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Editorial

Music Information Retrieval Based on Signal Processing

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The main focus of this special issue is on the application of digital signal processing techniques for music information retrieval (MIR). MIR is an emerging and exciting area of research that seeks to solve a wide variety of problems dealing with preserving, analyzing, indexing, searching, and accessing large collections of digitized music. There are also strong interests in this field of research from music libraries and the recording industry as they move towards digital music distribution. The demands from the general public for easy access to these music libraries challenge researchers to create tools and algorithms that are robust, small, and fast.

Music is represented in either encoded audio waveforms (CD audio, MP3, etc.) or symbolic forms (musical score, MIDI, etc.). Audio representations, in particular, require robust signal processing techniques for many applications of MIR since meaningful descriptions need to be extracted from audio signals in which sounds from multiple instruments and vocals are often mixed together. Researchers in MIR are therefore developing a wide range of new methods based on statistical pattern recognition, classification, and machine learning techniques such as the Hidden Markov Model (HMM), maximum likelihood estimation, and Bayes estimation as well as digital signal processing techniques such as Fourier and wavelet transforms, adaptive filtering, and source-filter models. New music interface and query systems leveraging such methods are also important for end users to benefit from MIR research.

This issue contains sixteen papers covering wide range of topics in MIR. In the first paper, Diniz et al. introduce new spectral analysis methods that may be useful for pitch and feature extraction of music. In the second paper, Lacoste and Eck make an important contribution in detecting where a note starts, which is fundamental to many of higher-level MIR tasks.

The next two papers, by Peeters and Alonso et al. deal with the challenge of finding tempo in music. The subsequent two papers by Kitahara et al. and Woodruff and Pardo consider the problem separating and identifying instruments in music with multiple instruments playing together while Poliner and Ellis focus on the difficult problem of piano transcription. To enhance queries based on sung melodies, Suzuki et al. use both lyric and pitch information. The problem of segmenting music into large sections is refined in the two papers by Jensen and Müller and Kurth. The issue of key finding in music is nontrivial and is covered by Chuan and Chew. The next three papers by West and Lamere, Cataltepe et al., and Barbedo and Lopes address the problem of music similarity and genre classification.

A paper by Rossant and Bloch contributes to the advancement of optical music recognition systems, which help to create large symbolic music databases. The last paper by Goto et al. makes a worthy contribution by converting the emerging music notation standard MusicXML to Braille music notation.

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Ichiro Fujinaga is an Associate Professor at Schulich School of Music at McGill University. He has Bachelor's degrees in music (percussion/theory) and mathematics from University of Alberta in edmonton, where he performed with various musical groups including Edmonton Symphony Orchestra and Brian Webb Dance Company. He also cofounded *Kashim*, Edmonton's first professional percussion quartet and *Synthesis*, an electronic music ensemble. He then attended McGill University where he obtained the Master's degree in music theory and the Ph.D. degree in music technology. From 1993 to 2002, he was a faculty member of the Computer Music Department at the Peabody Conservatory of Music of the Johns Hopkins University. In 2002-2003, he was the Chair of the Music Technology Area at McGill's School of Music and in 2003-2004 he was the Acting Director of the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT) at McGill. His research interests include music information retrieval, phonograph digitization techniques, distributed digital music archives and libraries, music perception, machine learning, and optical music recognition. Since 1989 he has been performing as a member of Montreal's traditional Japanese drumming group *Arashi Daiko* and he tours with them across North America and Europe.

Masataka Goto received the Doctor of Engineering degree in electronics, information, and communication engineering from Waseda University, Japan, in 1998. He then joined the Electrotechnical Laboratory (ETL), which was reorganized as the National Institute of Advanced Industrial Science and Technology (AIST) in 2001, where he has been a Senior Research Scientist since 2005. He served concurrently as a Researcher in Precursory Research for Embryonic Science and Technology (PRESTO), Japan Science and Technology Corporation (JST) from 2000 to 2003, and an Associate Professor of the Department of Intelligent Interaction Technologies, Graduate School of Systems and Information Engineering, University of Tsukuba, since 2005. His research interests include music information processing and spoken-language processing. He has received 18 awards, including the Information Processing Society of Japan (IPSJ) Best Paper Award and IPSJ Yamashita SIG Research Awards (special interest group on music and computer, and spoken language processing) from the IPSJ, the Awaya Prize for Outstanding Presentation and Award for Outstanding Poster Presentation from the Acoustical Society of Japan (ASJ), Award for Best Presentation from the Japanese Society for Music Perception and Cognition (JSMPC), WISS 2000 Best Paper Award and Best Presentation Award, and Interaction 2003 Best Paper Award.

George Tzanetakis is an Assistant Professor of computer science (also cross-listed in music and electrical and computer engineering) at the University of Victoria, Canada. He received his Ph.D. degree in computer science from Princeton University under the supervision of Professor Perry Cook in May 2002 and was a Post-Doctoral Fellow at Carnegie Mellon University working on query-by-humming systems with Professor Roger Dannenberg and on video retrieval with the Informedia group. His research deals with all stages of audio content analysis such as feature extraction, segmentation, classification with specific focus on music information retrieval (MIR). His pioneering work on musical genre classification is frequently cited and received an IEEE Signal Processing Society Young Author Award in 2004. He has presented tutorials on MIR and audio feature extraction at several international conferences. He is also an active Musician and has studied saxophone performance, music theory and composition. More information can be found at http://www.cs.uvic.ca/~gtzan.