s definition (though Fabbri does note that the original community knows best what a genre is). The online musical community at sites like last.fm may not be a center collectivity, but they are a community that has reached consensus on at least some genres, and the information they produce is valuable.

There is a good explanation by McKay and Fujinaga about why genres are valuable for MIR: they provide an already packaged set of culturally sanctioned categories with which people are already familiar, and they constitute a vocabulary for communication about music that is unrivalled in intra-cultural universality (2006). Noting the downsides, they comment on the lack of agreement and variable level of genre vocabulary among genre annotators, as well as a lack of clear and consistent definition, a tendency toward overlap and multiple parents, complex inter-relationships, and multiple genre levels.

Jean-Julien Aucouturier and François Pachet in their introduction to the state of the art of genre note that “genre is intrinsically ill-defined and attempts at defining genre precisely have a strong tendency to end up in circular, ungrounded projections of fantasies” (2003). They draw on linguistic categories to distinguish between intentional definitions of genre based on interpretations of a community and extentional definitions,
based on the grouping of music by characteristics. They further assert that genre is not based on intrinsic properties of music, but rather on culturally extrinsic habits, making the label itself unsuitable for automatic classification. They further note the infeasibility of conducting manual analysis by human annotators for the millions of songs available.

In its vision of genre, MIR up till this point has mainly viewed genre in a classical binary fashion. As such, genre cannot be adequately captured and represented. What many MIR researchers seem to be looking for are, as Aucouturier and Pachet have noted, intrinsic features. For this, it seems that musical style is a better avenue to follow than genre if the goal is for a computer alone to analyze. Even this has social elements, but style is more grounded in the musical features than genre, which encompasses a great deal more that is extrinsic.

That being said, a number of MIR techniques could be harnessed to help musicologists better understand the nature of genre, and their research in turn could perhaps be used as a form of groundtruth in future classification strategies.

A promising area of study and a fascinating source of data are the folksonomies. Though there are certainly issues, they provide a living, breathing representation of relationships between semantic data, annotated by human beings. The dynamism that lacks in taxonomies could perhaps be present in these folksonomies over a great period of time. If it were possible to weigh in demographic information about the taggers (for example, the age of the tagger), and to track the accumulation of tags over many years, pictures could form of the changing relationships and lives of genres. This is similar to what Brackett was looking for in his research.
Following Brackett’s research would also be worthwhile. The information he has looked at could provide valuable incite into the hierarchy of very broad genres. In order to facilitate this, genre information from record companies, Billboard, radio stations, and media-fan information would need to be procured. As mentioned above, by combining this information in small chunks (say a period of six weeks or a few months) and comparing, one could get a picture of the changing nature of genres over time, especially of the more nebulous genres, such as “pop” and “rock.”

Fabbri’s rules provide a starting point for accumulating other genre relevant information. The formal and technical rules are already being addressed by MIR in the form of content-based analysis. Musicologists are already working with MIR to produce machine-learning solutions to these challenges.

Semantic, behavioral, social, and ideological rules are probably outside the reach of machine-learning at this juncture. Information in this arena must come from manual work by researchers in the social sciences and humanities, and research must also be conducted into ways of representing this data in a computer-readable form.

Data that could immediately be produced for the economic rules revolves around information about record companies and record labels. Amazon.com and other sites already have label information for many albums. This is a good starting point. More research would be required to acquire information regarding the life of labels and what type of scale should be used to record their “independent” or “mainstream” status, i.e. does an independent label bought by a major label automatically turn into a mainstream label in a binary system or are there shades of gray to be recorded in a gradated manner? Ideally this information would be propagated on a large scale through a site like Amazon,
and researchers familiar with each label would adjust the data to reflect the more granular details.

In order to move beyond classical categories, a lot more data must be gathered, especially social data. In the digital era, much of this information will become more readily available through the Internet, but to properly create a representation of genre in popular music, much data must be acquired for the post-war era leading up to the present. By acquiring as much relevant information as possible and beginning to assemble it into controlled data, MIR can provide a ground base for musicologists to interpret the data and develop new methods of representation of social data for MIR.

To close, I think it is important to keep in mind what happens if MIR succeeds in its goals and becomes the method through which most people find and consume music. There will undoubtedly be social implications. What is programmed into an algorithm, though seemingly objective, implicitly values certain kinds of results, which cannot in the short term, at least, reflect everyone’s values. There will be judgments made, and the effects of these judgments will have real effects on what music people are exposed to. It is important for MIR to not ignore the postmodern insights that have guided recent musicology. The search for objective facts is ripe with subjective judgment, especially in the area of genre.


McKay, Cory, and Ichiro Fujinaga. 2006. Musical genre classification: Is it worth pursuing and how can it be improved? In the *Proceedings of the 7th International Conference on Music Information Retrieval, Victoria, BC, Canada, October 8-12*.


