



SBCM 2017

PROGRAM

16th Brazilian Symposium
on Computer Music

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University of São Paulo

September 3-6



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Monday Sept 4th		Tuesday Sept 5th		Wednesday Sept 6th	
09:30		Welcome coffee	Welcome coffee	Welcome coffee	
10:00		Technical Papers I: Audio Synthesis	Technical Papers II: MIR	Technical Papers V: Visualization and interaction	
10:30					
11:00		Music Papers I: Composition and Improvisation	Technical Papers III: Computer Music (I)	Technical Papers VI: Computer Music Outreach	
11:30					
12:00		Lunch break	Lunch break	Lunch break	
13:30					
14:00	Registration + Welcome coffee	Poster craze	Music Papers II: Music software	Poster Session II	
14:30					
15:00	Opening ceremony	Poster session I	Technical Papers IV: Computer Music (II)	Discussion panel + CE-CM meeting	
15:30					
16:00	Keynote Talk I: Xavier Serra	Keynote Talk II: Emilios Cambouropoulos	Keynote Talk III: Damián Keller	Workshop: Music Information Retrieval	
16:30					
17:00	Coffee-break + Walk	Coffee-break + Walk	Coffee-break + Walk	Coffee-break	
17:30					
18:00				Closing ceremony	
18:30	Opening Concert	Acousmatic Concert	Performatic Concert		
19:00					

Program Sessions - SBCM 2017

Technical Papers I: Audio Synthesis

- Design and implementation of an open-source subtractive synthesizer on the Arduino due platform (R. Pirotti, M. Pimenta, and M. Johann)
- Modeling a physical model with conditional adversarial autoencoders (S. Sinclair)
- Timbre spaces with sparse autoencoders (P. Riera, M. Zabaljauregui, and M. Eguia)

Technical Papers II: Music Information Retrieval

- A probabilistic model for recommending music based on acoustic features and listening data (R. Borges and M. Queiroz)
- The million playlists songs dataset: a descriptive study over multiple sources of user-curated playlists (F. Falcão and D. Gondim)
- Impact of genre in the prediction of perceived emotions in music (F. Tanios and T. Tavares)

Technical Papers III: Computer Music (I)

- Else library for pure data (A. Porres)
- Vivace: a collaborative live coding language and platform (V. V. da Silva Junior, G. Lunhani, G. R. Junior, C. Luporini, D. Penalva, R. Fabbri and R. Fabbri)
- aAaA: an attribute aware abstraction architecture allowing arbitrary argument assignment in Pure Data (J. Padovani)

Technical Papers IV: Computer Music (II)

- A domain specific language for drum beat programming (A. D. Bois and R. Ribeiro)
- Synesthesia add-on: a tool for HTML sonification (R. Bodo and F. Schiavoni)
- Web audio application development with mosaiccode (L. Gonçalves, F. Schiavoni, and A. Gomes)

Technical Papers V: Music visualization and multimodal interaction

- Gestures of body joints, musical pulses and laban effort actions: Towards an interactive tool for music and dance (L. Souza and S. Freire)
- A score-informed approach for pitch visualisation of a cappella vocal quartet performances (R. Schramm, H. S. Nunes, and E. Benetos)

Technical Papers VI: Computer Music Outreach

- Impact of algorithmic composition on player immersion in computer games: A case study using Markov chains (R. Oliveira and T. Tavares)
- Challenges for a second decade of ubimus research: Metaphors for creative action (D. Keller)
- Technology enhanced learning of expressive music performance (R. Ramirez)

Music Papers I: Composition and Improvisation

- Communicating a World View: *figer*, a Manifold Composition (Sever Tipei)
- An analysis of *Desdobramentos do continuo* for violoncello and live electronics performed by audio descriptors (Danilo Rossetti, William Teixeira, Jônatas Manzolli)
- The Maxwell Demon: Comprovisation in Ecologically Grounded Creative Practice (Luzilei Aliel, Damian Keller, Rogério Costa)

Music Papers II: Music Software

- AirQ Sonification as a context for mutual contribution between Science and Music. (Julian Arango)
- Web Orchestra Studio: a real-time interactive platform for music and education (J. Kestenberg, V. Rolla, D. Lúcio, and L. Velho)
- The Maxwell Demon (performance by Luzilei Aliel)

Poster sessions I/II

- A tool for the musical education of deaf people (E. Duarte and T. Tavares)
- An algorithm for guiding expectation in free improvisational solo performances (J. Fornari)
- An open dataset for vocal music transcription (M. Woitowitz, H. S. Nunes, and R. Schramm)
- Complex networks of chord transitions in Alexander Scriabin's piano pieces (J. Pégola)
- Developing a set of applications for music creation using low-cost brain-computer interfaces (G. Santo and M. Queiroz)
- Embedding microcontroller and audio interface in an augmented musical instrument (E. Meneses and M. Wanderley)
- Live coding console with remote audience into the web (G. Lunhani and F. Schiavoni)
- Melody and accompaniment separation using enhanced binary masks (S. Moura and M. Queiroz)
- Methods on composer identification using markov chains (A. Neto and R. Pereira)
- Pedal board approach to sound effects customization (T. F. M. Arcanjo, F. M. R. Junior, and T. Rocha)
- T2M/M2T: Sonifying text and textualizing sound using audio tags (B. Mesz and L. Samaruga)

