

# **100 Loops - Deep Music Dive**

## **ITSC 3155 Final Project Report**

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## 1 Introduction

This project is inspired by some personal friends of ours who create pretty good music, yet have trouble getting connected to a record label. The idea of Deep Music Dive is to allow record labels to easily view analytics on currently trending music and artists in order to make an informed decision on what artist to sign. The project uses data collected on 160,000 songs on Spotify created from 1921 to present times. Using this data, record labels will be able to see what songs get interacted with by listeners. With this information, they can pick out promising artists to sign. By doing this, listeners will be exposed to high quality artists who normally would fly under the radar of record labels.

### 1.1 Product Vision

For Music record labels Who want to increase their profits and expand their audience base, Deep Music Dive is a web-based product that provides insight towards upcoming trends and artists using graphs, charts, and other power visualizations of data. The data will be displayed in an intuitive UI for easier understanding of large amounts of data. Unlike other data analyzer organizations, Deep Music Dive will provide unique data which can be accessed by multiple music record labels without being exclusive for one single company. Our product will help uncover obscure trends that provide deep perception about the music industry in a simplified and easy to understand manner.

### 1.2 Customer Description

Music Record Labels - Corporations who pick out artists and sign a deal to spread their brand in return for a portion of their profits. This could be through merch, distributing songs, promotion, etc

### 1.3 Project Scope and Objectives

The scope of this project will be to inform Music labels/Producers/Artists about upcoming trends and artists. This will be more than just an exposure platform because it will also help with predicting future trends and ideas.

The UI will contain many easy to read graphs and pre-analyzed data that will inform any viewer of their specific point. Producers will be able to check how other users are doing and projecting to see if they should sign them instead of them having to just be discovered randomly listening to music. Artists will be able to track how listeners like certain things and find new ways to incorporate that into their style. All in one app.

### 1.4 Ethical concerns

Deep Music Dive provides insight towards the song attributes to search for in the next big artist. Though the intent of DMD is to highlight popular song attributes to find upcoming artists, it can also serve as a disadvantage to other new artists' songs which don't follow the pattern and attributes provided by DMD. Therefore, Music Record Label companies can potentially deny the opportunity for undiscovered and talented artists.

## 2 Project Resources

- Source control (github)
- IDE (such as pycharm)
- Communication server
- Data file

### 2.1 Group Members

1. Tim Williams
2. Prasheeth Venkat Kumar
3. Cameron Stanley
4. Nathan Williams

### 2.2 Data

Data Source - <https://www.kaggle.com/yamaerenay spotify-dataset-19212020-160k-tracks>

The data source is a Spotify dataset that represents the track played on Spotify, songs ranging between the years of 1921 and 2020 with over 160K tracks. The dataset can be sorted through an artist, genre, and year perspective. Each perspective provides various aspects of the Spotify tracks such as acousticness, danceability, duration, energy, instrumentalness, liveness, loudness, speechiness, and tempo.

### 2.3 Hardware and Software Resources

- Source control (github)
- IDE (such as pycharm)
- Communication server
- Data file

