

Collaborative Poster Session

Project Structure, Design, and Management

CosmoNote: Visualizing expressive music information layers and public engagement in annotating performed music structures

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Abstract

Music listening is a ubiquitous activity for most people. Music is communicated through performance; performers introduce acoustic variations to help listeners parse the music through segmentation and prominence. Such structures are widely studied from a computational point of view. Humans are able to abstract subtle, but important aspects of the structures conceived and shaped by the performer(s). CosmoNote is a citizen science tool to aid in the study of such performed structures. The interface provides representations of music along with custom visualizations of its prosodic and harmonic features. It enables users (non-musicians and musicians alike) to identify and mark music structures in performance, with training videos and examples. Attendees will learn about the CosmoNote platform, see annotation examples, and learn about performed music structures such as boundaries, transitions, groupings and tipping points.

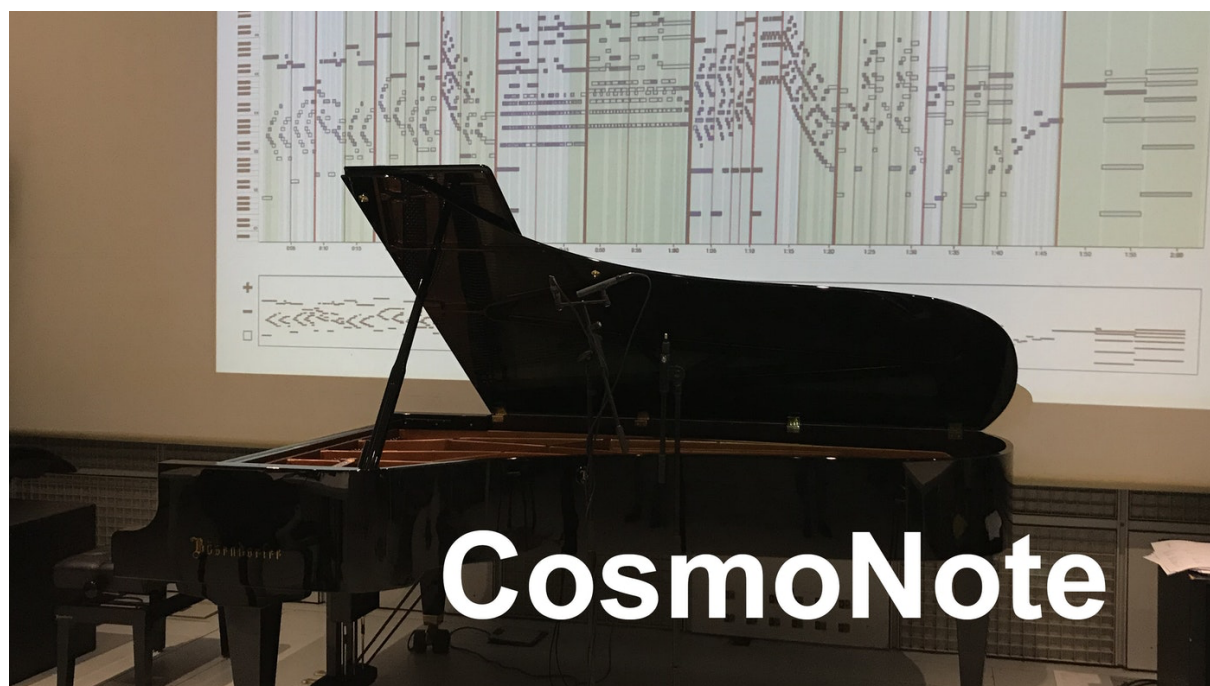


Figure 1 - Photo of the Bösendorfer disklavier at IRCAM with a projection of CosmoNote in the background

What is CosmoNote?

CosmoNote is a web-based interface that allows participants to explore the musical universe by listening to, and annotating structures found in performed music (Fig. 1). Any person able to hear acoustic variations who is over the age of 18, with or without formal music training,

can enjoy recorded music while helping researchers understand how musical structures are scripted by the composer, shaped or altered by the performer, and perceived by the listener.

What are structures in performed music?

We all know that music is a primarily auditory art form. Music research usually focuses on the study of music in its written representation: the score. However, it is music performance that transforms the score to sound. There are many subtle, but important choices that a performer makes to which the audience can pay attention, and use to expand and deepen their enjoyment of a live performance. These decisions shape the sound that emanates from the instrument. The acoustic variations introduced in expressive music performance are critical for analyzing and understanding music. It is also key for making annotations in CosmoNote.