Opening concert - September 3rd - 18:00

- “Sinfonietta de abertura” (Luzilei Aliel, Migue Antar and Yonara Dantas) - Orquestra Errante¹ and KairosPania².
- “phátis” for flauta transversal and live electronics (José H. Padovani) - Cássia Carrascoza, flute; José H. Padovani, live electronics.
- “O Estranho” for voice, percussion, video and digital processing (Lilian Campesato and Fernando Iazzetta) - Lilian Campesato, voice; Fernando Iazzetta, percussion, video and digital processing.
- “Arquipélago silencioso” improvisation performance for guitar, saxophone and live electronics. (André Martins e Rogério Costa) - Andre Martins, guitar and live electronics; Rogério Costa, saxophone and live electronics.

Acousmatic concert - September 4th - 18:00

- “Colour Etude” (Omar Perracha)
- “Figer” (Sever Tipey)
- “Rare yet soft” (Kyong Mee Choi)
- “Lignes et points” (Antonio D’Amato)
- “Suíte [en]quadrada” (Luzilei Aliel, Migue Antar and Yonara Dantas) - Orquestra Errante and KairosPania (see footnotes 1 and 2)

Performatic concert - September 5th - 18:00

- “Allure – a machinic performance” (André Martins) - guitar and live electronics.
- “Desdobramentos do contínuo” (Danilo Rossetti) - Willian Teixeira, violoncello; Danilo Rossetti, live electronics.
- “For alto saxophone” (Rodolfo Valente) - Pedro Bittencourt, saxophone; Rodolfo Valente, live electronics.
- “Puzzle Pieces” (Paul Schuette) - Brianna Matzke, piano; Paul Schuette, live electronics.

¹Orquestra Errante: Mariana Carvalho, piano and ventilarpa; Denis Abranches, acoustic guitar; Fábio Manzione, percussion; Fábio Martinelli, trombone; Max Schenkman, voice and experimental luteria; Pedro Sollero, guitar; Migue Antar, bass; Pedro Canales, bass clarinet; Caio Righi, flute; Inés Terra, voice; Natália Francischini, guitar; Vinicius Fernandes, guitar; Luzilei Aliel, live electronics; Micael Antunes, live electronics; Rogério Costa, saxophone and coordination

²KairosPania: Anna Kobzareva, Carmen Esteves, Filipe Augusto, Kelly Caldas, Lara Kadocsa, Samya Ennes, Victor Pessoa, Yonara Dantas

Technical Papers

A Domain Specific Language For Drum Beat Programming

Andre Du Bois (Universidade Federal de Pelotas) ; Rodrigo Ribeiro (Universidade Federal de Ouro Preto)

This paper describes HDrum, a Domain Specific Language for writing Drum patterns. Programs written in HDrum look similar to the grids, available in sequencers and drum machines, used to program drum beats, but as the language has an inductive definition we can write abstractions to manipulate drum patterns. HDrum is embedded in the Haskell functional programming language, hence it is possible to implement Haskell functions that manipulate patterns generating new patterns. The paper also presents a case study using HDrum, an implementation of *The Clapping Music*, a minimalistic music written by Steve Reich in 1972. The HDrum language is currently compiled into midi files.

A Probabilistic Model For Recommending Music Based on Acoustic Features and Listening Data

Rodrigo Borges (University of São Paulo) ; Marcelo Queiroz (University of São Paulo)

The “Cold Start” problem is a well known issue in Collaborative Filtering recommendation systems, associated to the moment when a new item or user is added to a given collection, because the system has no historical information of interaction between existing and new elements and it still need to incorporate these elements into the recommendation algorithm. This work addresses one possible solution for the case where new songs are added to a dataset of a music recommendation system, by proposing a probabilistic model for inference based on the songs’ acoustic/timbre features. This model was first proposed for tagging music with semantic labels but is here suggested as being suitable for predicting user interactions with new songs. The experiments were conducted with a reduced set of Brazilian popular music and the results outperform previous auto tagging results with the same method.

