Music Visualization: Seeing La Folía

ECS 163 Final Report
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- Data

With the purpose to "see" the music piece La Folía while listening to it, we explored and processed the La Folía MIDI data, then created a interactive visualization system. The original MIDI data exported from the MuseScore database is then processed from a binary encoded music data file to a JSON file and a CSV file. Our goal is to visualize La Folía in deep along with a music play.

- Visualization Proposal

We initially planned to create a Radial scatter plot which introduces the music piece based on information of each music node, a Tonnetz visualization plot which shows detailed music texture information for professional analyzation, and an Arc diagram which describes the whole structure of the music piece.

- Implementation Processes

During the implementation processes, the Tonnetz visualization was discarded. Besides that, the audio player was sort of deprecated. Our progress bar of our audio

player did not match the node we were showing, though it was still usable to suggest vague range of current nodes. The reason is that MIDI standard is not designed to be a file structure but rather for communication between MIDI devices. Because of its unique definition of time, it is extremely hard to map its time to corresponding playback time in seconds in javascript. Basically, to make the audio player function work with correct mapping means to write a MIDI player (which is not supported by modern browser) from scratch for web frontend, and we simply did not have enough time to achieve that. Other visualizations maintained functionally and the designs did not change through project.

- Update Processes

The Tonnetz visualization was replaced by a modified Line chart, for the Tonnetz visualization doesn't make much sense for audience who is not professional with musical background. Thus, instead of visualizing professional music information, we chose to implement a line chart like graph that shows the melody contour and music gestures (shape of melody).

- Final Visualization System

The final visualization system contains a Radial scatter plot, a Line chart, and an Arc diagram (See Figure 1). Three features were covered in our design: data filtering, data selection interaction and animation.

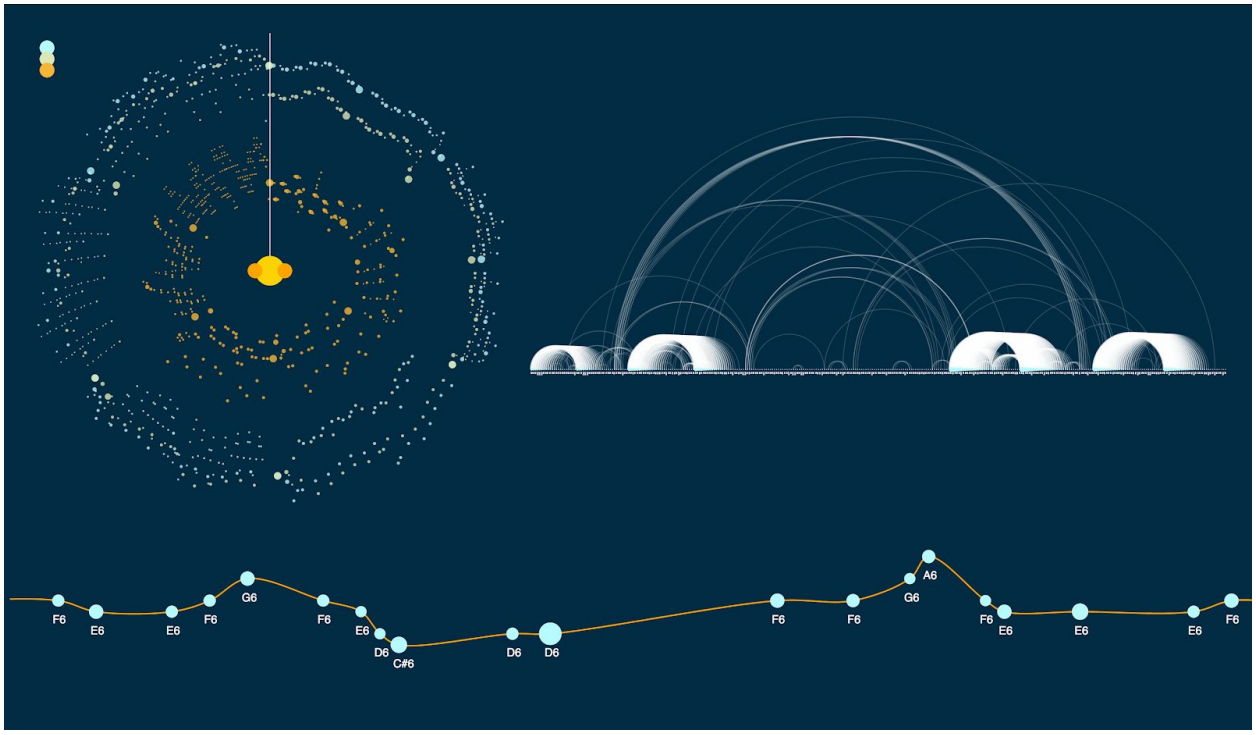

Figure 1: Visualization System Overview

The Radial scatter plot is placed at the left top as an overview of the Music Visualization System (See Figure 2). Color hues map to different tracks of this music piece, while polar coordinates radius maps to each music note pitch whose angle represents its play time. The radius of each circle is related to their play duration. The white line is implemented for the media player as a mimic traditional progress bar. Three solid circles at the center are the audio control units. The yellow one in the middle is the play/pause button, while the other two is used respectively for skipping 10 seconds ahead or behind. Volume filters are implemented as three same-size solid circle on the top left. Clicking on any one mutes the corresponding track. All music nodes are deeply explained by a detailed tooltip to show their pitches and instruments and hovering would also

highlight all notes with same pitch, and clicking on any leads to updates in other two visualizations for corresponding track and highlight all notes of clicked track.

