MUSI 2526: Intro to Audio Tech II
Spring 2024

Final Project

You and your partners (teams of ~3) will explore the topics of feature extraction, audio analysis, data science, and the various topics covered in this class since midterms. In this project, you will attempt to perform some kind of classification or prediction model based on feature estimation for a set of songs (that will be provided to you). You will share your complete workflow, including parameter choices and model design, and present your findings to the class. The complete analysis will be implemented in a Jupyter notebook with all the code to run it (except for the raw data). As with the midterm, the focus of this project is the implementation of the project—not the "accuracy" of your results. The "presentation" will again be a proof of concept. Your implementation and presentation should demonstrate your familiarity with signal processing and audio analysis, and should attempt to include caveats or notes regarding any shortcoming(s) of the approach your team decided on. You will demonstrate your understanding of the concepts in class through this analysis and presentation. Therefore, you should have a solid understanding of your groups' analysis/modeling system, and each member of the team should be able to explain any decision-making processes regarding feature selection or optimization to the class.

As with midterms, code will go through plagiarism review. Be sure to write your own code.

You will choose one of the following MIR tasks:

1) Genre classification
2) Key estimation
3) Tempo estimation

Regardless of the task you choose, you should ultimately have *multiple models* (i.e., models with different parameters or parameter choices, different thresholds, etc.) You will then use the models' predictions cumulatively in some way to "optimize" the outcome (of matching the ground truth.)

Collections of audio will be provided for each task (you should estimate that you will need up to 1G of space for this audio!)

Deliverables:

- All code used, with accompanying pseudo-code explanations of ALL self-defined functions and processing.
- Summary of models as a table, list, or bullet-point of all features used and the parameters/choices/thresholds/etc. for each model, with a brief explanation of your choices (as necessary).
- Clear explanation of any custom functions

- Graphs (or some kind of visualization) of relevant results (and intermediate steps, if appropriate), e.g.,
    - Tempo distributions
    - Key distributions
- Visualizations of your final model's accuracy, e.g.,
    - Confusion matrices
    - Scatterplots, bar plots, etc.
- Evaluation of your model against some kind of "naïve" model (e.g., random chance).
- In person presentation (Monday, Apr. 29)

Grading:

- Fulfillment of all deliverables (including visualizations) and code functionality, including proper documentation and explanation of code (all functions, arguments, parameter selection, etc.) – 30%
- Evaluation (results have been appropriately evaluated) – 10%
- Efficiency (of code) – 10%
- Effort and Creativity – 20%
- Demonstration of understanding of concepts – 20%
- Presentation (clarity, effort, comprehensiveness) – 10%