A Score-Informed Approach for Pitch Visualisation of a Cappella Vocal Quartet Performances

Rodrigo Schramm (Universidade Federal do Rio Grande do Sul) ; Helena Souza Nunes (Universidade Federal do Rio Grande do Sul)

This paper presents a score-informed method for visualising the pitch content of polyphonic signals from audio recordings containing a cappella performances with multiple singers. A Probabilistic Latent Component Analysis (PLCA) model is proposed for estimating the activations of multi-pitch candidates, with the support of a 4-dimensional dictionary built on spectral templates of singer vocalisations. The model is assisted through a soft masking mechanism built from the given music score during the vocal performance. Since the music score is prior knowledge of our system, the main contribution of this method is the potential frame-based visualisation of the fundamental frequency of each vocal part, which can be further used

for singing analysis as tuning, vibrato and portamento analysis. We evaluated our system on recordings of vocal quartets, including Bach Chorale and Barbershop styles. The evaluation process also takes into account possible discrepancies between the singing performance and the original music score. Experimental results show the influence of such mismatches on the final system accuracy.

aAaA: an attribute aware abstraction architecture allowing arbitrary argument assignment in Pure Data

José Padovani (University of Campinas)

We describe aAaA, an abstraction-based extension for Pure Data (Pd) that parses any number of attributes (@-initiated symbols) and their associated arguments and routes the entered values to unique labeled receivers. This approach expands the syntax of Pd without the need of compiled libraries, objects and extensions - a feature that can be useful in contexts in which Pd abstractions are embedded in applications, mobile and similar architectures.

Challenges for a Second Decade of Ubimus Research: Metaphors for Creative Action

Damián Keller (Universidade Federal do Acre)

This is the first part of a discussion on the challenges of a second decade of ubimus research. I lay out and exemplify the concept of metaphor for creative action. I summarize the results of three studies employing the time tagging metaphor, configuring an effective strategy for supporting everyday musical creativity. Then I report results of a study employing the stripe metaphor - an extension of time tagging devised for usage of a large number of resources. Twelve subjects, encompassing musicians and casual participants, realized improvisatory sessions in a non-standard setting - an audio and musical equipment store. The results indicated a promising new avenue of research targeting lay-musician interaction. Topic: ubiquitous music

Design and implementation of an open-source subtractive synthesizer on the Arduino Due platform

Rodolfo Pirotti (Universidade Federal do Rio Grande do Sul) ; Marcelo Pimenta (Universidade Federal do Rio Grande do Sul) ; Marcelo Johann (Universidade Federal do Rio Grande do Sul)

In this paper we present the design of a digital subtractive synthesizer using fixed-point arithmetic on the Arduino Due platform. Our main contribution is to show that a fully functional instrument of this type can run on a cheap and widely accessible processor. We have implemented oscillators with anti-aliasing algorithms, resonant filters, an envelope generator, a delay effect, a MIDI interface and a keybed scanner, therefore making a complete playable instrument. The implementation uses object orientation to create software modules replicating those classic analog synthesizer functions. With this approach, we have a modular software system that can be easily extended and adapted for new functionalities. An external DAC was used to provide the high-quality audio output of 16 bits at 48KHz. In addition to this, we also included an additive synthesis organ, demonstrating the possibility of having two important synthesis methods at the same time on the Due board. With this open and public design, we intend to contribute to the maker movement and encourage new and innovative implementations in this area.

ELSE Library for Pure Data

Alexandre Porres (University of São Paulo)

The main computer music languages for Live Electronics nowadays are: Max, Pure Data (or just Pd) & SuperCollider. In comparison to the other two, Pd offers a very limited set of internal functions in its main distribution (a.k.a Pd vanilla), relying heavily on external libraries. This paper describes the ELSE external library for Pd, which aims to improve the tools for programming with the Pd language. Its original goal was to bring some elements that

were missing in Pd Vanilla and its current external libraries. This grew to include functions not available elsewhere as well. In addition, the library also expanded to include a revision of elementary building blocks of computer music found not only in external libraries or Pd Vanilla, but also elsewhere. One example discussed throughout the paper is designing new oscillators. In this case, the ELSE library brings new functionalities to basic oscillators not yet available for Pd internals or externals. Not only that, but also not available elsewhere such as in Max or SuperCollider. The ELSE library provides a large collection of objects that were carefully and meticulously designed to improve the patching experience for Pd, allowing some techniques of computer music to be implemented or just more conveniently programmed. It is also part of a didactic project for computer music, that uses Pd to cover a wide range of techniques in over 350 examples. The final goal is to strongly depend on it to patch the given examples.

Gestures of Body Joints, Musical Pulses and Laban Effort Actions: Towards an Interactive Tool for Music and Dance

Leandro Souza (Universidade Federal de Minas Gerais) ; Sérgio Freire (Universidade Federal de Minas Gerais)

In this paper we present a proposal of segmentation and description of gestures of dancers based on the Laban Movement Analysis. This procedure is the main core of an interactive tool for music and dance, implemented in Max/Msp/Jitter and using Kinect, which aims to associate corporal and sonic gestures. The segmentation is done by means of the inspection of the zero-crossings of the acceleration curve of each body joint. After that, different descriptors for each gesture are extracted, and they feed routines to estimate three of the Laban effort factors: time, space and weight. From these data, it is possible to classify the gestures according to the eight basic Laban effort actions. A case study is also presented, in which we search for correlations between the pulse and character of a musical excerpt and the rhythms and qualities of the extracted gestures.

