2nd DARIAH-AIM Meeting: The Artificial Intelligence and Music WG at the DARIAH 2021 Annual Event (open meeting)

Location. Online via Zoom. Registration link here

Date and time. 7 October 2021, 10:30-12:00 CEST/CET (DARIAH full event timetable here)

Organizers. Albert Meroño-Peñuela and Enrico Daga (WG chairs)

Meeting description. AIM (Artificial Intelligence and Music) is a working group that focuses on strengthening communities around Music and Artificial Intelligence. We address the outreach needs of universities, industry and institutions by mapping these communities, and providing them with communication spaces and tools.

The goal of this meeting is to give the opportunity to the WG members to present the projects, teams and missions they have been involved in regarding AI and music. We hope that this will allow us to start a shared agenda towards a community white paper, which faithfully represents the variety of expertises and goals of the group. As an example of this, we will present Polifonia, a H2020 project we have started to work on this year, and that we think can contribute to the mission of the WG.

We encourage all interested WG members and beyond to use this opportunity to tell AIM about your projects and teams working on all aspects of AI and music, regardlesms of their academic field or industrial sector. To do so, please use the template below to indicate the title of the lightning talk, the name and affiliation of the speaker, and a short abstract (maximum 200 words). We will make sure to allocate enough time to all proposed talks, and use their content to make plans towards the community white paper.

Please contribute your template no later than **6 October 2021**.

Agenda. The provisional agenda for the meeting is:

1. Welcome [5 minutes]
2. Lightning talks session [45 minutes]
3. White paper plans [25 minutes]
4. AOB and closing [10 minutes]

Lightning talks template

Title. The Polifonia ecosystem for music data sharing and linking
Speaker. Albert Meroño (King's College London), Enrico Daga (The Open University)
Abstract. The Polifonia project (https://polifonia-project.eu) aims at "playing the music of our history", by unveiling unknown and exciting connections between European musical heritage collections of all kinds. Polifonia makes this happen by building novel ways of

inspecting, representing, and interacting with digital content, making extensive use of AI technologies in 10 ambitious pilots. In this lightning talk, we will present an overview of the Polifonia goals and summarise our current efforts in using semantic technologies and ontologies to represent, connect, enrich and intelligently browse musical collections; using music analysis techniques to discover meaningful musical patterns among those collections; and connecting those collections to historical texts that provide a deeper and richer understanding of musical heritage once they are connected to the musical sources. With such ambitious objectives, Polifonia will need an extensive and varied Stakeholder Network, that we hope can benefit as early adopters from Polifonia technologies, tools and communities, at the same time they help us ensure their long term sustainability.

Title. Music AI related projects for Polish folk music collections

Speaker.
Ewa Łukasik (Poznan University of Technology),
Magdalena Chudy (Institute of Art, Polish Academy of Sciences),
Ewa Kuśmierek, Aleksandra Nowak, Tomasz Parkoła (Poznan Supercomputing and Networking Center)

Abstract.
DARIAH-PL Music Information Retrieval Working Group (DARIAH-PL MIR-WkG) concentrates its activities on developing digital solutions that integrate MIR tools with a number of repository-based functionalities in order to facilitate advanced interdisciplinary studies on Polish traditional music.

Recently, DARIAH-PL MIR WG has started two EU-funded projects that aim at developing smart infrastructures for research in digital arts and humanities including the application of Music AI solutions to folk music collections, namely FBC-TeNe and Dariah.lab

The goal of the FBC-TeNe project is to increase the availability of digital collections of Polish cultural and scientific institutions by expanding the functionalities of the Federation of Digital Libraries, a national Europeana-accredited aggregator, by means of content-based search for both textual and musical content. For example, the deep learning methods will be applied to perform OMR on aggregated collections of sheet music to enable melody search by example.

The Dariah.lab project builds a research infrastructure that combines hardware resources and software services developed using state-of-the-art technologies with integrated digital corpora from various fields of humanities and art sciences. Within the Automatic Enrichment Laboratory, AI Music solutions will be implemented into tasks such as automatic transcription, timbre analysis and automatic music generation.

Meeting notes

- Lightning talks/introductions
    - **Ewa Lukasik**: AI and machine learning, strong but small group. Great interest in audio processing. Music Information Retrieval (MIR) group, Polish folk recordings, strong ethnographic research. DARIAH-PL project: (i) distributed lab related to DH, methods for digital musicology; (ii) enriching collections using OMR and OCR methods; (iii) discovery of needs of Polish folk groups (funded by DARIAH)
    - **Ivan Magrin-Chagnolleau**: lab in Marseille, PRISM laboratory, recent. Co-created by Aix-Marseille university and CNRS. Aims at interaction between Art and Science. Acoustics and perception, practice as research in musicology/creation process, phenomenology and applications for e.g. health. Ivan is an artist, interested in joining creative process and research process; relation to cognitive sciences, enactive theory, and pedagogy (enactive pedagogy). As a practitioner, he tries to articulate creation and research. AI to inform/support the creative process. Part of the WG Internet, AI and Society, including Music. Expertise includes voice technology, ML and NN. Intention is to revisit those technologies, linking them to creativity. Music but also Images, and Video. Topics include: Image sonification; MIR (music/ singing voice separation); Ethical dimension. Interesting tools: Sony Flowmachines. See also: https://www.prism.cnrs.fr
        - Creativity models typically aim at reproducing it by machines rather than explaining human behavior
        - Creativity is very important for pedagogy but also research and science. The intuition is that the research process may not be essentially different from the creative process of an artist.
        - How to evaluate computational creativity? Qualitative methods are abundantly used, question of evaluation heavily discussed in the lab. How to relate qualitative approaches to quantitative metrics. How can these two have a dialog?
        - The epistemological question is also important when joining communities that have different cultures
    - **Lars Johansen**: Aarhus University, DH Lab under development. Postdoc application where the main product is a Web interaction interface for musicologists, musicians, etc. to use ML techniques. Work with historical music and theories of music. Interested in supervised and unsupervised ML approaches, to automatically label music scores and / or identify recurrent categories bottom-up. Visualisation is also important and research on how it can support musicologists.
        - Too much focus on performance instead of other features that could give interesting insights?
        - Important problem in AI/Musicology is the brittleness of CS models, which are typically intolerant to inconsistencies, while most of music theories are more tolerant to variances and exceptions (“documents don’t crash”).
    - **Marianne Huang**: My interest is human / technology interaction and artistic research, but also very concretely that we - at Aarhus University - host an

