



LUMuA

CUNY's Laboratory for the Understanding of Music and Audio

Johanna Devaney

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www.lumaa.info

Current Lab Members



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Alexander Morgan

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Chunyu Yuan

Graduate Research Assistant

Cecilia Beauchamp

High school research assistant

Current Projects



- CoSoD (Collaborative Song Dataset)
- pyAMPACT (Automatic Music Performance Analysis and Comparison Toolkit)
- Incorporating Domain Knowledge into Deep Learning Models
 - Automatic Chord Estimation
 - Bioacoustics
- Analysis of Speech and Singing from People Living with Communication Disorders

CoSoD (Collaborative Song Dataset)



- 331 multi-artist collaborations from the 2010–2019 Billboard “Hot 100” year-end charts
- Currently Available Annotations
 - Formal sections
 - Artist information: Gender, Functional Role, Vocal Delivery
 - Automatically Estimated Features: f_0
 - Annotated Mixing Features: Environment, Layering, Width
- Work-in-Progress Annotations
 - Note segmentation (to facilitate analysis with pyAMPACT tools)



Michèle Duguay
Harvard University



Kate Mancey
Harvard University

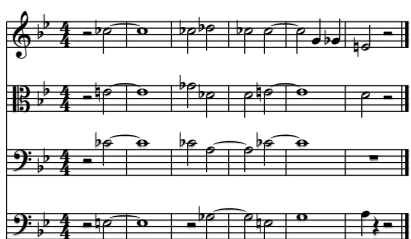


Leo Burke-Rench
Undergraduate Research Assistant

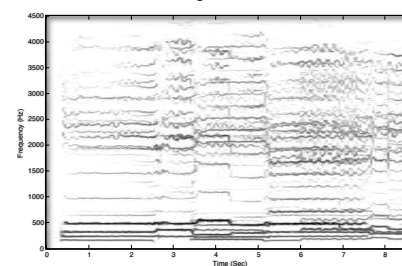
pyAMPACT

- Reimplement of MATLAB-based Automatic Music Performance Analysis and Comparison Toolkit

Symbolic Representation

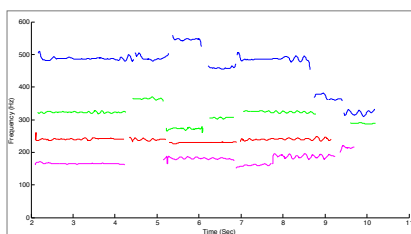


Audio Representation

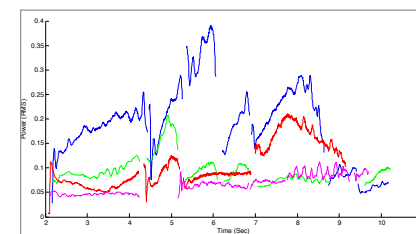


Alignment

Note-wise f_0 estimations



Note-wise power estimations



Daniel McKemie

Graduate Research Assistant



Alexander Morgan

Research Associate

pyAMPACT

- pyAMPACT estimates a variety of performance parameters from the note-wise f_0 and power estimates
 - Pitch: perceived pitch, vibrato rate and depth, jitter, f_0 slope and curvature
 - Loudness: Perceived loudness, shimmer
 - Timbre: spectral centroid, slope, flatness, and flux,
- Note-level timing information is available from the symbolic-audio alignment
- Note-level performance data can be exported to either Humdrum's kern format or MEI



Daniel McKemie

Graduate Research Assistant



Alexander Morgan

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pyAMPACT



- pyAMPACT can also import score-event aligned harmonic annotations to Humdrum
- This works for underspecified symbolic representations (e.g., transcriptions) as well as full scores