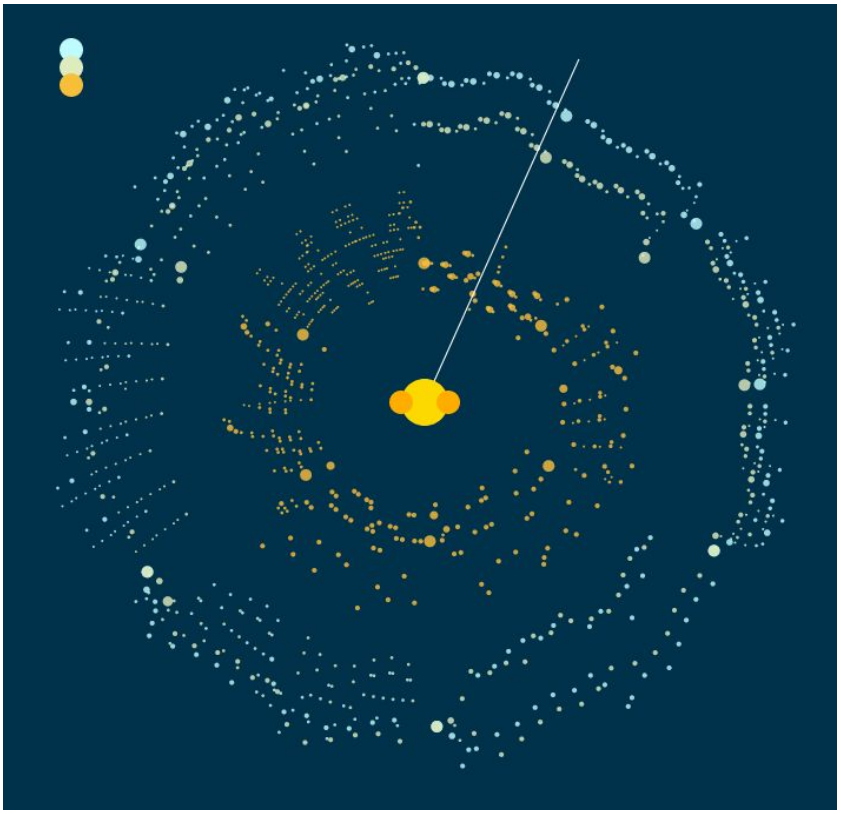

Figure 2: Radial Scatter Plot

The Line chart at the bottom includes a path showing melody contour of a selected track (See Figure 3 and 4). In this visualization, y coordinates map to the vertical pitch order and x coordinates map to the current music playback time. Current audio progress could be seen on this graph along with the white line's movement.

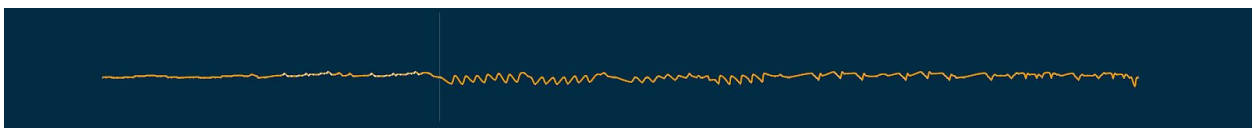

Figure 3: Line Chart

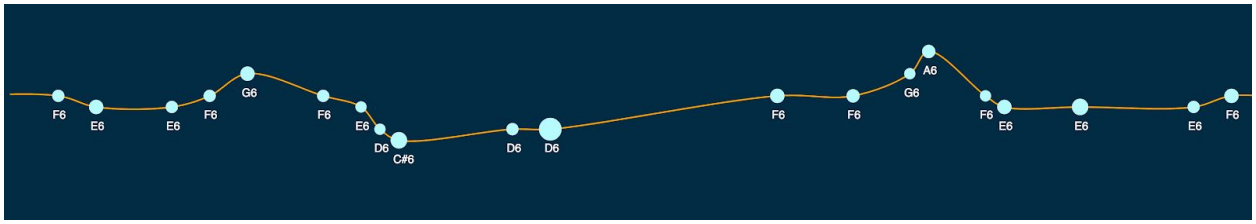

Figure 4: Line Chart with Zoom-in

The Arc diagram next to the Radial scatter plot is to show given track at the meanwhile showing the overall structure of the music piece (See Figure 5 and 6). Hovering mouse on a note would highlight arc and other notes that related to the selected note, and hovering on arc would highlight the actual notes on the scatter plots to revel actual music content of this particular substructure.

