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Final Project Proposal

1. **The Big Idea:**

The main idea for this project is a song/music sentiment detector with a large visual component. We would like to break a song into its musical and lyrical components to determine the sentiment of both sections (considering notes, tone, tempo, and words) and then have a visual representation for the different emotions. For example, the visual component of this project could be a colorful shape. The sentiment of the lyrics would determine the shape while the sentiment of the actual music might be represented by different colors.

Our MVP would be a program that listens to a song being played through a microphone, and has a visual representation of the sentiment of the music that changes real-time as the song is played.

Another feature that we would like to enable is another visual component that relates to the sentiment of the lyrics; this might not necessarily be real time. We would like to make sure that the visuals are pretty, the colors and shapes gradient nicely from one to another, and to have minimal delay between the song being played and the visual component.

Our main stretch goal would be to be able to determine the lyrics of the song from the audio being played.

2. **Learning Goals:**

Becca: I'm still really curious about libraries. Python is capable so much, a lot that I'm not even aware of, so I would like to continue to learn about what it can do. In this project, that means incorporating some new libraries that I haven't used before and understanding their documentation.
Liz: Understand all of the code (make sure it is readable and well commented) that we write and the libraries we import both in the context of this project and their broader use.
Audrey: Make really organized and readable code, using the object-oriented features of Python to avoid re-writing code.
Cecilia: I'm really interested in learning more about visualizing an input in a smooth and appealing way. Also making sure I understand what the libraries we are using actually do.

3. **Implementation Plan:**

Because we're starting with analyzing the music stream in real time based on pitch and key, the first things we'll need to set up are a pyALSA function to detect the stream, and use a library like Aubio to determine the pitch. Next, we would convert the Aubio data into a function, which could be determined not only by the current profile of the music, but how it changed from the previous couple of profiles. Then, we'd have to implement the visualization, either by drawing shapes with something like PyGame, or drawing pretty graphs with something like ViolinPlot. After the visualization step, we could move on to implementing the lyrics portion, which would involve asking for user input around which song it was, and then using a lyrics website API to find the lyrics, and do sentiment analysis using Pattern. We would update the visualization portion of the code to include the new lyric data. The stretch goal, real-time detection of the lyrics, would involve removing the user input and lyrics website portion, and adding in functions to do the Audio Fingerprinting (maybe using the EchoNest API). We want to use a model-controller-view structure, where the music stream and the lyric detection could be controllers, the pitch and BPM data and their corresponding functions would be the model, and our visualization would be the view.

4. **Project schedule:**

Week	Tasks (maybe?)
1	Libraries, research, pairs; look into EchoNest; start wk2 work
2	Word and sound analysis
3	Finish analysis, start integration or visualization research
4	Finish integration of analysis parts
5	Visualization
6	Finish up code, write-up

5. **Collaboration plan:**

Our current plan is to split tasks up between peer program teams (there are 4 of us) so we can get basic implementation of our three main tasks: sound analysis of an audio, word analysis of lyrics, and visual representation of sentiment. We will probably end up doing some independent research to figure out how to implement these tasks efficiently. After getting basic implementation of the first two tasks we will work together to integrate them and then move on to visualization. If one pair finishes their analysis section before the other pair then they will either help that pair debug and/or move on to figuring out potential visualization implementations.

6. **Risks:**

We are concerned about how to work to the lyrics as well as how to actually determine the sentiment of the music(should we be looking at minor/major key, tempo, individual notes?? What makes a song happy or sad or mad??).

7. **Additional Course Content:** What are some topics that we might cover in class that you think would be especially helpful for your project?

-Refresher on good habits when using libraries