Impact of Algorithmic Composition on Player Immersion in Computer Games: A Case Study Using Markov Chains

Raul Oliveira (University of Campinas) ; Tiago Tavares (University of Campinas)

The feeling of immersion is an important aspect of gaming experiences. It can be greatly impacted by background music. In this work, we investigate the use of algorithmically-generated background music as a mean to generate immersion in gaming experiences. For such, we developed two versions of the same game. One of them uses music written by a human composer. The other uses real-time generated melodies based on a Markov chain. We evaluated immersion related to each of these versions using user questionnaires and performance measures. The results did show only a small immersion difference between the versions. This indicates that algorithmic music can be a suitable option for game content generation.

Impact of Genre in the Prediction of Perceived Emotions in Music

Felipe Tanios (University of Campinas) ; Tiago Tavares (University of Campinas)

In on-line music streaming systems and music digital libraries, the emotions that people perceive while listening to a track have become an important criterion while trying to find what to listen to. There are several possible solutions that use emotion as a criterion. Some of them separate and predict emotions in a track learning individually from its user which demands a considerable amount of computational time to generate adequate result. Others predict in a generalized way for every user, so it does not take in count individual characteristics in musical taste. People that identify with a social group tend to perceive the same emotions in music and social groups' members often identify with the musical genre. In this paper we describe a method for music emotions prediction using genre information and compare it with a similar classifier that does not use genre information. Results show that prediction accuracy improves in all tested genres, except for one. This suggests that music in different genres convey emotions using different means.

Sounderfeit: Cloning a Physical Model with Conditional Adversarial Autoencoders

Stephen Sinclair (Inria Chile)

An adversarial autoencoder conditioned on known parameters of a physical modeling bowed string synthesizer is evaluated for use in parameter estimation and resynthesis tasks. Latent dimensions are provided to capture variance not explained by the conditional parameters. Results are compared with and without the adversarial training, and a system capable of “copying” a given parameter-signal bidirectional relationship is examined. A real-time synthesis system built on a generative, conditioned and regularized neural network is presented, allowing to construct engaging sound synthesizers based purely on recorded data.

Synesthesia Add-on: a Tool for HTML Sonification

Roberto Bodo (University of São Paulo) ; Flávio Schiavoni (Universidade Federal de São João Del Rei)

Web browsers using HTML5 and WebAudio have been widely used as real-time audio environment and brought up new possibilities for web art. In this paper, we present an investigation on HTML sonification. In our approach, HTML pages are read as musical scores and page elements are played as a sequencer. We developed a tool for website sonification which can be used to explore musical creativity and to create new sound contexts based on the web pages. We present the tags and attributes that are mapped to sound parameters. In addition, we show how we created sounds and visual feedback in this tool.

Technology Enhanced Learning of Expressive Music Performance

Rafael Ramirez (Universitat Pompeu Fabra)

Learning to play music is mostly based on the master-apprentice model in which modern technologies are rarely employed and students' interaction and socialisation is often restricted to short and punctual contact with the teacher. This often makes musical learning a lonely experience, resulting in high abandonment rates. In the context of TELMI, an international project, which aims to address these issues by providing new multi-modal interaction paradigms for music learning and to develop assistive, self-learning, real-time feedback, complementary to traditional teaching, this paper focuses on the computational modelling of expressive music performance as a tool for music learning. We record a professional violinist and apply machine learning techniques to induce an expressive model the recordings. We use this model to generate feedback on expressive aspects of arbitrary pieces to violin students.

The Million Playlists Songs Dataset: a descriptive study over multiple sources of user-curated playlists

Felipe Falcão (Universidade Federal de Campina Grande) ; Daniel Gondim (Universidade Federal de Campina Grande)

User interest for playlists is increasing as current music streaming services become more and more popular. In order to get sets of songs that best match current musical needs (e.g. size, diversity, mood), one has to select a compatible playlists source between a representative number of options. Most of available music streaming platforms (e.g. Spotify, Pandora, Deezer) already contain playlists searching mechanisms, but as a secondary source of such information we have websites that allow users to submit, manage and publish their own playlists, organizing them according to some specific criteria. This paper proposes a descriptive study over four of these websites in such way that it categorize the groups of playlists available on each one. By recursively crawling and querying data from these sources and enriching it with acoustic information fetched from AcousticBrainz, we were able to build a dataset called The Million Playlists Songs Dataset which guided the descriptive process and is now available for further investigation.

Timbre spaces with sparse autoencoders

Pablo Riera (Universidad Nacional de Quilmes) ; Matias Zabaljauregui (University of Buenos Aires) ; Manuel Eguia (Universidad Nacional de Quilmes)

Timbre perception studies emphasize the multidimensional nature of timbre. Many studies rely on dimensionality reduction techniques to visualize perceptual similarity evaluations or sound descriptors that encompass timbre perception. In this work we explore the uses of sparse autoencoders to perform unsupervised learning and nonlinear dimensionality reduction to extract a spectral code representation that is used for timbre analysis and visualization.

Using only one music fragment in the autoencoder learning process generates an overfitted reconstruction, but gives a low dimensional neuronal activity pattern which encoded all the sound spectrum information and could be used for synthesis as neuronal music score.