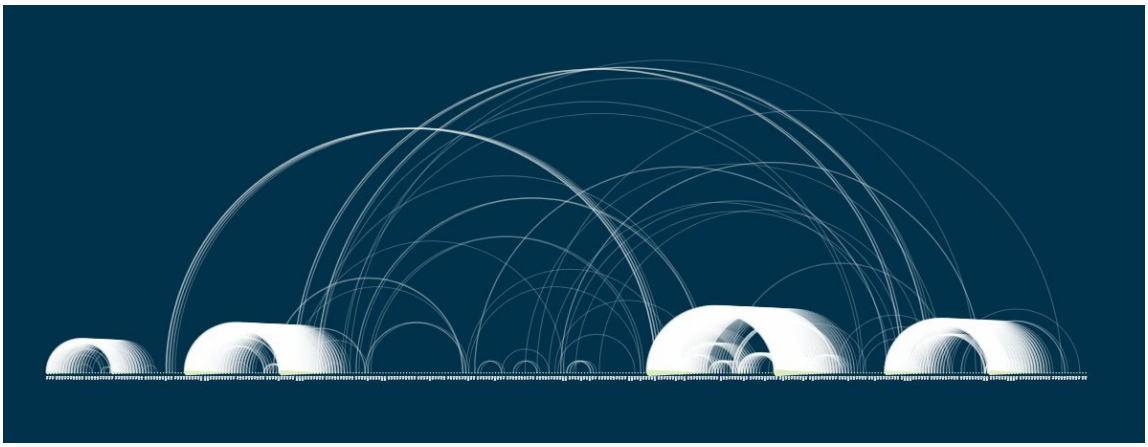

Figure 5: Arc Diagram

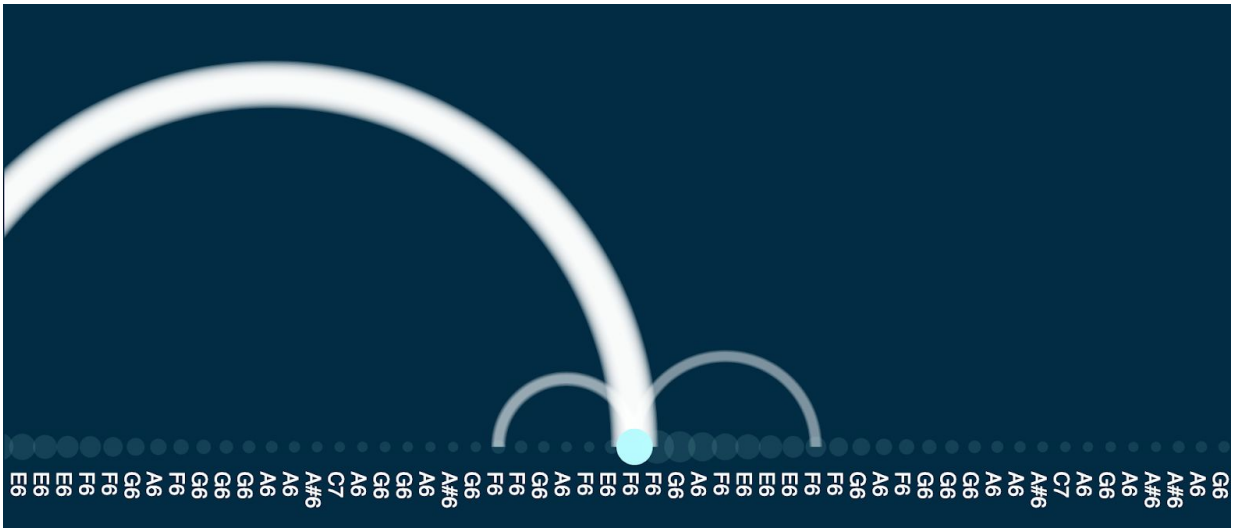

Figure 6: Arc Diagram with Zoom-in and Hovering

The current interactions allow users to explore La Folía as if they were playing a Youtube music piece but in a more detailed way which displays the music's inner creativities. A simple try on this visualization system is to click on any filter circle then the yellow play circle on the Radial scatter plot, which leads to actual playing of La Folía (without muted track(s)). Clicking the yellow circle again pauses the playing, and, moving the white line changes playback time position of playing this part of La Folía. After the track selection step in the Radial scatter plot, Line chart gets updated while the music goes on showing specific melody contour, and, Arc diagram get updated.

- Group Work

All members contributed to this project with great efforts. Qianrui and Liya focused on preprocessing of data and Kirby contributed to the basic functions of visualization. Follow up detailed function design and actual coding is done by everyone in the group.