audio design program and collaborate with the Music Academy, notably the Danish Electronic Music Lab. This collaboration goes also towards created soundscapes for urban communities, and planning. This in collaboration with testlabs and incubation environments for sound art and education, supported by Bang & Olufsen.
    - **Eamonn Bell**: Digital humanities and CS, Durham University. Musicologist and music theory as background, interested in computational models of music, like to "write code and play". Interested in epistemological and philosophical questions, but also on Musical and Images scores, particularly on manuscripts. Also interested in early web as source for history of digital media and music (e.g. CDs, YouTube comments etc.)
        - About music, AI and creativity and history of technology https://www.eamonnbell.com/blog/2020/11/20/on-fugues-and-functionalism/
    - **Jacopo de Berardinis**. PhD in MIR at Uni Manchester. MIR and ML for music segmentation, music structure analysis, emotion recognition, generation.
    - **Andrea Poltronieri**. PhD student at the university of Bologna. Interest is MIR and Semantic Web technologies, trying to find connection points and interactions between these two fields. My PhD project is on extracting meaningful patterns from music, both from a perceptual point of view and musicological point of view.
    - **Albert Meroño**: Polifonia is in its first year (Enrico, Jacopo, and Andrea are also members of the project) and has at its core the development of a Knowledge Graph of Musical Resources. The intuition is that there can be common insights in very different datasets. Evidence include traditions that may interact even during political conflicts, so traces of this influences is hidden the sources but not "advertise" in traditional scholarship (case of Dutch/French folk music).
    - **Enrico Daga**. What kind of problems arise when trying to achieve this vision. For example, we develop key studies where these problems are treated theoretically and practically. How do you manage diversity in e.g. knowledge graph construction. Combination of expertise: humanists, musicologists, MIR, CS, musicians, ontology engineers,
- White paper plans
    - Albert: What makes us different from MIR?
    - Ivan: temporal dimension is very crucial and it may be one reason for the higher success of DNN models in dealing with static images. Not addressed a lot.
    - Lars: network representations can include time as a dimension. Do we want projects in our fields to start for scratch? How to focus on reuse?
    - Enrico: Polifonia is trying to tackle the problem of reuse by developing an Ecosystem of interlinked components. It is an open question though how such an ecosystem approach can contribute to reuse outside the project.
    - Ivan: sharing platform?
    - Albert: one enabling scenario is music dataset search, to help researchers find reusable assets.

    - Jacopo: connecting the problem of temporal dimension and how to evaluate creativity. Generative systems of music they have the problem of learning long term dependencies, one of the key problem is to evaluate the ability of the system to generate coherent structures. One of the key point is how do we evaluate those systems to go from qualitative evaluation to quantitative one: what metrics would be designed to measure their performance? About reusability, in NLP you can reuse embeddings for text but with music this is not really possible. This is something that is missing in the literature.
    - Albert: the FAIR data principles, Workflows in Open Science, are both relevant to Music. But how those need to be adapted for the music case?
    - Lars: one problem with Semantic Web is that it currently lacks the details. It would be amazing if it could! The problem is the lack of resources/infrastructures specifically tailored to music computing research.
    - Albert: this aspect of computing infrastructures is key
    - Ewa: Sharing the infrastructure is the goal of our DARIAH-PL project, so we will be happy to continue the discussion in this topic.

List of topics from 1st meeting

- Ethical issues around AI and Music (check this) → Important to reflect this in the white paper -> Involve DARIAH WG ethics https://dariah.zoom.us/meeting/register/tZUsduqvqD8tHdKeGxBz8Smxpc5mE71iU5W0 Attend! 22 October
- Computational musicology
- Music generation methods
- Symbolic and subsymbolic representations of music
- Computational music cognition
- Human computer interaction and music
- Music and Knowledge Representation & Reasoning
- Semantics and ontologies of music
- Music on the Web
- Music and Linked Data
- Preservation and archiving of digital music
- Automatic expressive performance of music
- Music interpretations
- Analysis of the reception and effect of music
- Language and discourse on music
- Intelligent music information retrieval
- Music search and recommendation
- Folk music and ethnographic analysis
- OMR and OCR for enriching music collections
- What is creativity and how can AI support it
- Image sonification
- Dialog between qualitative and quantitative evaluation methods (e.g. how to translate qualitative methods into quantitative metrics)
- Interaction interfaces for musicians and musicologists (e.g. ML) → Tension within MIR community?

- Inconsistency support (i.e. a document doesn't "crash" when it contains and inconsistency) -- sometimes you have to break the rules for e.g. being creative
- Shared resources/infrastructures