Web Audio application development with Mosaicode

Luan Luiz Gonçalves (Universidade Federal de São João Del Rei) ; Flávio Schiavoni (Universidade Federal de São João Del Rei) ; André Gomes (Universidade Federal de São João Del Rei)

The development of audio application demands a high acknowledgment about this application domain, traditional programming logic and programming language. It is possible to use a Visual Programming Language to ease the application development, including experiments and creative exploration of the Language. In this paper we present a Visual Programming Environment to create Web Audio applications called Mosaicode. Different from other audio creation platforms that use visual approach, our environment is a source code generator based on code snippets to create complete applications.

Vivace: a collaborative live coding language and platform

Vilson Vieira da Silva Junior (Universidade do Estado de Santa Catarina) ; Guilherme Lunhane (Universidade Federal de Juiz de Fora) ; Geraldo Rocha Junior (Instituto Paulo Freire) ; Caleb Luporini (Freelancer) ; Daniel Penalva (IFT/UNESP) ; Ricardo Fabbri (Universidade do Estado do Rio de Janeiro) ; Renato Fabbri (University of São Paulo)

Live coding is a performance and creative technique based on improvised and interactive coding. Many recent endeavors have focused in live coding both because of aesthetics and as a way to alleviate performance drawbacks when the musical instrument is a computer. This paper describes the principles and the design of Vivace, a live coding language and environment built with Web technologies to be executed on web browsers. The approach is compelling by 1) allowing many performers to code simultaneously; 2) the synthesis of audio and video; 3) a very simple syntax; 4) being a multiplatform software. We also strive to contextualize Vivace by means of historical and usage summaries including a live coding sub-genre.

Music Papers

AirQ Sonification as a context for mutual contribution between Science and Music

Julian Arango (Caldas University)

This paper addresses a high-level discussion about the links between Science and Music, focusing on my own sonification and auditory display practices around air quality. Grounded on recent insights on interdisciplinarity and sonification practices, the first sections will point out some potential contributions from scientific research to music studies and vice versa. I will propose the concept of mutualism to depict the interdependent status of Music and Science. The final sections will discuss air contamination as a complex contemporary problem, and will report three practice-based design projects, AirQ jacket, Esmog Data, and Breathe!, which outline different directions in facing local environmental awareness.

Analysis of Desdobramentos do continuo for violoncello and live electronics performed by audio descriptors

Danilo Rosseti (University of Campinas) ; Willian Teixeira (Universidade Federal do Mato Grosso do Sul) ; Jônatas Manzolli (University of Campinas)

This article proposes an audio descriptors model for the analysis of live electroacoustic music. In this context, an analysis of the work Desdobramentos do contínuo for violoncello and live electronics is addressed, concerning both tape (deferred time) sounds and live electronics (instrument sound and real time processing). For this analysis, audio descriptors such as spectral flux, energy mean, centroid and loudness were employed. The objective was to define which events produce huge timbre variations and to identify timbre subtle nuances which are not perceptible in a first listen of the work. We conclude comparing the analysis results to the compositional hypotheses presented in sections 2 and 3.

Communicating a World View: figer, a Manifold Composition

Sever Tipei (University of Illinois)

A composition, figer, for computer-generated sounds, is analyzed in some detail. The formal architecture, and types of materials used are discussed along with particular features of DISSCO, the original software employed. A non-linear narrative is detected and the implications of an work open to multiple interpretations are examined together with existing clues about the author's belief system. Finally, the world view embedded in the composition is analyzed and the merits of comprehensive or black box software are identified as essential to the production of composition classes or manifold compositions such as figer.

The Maxwell Demon: Comprovisation in Ecologically Grounded Creative Practice

Luzilei Aliel (University of São Paulo) ; Damián Keller (Universidade Federal do Acre) ;
Rogério Costa (University of São Paulo)

This paper aims to expand the research on ecological synthesis (Keller, 1999) through the inclusion of improvisation practice. We propose a formalization of creative processes in sonic improvisatory-compositional environments (targeting comprovisation), based on ecologically grounded creative practices. Our approach entails the use of socio-ecological models that deal with complex adaptive systems [Sibertin et al., 2011]. We developed a performance/experiment called The Maxwell Demon, as a case study. The observations done during the case study indicate that imitation is an important strategy for creative activities in socio-ecological systems. Improvisation may provide a relevant source of sonic content in ecological environments, enhancing their flexibility without losing consistency.

Web Orchestra Studio: a real-time interactive platform for music and education

Juliano Kestenber (Universidade Federal do Rio de Janeiro) ; Vitor Rolla (Instituto Nacional de Matemática Pura e Aplicada) ; Djalma Lúcio (Instituto Nacional de Matemática Pura e Aplicada) ; Luiz Velho (Instituto Nacional de Matemática Pura e Aplicada)

In this paper, we introduce the Web Orchestra Studio, a set of applications which enables the development of musical concerts for laptop orchestras. We offer an open-ended platform for collective artistic experimentation which can be utilized by experts and non-initiated students. In order to instance some of the platform features, we present a case study describing our participation in the Math Festival activities with the workshop Music, Mathematics and Computers. Fundamentally, with this work we intend to leverage academic debate concerning the interdisciplinary fields of music, computer science and education.