CosmoNote interface elements

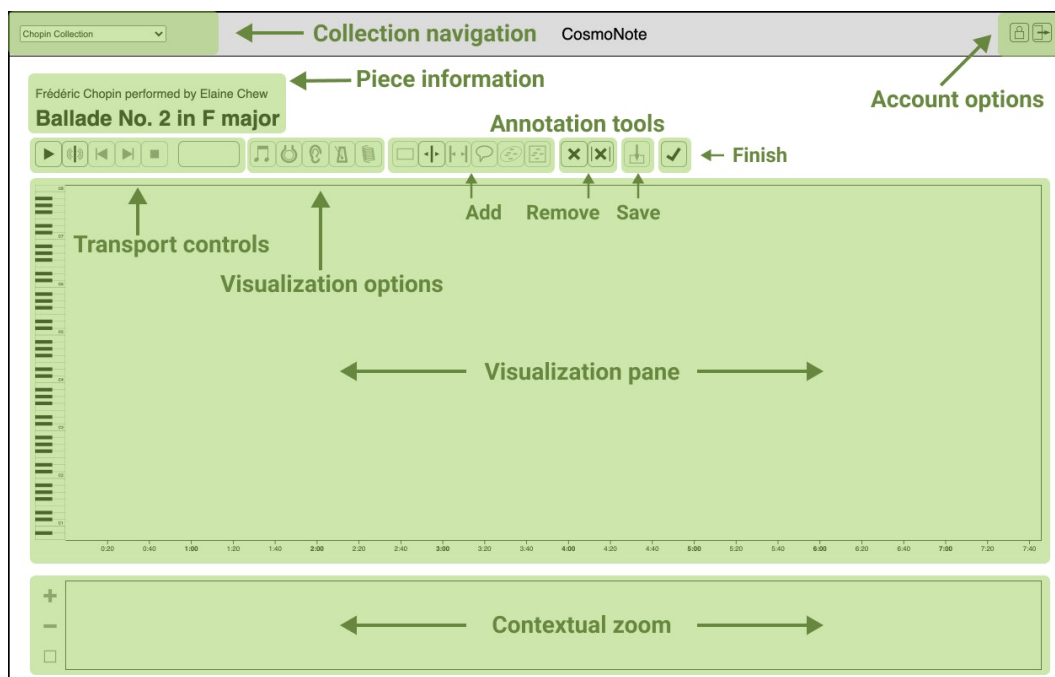


Figure 2 - Elements of CosmoNote's main interface

CosmoNote (Fig. 2) is a single-page application, i.e., its code is updated dynamically, rewriting what the participants see by fetching data from a server. The most important part of the page is the Visualization pane. The interface is capable of displaying visualizations of musical features synchronized with the audio of the piece being annotated.

Expressive Music Features

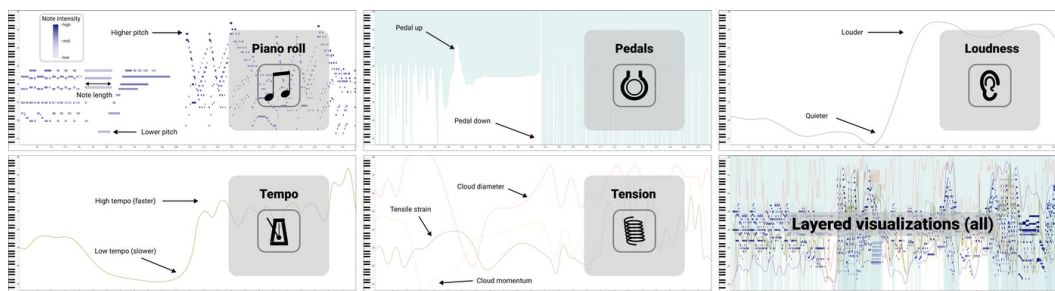


Figure 3 - CosmoNote's expressive music features visualizations

CosmoNote presents visual representations of the music information and its expressive features. There are five main visualizations (Fig. 3) that show complementary information about the music that can be combined in layers.

MIDI (pitch and duration): Shows a piano roll representation giving the notes and their intensity over time.

Pedals: Depicts the pedal use; pressing the pedals while playing piano changes the sonority and timbre of the sounds produced by the instrument.

Loudness: Represents the perceived intensity of the recorded sound, i.e., how soft or loud the music is.

Tempo: Shows changes in the speed (tempo) of the music as they occur.

Harmonic tension: Provides measures of dissonance, chord change rate, and deviation from the global key, which are linked to harmonic tension.

These representations are intended to help the listener to recognize prosodic cues like stress, rate, pause(s) while marking annotations.

