Problem Statement and Goals
ProgName

Team #, Team Name
Student 1 name
Student 2 name
Student 3 name
Student 4 name

Table 1: Revision History

Date	Developer(s)	Change
Date1	Name(s)	Description of changes
Date2	Name(s)	Description of changes
...	...	...

1 Problem Statement

[You should check your problem statement with the problem statement checklist. —SS]

[You can change the section headings, as long as you include the required information. —SS]

1.1 Problem

1.2 Inputs and Outputs

[Characterize the problem in terms of "high level" inputs and outputs. Use abstraction so that you can avoid details. —SS]

1.3 Stakeholders

1.4 Environment

We strive to launch an on-premise server operating with a version of Ubuntu server, likely the most recent version, 24.04.1. The server shall respond to and

process requests from a web-application front-end, making the service accessible to many different devices, but requiring a network.

2 Goals

Goals	**Importance**
The system shall adequately process and respond to requests involving widely-published music genres, e.g., pop, hip-hop, and rock.	Widely-published music genres have the largest corpus of data that can be used to train the featurization and generation mechanisms of the system, i.e., the system must perform favourably in tasks that it is well-trained on.
The system shall generate tabular features that correspond to characteristics of the input song (snippet), akin to those of Spotify, e.g., danceability, instrumentalness, and energy.	Structured tabular data can be rapidly process, making the task of song recommendation more efficient and song generation more explainable.
The system shall produce a list of songs that are similar to a single song provided or a collecetion of songs provided by the user.	This is a core feature of the system. Its inclusion should facilitate users to explore a music genre or "sound" of interest.

3 Stretch Goals

Goals	**Importance**
The system shall adequately process and respond to requests involving *not-as-widely*-published music genres, e.g., jazz, funk, and blues.	Such music genres have a smaller corpus of data that can be used for training, hence the system may not perform as favourably in tasks that it is not very well-trained on, but the inclusion of such genres would allow access to a larger user-group.
The system shall generate tabular features that correspond to characteristics of the input song's *cover art*.	Cover art tends to capture, however abstractly, the mood, energy, and intent of a song or album, thus may contain tacit information that can be accessed with image processing.

4 Challenge Level and Extras

The project is of a *general* challenge level.

- It requires domain knowledge about signal (audio) processing, music theory, learning models, generative models, and infrastructure setup.
- Its implementation is non-trivial, incorporating algorithm implementations, training and testing models, assessing their performance, automating the extraction- processing-storage workflow and the live-response workflow.
- The system is not particularly novel. Recommender systems are not new, but we are attempting to find and use features to create a better recommender system. The generative component has been done before with images and video, so scaling down to audio and frequency should be attainable, especially as it is a field that was researched quite deeply even before the advent of neural network-based generative techniques.

Project will include extras like user & API Documentation for ease of reference, usability testing for easy startup, and design thinking to build an intuitive user interface.

Appendix — Reflection

[Not required for CAS 741 —SS]

The purpose of reflection questions is to give you a chance to assess your own learning and that of your group as a whole, and to find ways to improve in the future. Reflection is an important part of the learning process. Reflection is also an essential component of a successful software development process.

Reflections are most interesting and useful when they're honest, even if the stories they tell are imperfect. You will be marked based on your depth of thought and analysis, and not based on the content of the reflections themselves. Thus, for full marks we encourage you to answer openly and honestly and to avoid simply writing "what you think the evaluator wants to hear."

Please answer the following questions. Some questions can be answered on the team level, but where appropriate, each team member should write their own response:

1. What went well while writing this deliverable?
2. What pain points did you experience during this deliverable, and how did you resolve them?
3. How did you and your team adjust the scope of your goals to ensure they are suitable for a Capstone project (not overly ambitious but also of appropriate complexity for a senior design project)?