Posters

A tool for the musical education of Deaf people

Erivan Duarte (University of Campinas) ; Tiago Tavares (University of Campinas)

Hearing impaired people are often neglected musical education. This happens because musical activities are often focused on the development of the sense of hearing. As consequence, they do not participate in musical activities which also foster, coordination, emotional growth and sociability. However, the participation in those activities can rely on senses other than hearing, like sight and touch. In this work we propose and evaluate the use of visual and haptic cues for musical education. These cues are generated from the real-time mapping of audio features extracted from a microphone stream. The real-time aspect of the mapping allows musical interactions between hearing impaired and non hearing impaired people. These mappings were incorporated into a mobile app and used in music lessons offered to a hearing impaired community. As a result of these lessons, participants developed the abilities of perceiving and producing rhythms, playing virtual instruments and participating in a collective musical practice. Therefore our proposal is a potential aid on the promotion of musical education for hearing impaired people.

An Algorithm for Guiding Expectation in Free Improvisational Solo Performances

José Fornari (University of Campinas)

Free improvisation lets a performer to openly explore musical outcomes unbounded by any structure or notation. However, the human mind is naturally constrained by its own built-in habits. As such, musicians usually develop, during years of practice and aesthetic predilections, a repertoire of self-known musical patterns which are intentionally, or unconsciously, used by them during a musical improvisation.

An open dataset for vocal music transcription

Marcos Woitowitz (Universidade Federal do Rio Grande do Sul) ; Helena Souza Nunes (Universidade Federal do Rio Grande do Sul) ; Rodrigo Schramm (Universidade Federal do Rio Grande do Sul)

This work presents an audio dataset which is designed to support the development of techniques for multi-pitch detection and voice assignment applied to audio recordings containing performances with multiple singers. The proposed dataset contains recordings of popular Brazilian songs, performed by non-professional vocal quartets. Besides the mixdown with the complete ensemble, the dataset also contains each vocal part recorded in separated tracks, with its frame-based pitch ground truth and music score.

Complex networks of chord transitions in Alexander Scriabin's piano pieces

Juan Pégola (Universidad Nacional de Tres de Febrero)

We consider chord transition networks built from piano pieces by Alexander Scriabin. We design a random walk algorithm for composing music based in the networks, and present two pieces generated in this fashion.

Developing a set of applications for music creation using low-cost brain-computer interfaces

Guilherme Santo (University of São Paulo) ; Marcelo Queiroz (University of São Paulo)

Brain-Computer Interfaces emerged in the medical field as a way to help patients with severe motor disabilities to communicate with their surroundings using only their brain activity. Nowadays, focused in the general public, companies started to develop more affordable interfaces for applications in entertainment and the arts. In this paper we present a set of applications to use low-cost brain-computer interfaces for music creation and performance in the form of a PureData (Pd) External Library. This set of Pd objects allows artists and other potentially interested users to access both raw EEG signals and derived features and to include them in their own implementations.

Live Coding Console with Remote Audience into the web

Guilherme Lunhane (Universidade Federal de Juiz de Fora) ; Flávio Schiavoni (Universidade Federal de São João Del Rei)

This article describes the context, reflections and the development of a livecoding application. In the first section, we introduce the *livecoding* concept and its historical constructions with the musical language until the newer developments. In the second section, we discuss three approaches which were measured for new developments in a previous article. The third section compares these approaches and the last section introduces a back-end system for livecoding.

Melody and accompaniment separation using enhanced binary masks

Shayenne Moura (University of São Paulo) ; Marcelo Queiroz (University of São Paulo)

Recovering melodic information from sound signals has several applications, being an important task in Computational Auditory Scene Analysis. This work presents enhancement methods for filtering the spectrogram of an audio signal based on melodic annotations for the separation of melody and accompaniment in different audio tracks. Preliminary quantitative results correlate well with subjective evaluations, showing that enhanced binary masks provide a reasonable starting point for the refinement of automatic melodic separation strategies based on spectrogram resynthesis.

Methods on Composer Identification Using Markov Chains

Adilson Neto (Centro Universitário do Estado do Pará) ; Rodrigo Pereira (Universidade Federal do Pará)

Markov chains along with other algorithms have already been used on the identification of music composers. This paper presents a survey on different types of music coding schemes and the effects of using each one on the precision of the Markov model.

New developments on the augmentation of a classical guitar: Addition of embedded sound synthesis and OSC communication over network

Eduardo Meneses (McGill University) ; Marcelo Wanderley (McGill University)

In this paper we present a series of experiments aiming modifications of an existing augmented musical instrument entitled GuitarAMI. We use a single-board computer and a prototyping platform to embed hardware capable of performing audio capture, gestural data generation and process, synthesis and sound manipulation, as well as audio input/output to create a augmented musical instrument capable of perform complex audio manipulations without the use of external processors.