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<score>
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      <layer>
        <note
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  </section>
</score>
```

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        60159061638382, 418.73664891143341, 418.47482327276629, 417.11096
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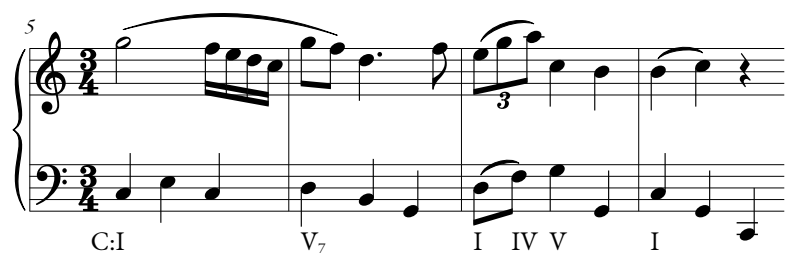
Cecilia Beauchamp

High school research assistant

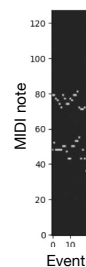
pyAMPACT

- pyAMPACT also facilitates multi-modal symbolic-audio analysis
 - Symbolic data is imported via music21
 - Unlike music21's tree representation, pyAMPACT represents symbolic data as a series of Pandas Dataframes that are more compatible with spectral representations of audio

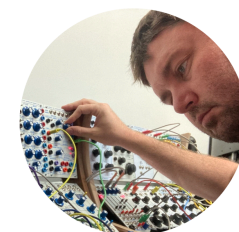
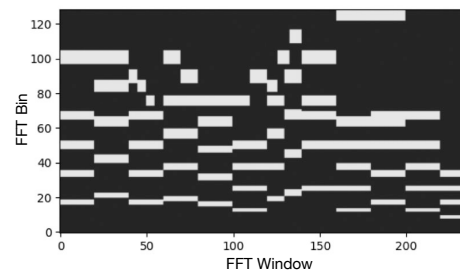
Symbolic Representation



Piano Roll



Spectrogram-like Mask
(from Dan Ellis' note2mask)



Daniel McKemie

Graduate Research Assistant



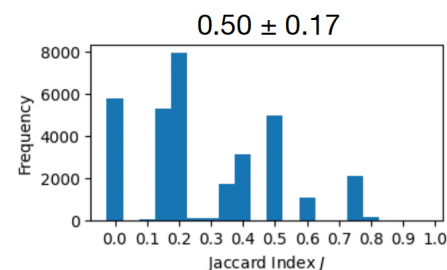
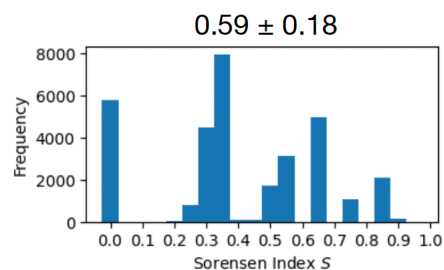
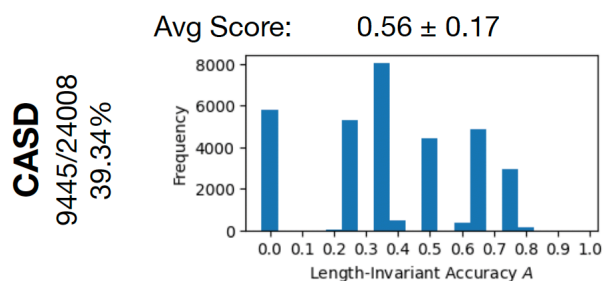
Alexander Morgan

Research Associate

Automatic Chord Estimation



- Multi-label pitch-class formulation
- Metrics that capture the overlap between pitch-classes - particularly informative cases of root disagreement



- Loss functions that leverage the multi-class/multi-label structure
- Incorporating domain knowledge from pedagogical texts
 - Art Music (Western Common Practice Tradition)
 - Popular Music (Western Rock Music)



Rebecca Moranis
Graduate Research Assistant



Ji Yeoung Sim
Graduate Research Assistant



Christof Weiß
University of Würzburg



Chunyu Yuan
Graduate Research Assistant

Bioacoustics



- Goal is to analyze large volumes of soundscape data from autonomous recording networks installed in Arctic North Slope Alaska
- Currently expanding supervised CNN-based model trained on the classes in the EDANSA to predict un/under-labeled bird species
- Experimenting with utility of codified domain knowledge in this task (such as the descriptions of bird sounds in World in Birds)
- Evaluating the best way to model the domain knowledge with an LLM and provide this information to our existing supervised audio model



Michael Mandel
Meta



Enis Berk Çoban
Graduate Research Assistant

Speech/Singing Analysis



- SingWell - large-scale project assessing the benefit of group singing for people living with communications disorders (e.g., aphasia, Parkinson's, stuttering)
- Starting to examine which acoustic features estimated from speech and singing can be used to predict
 - stress levels, measured by salivary cortisol levels
 - quality of life ratings, provided by participants

SSHRC  CRSH



Anastasiya Gousseva

*Former Undergraduate Research
Assistant*