Prosodic elements in music

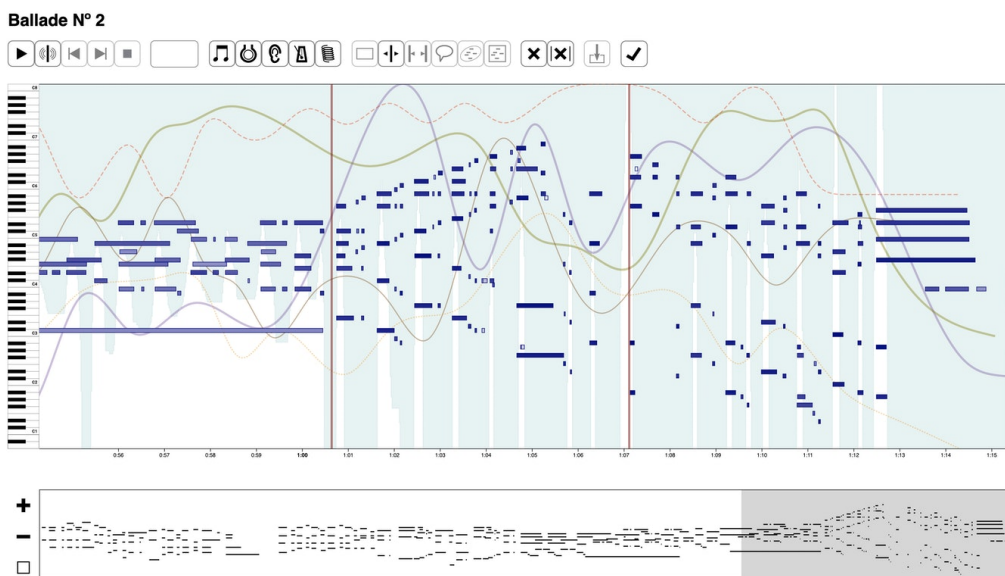


Figure 4 - Example of Chopin's Ballade No. 2 being annotated in CosmoNote

The performer manipulates the expressive features (Fig. 4) described above to create prosodic cues in music. These cues include:

Rate/tempo: The rate or tempo is the speed or pace of a piece of music, and is usually measured in beats per minute.

Pause(s): Pauses before, during, or after a musical event can be a tool for separating musical elements or for expressive effect.

Stress/accents: Stress is the emphasis placed on an element to make it more salient than those around it. Musically, it can be achieved by an increase in loudness or duration, or a change in timbre.

Annotating with CosmoNote

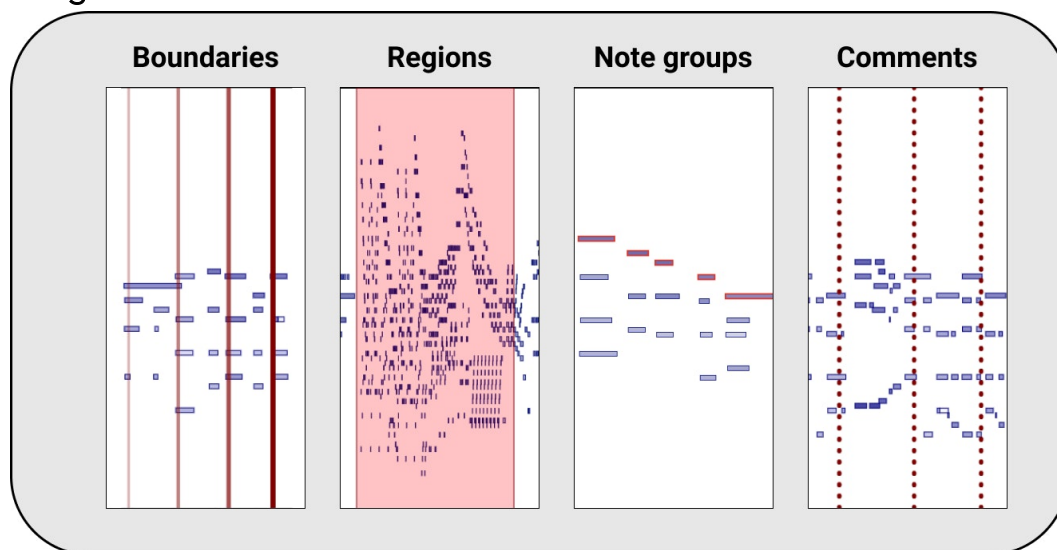


Figure 5 - CosmoNote's annotation tools

Anyone with an internet connection can interact with the CosmoNote interface and access and use four types of annotation tools (Fig. 5) anywhere in the timeline:

Boundaries: Vertical lines marking different degrees of separation between musical ideas applied by clicking the mouse on the visualization window or by pressing the 1,2,3,4 keys while audio is playing.

Regions: Time segments marked by selecting a start and end time with the mouse.

Comments: Dotted lines are created anywhere on the timeline with accompanying text comments or labels.

Note groups: Individual notes can be selected by clicking on them. To mark a note collection, select the grouping icon before selecting the notes, then click on the exit grouping icon when finished.

Future Work

Following local tests and pilot experiments, CosmoNote will be launched worldwide. Citizen scientists will be recruited from around the world to help inform studies on the shaping and perception of performed music.

Collections

Campaigns featuring curated collections that focus on specific themes will be launched periodically. We will inform you of what is coming soon.

Features

Development plans include visualizations of aggregated annotations to show participants how their annotations compare to those of their peers, once they have finished annotating a given collection.

Questions for discussion

Do you love music? How actively do you listen to music? Do you find yourself chunking the music? Do you pay more attention to certain parts of the music? Do you know why?

Enter CosmoNote

Before its official launch, CosmoNote is only available to a closed group of people. We have created a guest account for you to enter and see some of the content that will be available at launch. You will have to authenticate using the following credentials:

Login: posterGuest

Password: poster2021

<https://cosmonote.ircam.fr/>

Play around with the tools and get to know CosmoNote at your own pace!

Keywords

music performance, citizen-science, annotation

Acknowledgments



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