Pedal Board Approach to Sound Effects Customization

Thiago Felipe Miranda Arcanjo (Universidade Federal de Sergipe) ; Franklin Magalhães Ribeiro Junior (Instituto Federal do Maranhão) ; Tarcisio Rocha (Universidade Federal de Sergipe)

Nowadays, it is recurrent the exploration of new sonorities through the sound signals treatment with the use of equipment such as pedals. In addition, software such as digital audio signal processing systems that simulates pedals and other equipment used by musicians became an attractive alternative because of the practicality to make musical effects. However, many of these solutions have an expensive license to use, demand many effort to learn and in some cases, are focused on some specific instrument. On this way, we propose in this work a solution that is user-friendly, easy to learn and allows the user to encode or use third-party sound effects. Our proposal is free and is possible to use with guitar and bass.

T2M/M2T: Sonifying Text and Textualizing Sound Using Audio Tags

Bruno Mesz (Universidad Nacional de Tres de Febrero) ; Lucas Samaruga (Universidad Nacional de Quilmes)

We present T2M, a generative text-based music system, and M2T, a generative music-based text system. T2M takes words from tweets produced by the audience or Twitter trending topics, and composes music using as raw material Freesound sound files labeled with those words. Conversely, M2T takes sounds as input, finds timbrally similar sounds in Freesound, and generates text based on their verbal labels.

Art

Allure, a machinic performance

André Martins (University of São Paulo)

Our goal is an artistic performance from the constitution of a complex and diversified environment, convenient for theoretical and practical research on free improvisation. We seek to add theoretical reflection to a type of improvisation that takes place in a hybrid environment that includes, besides traditional musical instruments - acoustic or electronic - other apparatuses and technological tools. The connection of all these devices dynamically and interactively engaged by performers in a given space-time environment is what we call the “hybrid machine” here. This complex environment, which includes all and any sound as raw material, prioritizes the use of new technological digital resources of a mobile character that contribute to enrich the creation plan and interaction between the musicians. At the SBCM 2017 congress, we propose a demonstration of the “operation” of this complex environment through improvisation performance, acoustic instruments, interfaces, mobile computers, microphones, control pedals and the performance environment itself.

Colour Etude I

Omar Peracha (Independent)

Colour Etude I' is the first in a series of pieces exploring the strict application of certain spectral techniques influenced by the research of William Sethares, while keeping all parameters except for harmony very simple. These pieces function as a means to test harmonic concepts, and to create more accessible examples of microtonal and spectral music by leaving most aspects of the piece uncomplicated. An 11-partial waveform was generated in Supercollider using random numbers for the partial frequencies and amplitudes, which were then tweaked to taste. The entire piece uses instances of waveforms with these same ratios between the frequencies of their 11 partials - i.e. exact transpositions of the same waveform. In a particular 'key', only notes whose fundamental frequencies occur in the spectrum of the 'tonic' can be used, leading to a series of 11-pitch sets which modulate between each other via common pitches.

Desdobramentos do contínuo for violoncello and live electronics

Danilo Rosseti (University of Campinas) ; Willian Teixeira (Universidade Federal do Mato Grosso do Sul)

Desdobramentos do contínuo is a work for violoncello and live electronics written in 2016. It was the last live electroacoustic music composed during Rossettis PHD thesis [1], defended in the same year. The work was composed in collaboration with the violoncellist William Teixeira, for whom it is dedicated, and it involves both deferred time and real time electroacoustic procedures.

figer, Computer-assisted Composition for Computer-generated Sounds (fixed media)

Sever Tipei (University of Illinois)

figer(fr.), vb. to clot, coagulate, congeal. Realized with DISSCO, software for Computer-assisted Composition and Additive Sound Synthesis developed at the UIUC Computer Music Project and Argonne National Laboratory, figer contains elements of indeterminacy at all structural levels. As such, it is a composition class or a manifold composition: all its actual and potential variants share the same structure, but differ in the way events are arranged in time and details are crafted. The work includes four disquieting sections, three interludes and a coda; together they suggest an apocalyptic picture of surrealist aural images. Similar to paintings born from that aesthetics, it includes recognizable, familiar elements placed in an incongruent context. The coda, a quote from the traditional repertoire, enforces this perception. In figer there are no themes-characters participating in a logical plot. Instead various sound objects re-occur in a non-linear, ostensibly random succession and listeners are invited to create their own representations of the proposed sound shapes. New appearances of previously encountered entities are distinct although they all can be identified as being incarnations of three primary types of materials: points, lines, and aggregates/chords. The work could also be seen as a riddle, the answer to be found in the coda and the title. This submission accompanies the paper “Communicating a World View: figer, a Manifold Composition” which discusses in more detail technical aspects of the software and how it was used in this composition.

For alto saxophone and live electronic sounds: “era como se estivéssemos vivos”

Rodolfo Valente (University of São Paulo)

Piece written for saxophone player Pedro Bittencourt in which mostly percussive and noisy sound production techniques are explored, favoring confrontation of physical coporeality and bodiless presence of the electronic sounds. Thought as a gestural expansion of instrumental activity the live electronic part implements machine listening (mostly amplitude tracking) to activate sound layers in which physical models inform the behaviors of delay lines and envelope shapes, seeking less linear and yet expressive responses from the electronic system. The now submitted proposal is a work in progress featuring around 5 minutes in duration. The finished version will be around 7 minutes long.

Lignes et Pointes - étude pour la décomposition en deux parties d’une oeuvre de Joan Miró

Antonio D’Amato (Conservatorio di Musica di Avellino)

This piece comes from a research about the possibility of maximizing the transmission of emotions through a synesthetic transposition of abstract paintings into music. In fact from that point of view synesthesia is an interaction of different sensory modalities, assumed that in certain conditions a single sense could activate the others. On this side working on figurative

artworks conceived in the 20th century could be a good testbed because the theme of the synesthesia between figurative arts and music has often involved artists of different movements in the 20th century. The piece is a personal transposition into music of a gouache included in the first set of Constellations by Joan Miró, chosen by reason of a deep and personal study on chromatic relationships and of abstract geometrical forms conducted by Miró himself. The piece is formally conceived in two parts, intended as an etude on simple elements, grouped into two basic categories, each part focusing on different families of graphical elements. Long and slow elements are exclusively dominant in the first part, while impulsive sounds build up the second part. These elements are selected and extensively overlapped in order to develop an abstract study on basic elements of a music vocabulary. Here the goal is to attempt forcing the merging of communicative strengths from different art forms through the extraction of the overall shape of each graphical element and a successive superimposition of their general traits to sound elements through intensive dsp.

Puzzle Pieces

Paul Schuette (The University of the Arts)

As a composer of electroacoustic music, the figure of Stockhausen - the indelible German (or Sirius-ian?) explorer, technician, and mystic philosopher of 20th century music - looms large. In *Mikrophonie I* (the specific work that we were asked to respond to), Stockhausen breaks ground that the medium of electroacoustic music has in some ways been responding to ever since. From a technical standpoint, as one might surmise from the title, this work elevated the status of the microphone from a passive piece of hardware to an instrument capable of an extremely subtle range of expressive gestures. In fact to perform the work, one must become something of a virtuoso microphone performer in order to execute Stockhausen's incredibly detailed notation for the instrument. This perceptive restructuring liberated the status of electronics in music by putting the "microphonist" on the same plane as the violinist. From this perspective, all of my music, which seeks to integrate electronics in nuanced and novel ways in order to enhance the range of expressive possibilities, is made possible by Stockhausen's contributions. *Mikrophonie I* is also a primary example of another of Stockhausen's influential ideas: moment form. Simply put, Stockhausen's conception of a moment form is one in which, "no developmental direction can be predicted with certainty from the present one." Far from a license for piecemeal composition, Stockhausen was searching for a means to restructure the dimensions of music. By calling our attention to the "Now", he seeks to, "make vertical slices, as it were, that cut through a horizontal temporal conception to a timelessness I call eternity: an eternity that does not begin at the end of time but is attainable in every moment. I am speaking of musical forms in which apparently nothing less is being attempted than to explode (even to overthrow) the temporal concept." By seeking to expand upon the dimensional planes in which the structural logic of the piece is projected, *Puzzle Pieces* is my humble attempt to expand upon the implications of Stockhausen's "Now".

Rare yet soft

Kyong Mee Choi (Roosevelt University)

rare yet soft explores the subtlety of quoted thematic material from Mahler's Symphony No. 5 Adagietto. The piece has three sections when each quote is introduced in a different context. At the end, the piece shows how subtle influence of this quotation can affect the

overall shape of the piece. This piece is dedicated the composers beloved father, Soon Bong Choi.

Suíte [en]Quadrada

Miguel Antar (University of São Paulo) ; Yonara de Oliveira (Escola Superior de Artes Célia Helena) ; Luzilei Aliel (University of São Paulo)

The performance develops in the wake of dialogues and frictions between three languages: free musical improvisation, acting and live electronics. The performance explores the narrativity imprinted on moving bodies, the visual force of live video recording of these same bodies (triggering the everyday life of the bifurcation between real life and life on the screen) and acoustic and electronic sounds amalgamating the performance. The Suíte [en] Quadrada is an achievement of the artistic collective KairosPania, Orquestra Errante & Luzilei Aliel.

The Maxwell Demon

Luzilei Aliel (University of São Paulo)

The Maxwell Demon (TMD) is a comprovisation based on the James Clerk Maxwell experiment in 1871. This comprovisation (composition + improvisation) aims to enable multiple agents to exchange sound interactions through common equipment but not commonly used for sound and artistic practices: the mobile phone. TMD proposes the possibility of technical equality between musicians and non-musicians and sound discovery through interaction and interactivity relations between agents x agents, agent x environment and agents x algorithms.

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