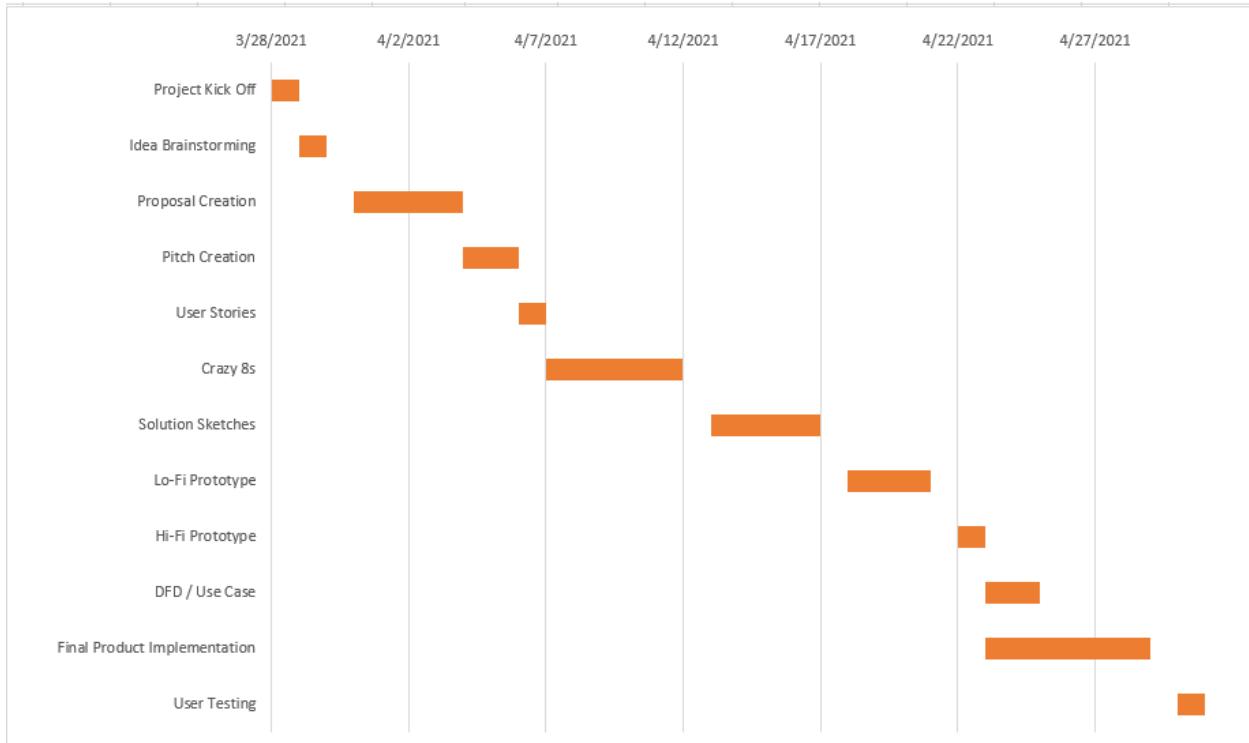
### 2.4 Special Resources

- Sklearn Python Machine Learning Package
- Pandas

## 3 Plan

This section contains is a list of tasks and deliverables associated with the project, a Gantt chart depicting task durations, dependencies and completion dates, and a summary of resource requirements and assignments for each task.

### 3.1 Timeline Chart



### 3.2 Task/Milestone Descriptions

**Project Kick Off:** Project Kickoff consists of putting together our team and settling on a way to communicate and work together. Ideas for the project should start to form.

**Brainstorming:** Each member of the group looks through data sets, gathering ideas about what the project can be on. Members should write down their favorite idea and prepare it for sharing with the rest of the group.

**Proposal:** Members of the team prepare a written proposal and share it with the rest of the group. All members of the group will then vote on which data set to use for the project

**Pitch:** Members of the group record a pitch on their take on the project. In the pitch, they will talk about what the product would do, who it is for, and how it would benefit the target customer. They will go into detail about how it is different from other existing products and how exactly the product functions.

Members will then view each other's pitches and vote on which idea is the best.

**User Stories:** As a team, members will think of things that the target audience might want to do with the product. They will then write these down in a "As a .... I would like to...." format.

**Crazy 8s:** Members will each make quick 8 minute drawings on how they feel the UI should look for the product. They will draw all of the ideas that they can think of and pick one that they like the most.

**Solution Sketches:** Members will take their favorite ideas from the crazy 8 exercise and sketch them. This time instead of having 8 minutes to draw, they will have unlimited time. Once everyone has put their best ideas into a drawing, members will send their drawings to one another and vote on which design they like best. This design will then be used for the final project's UI.

**Lo/Hi Fidelity Prototypes:** As a team, members will create both a low fidelity prototype and a high fidelity prototype of the product. The low fidelity prototype will consist of a visual representation of how

the UI will look. This prototype will not have any interaction. The High fidelity prototype will be like the low fidelity prototype, except using figma to incorporate intractability.

**DFD / Use Case Diagrams:** As a team, members will work together to create a Data Flow Diagram (DFD) and a Use Case Diagram. The Use Case Diagram will show how different processes interact with actors inside the system. It will also show what processes are needed for other processes to function. The DFD will showcase how data flows through the system in order to function.

**Implementation:** As a team, members will implement the final product. This will be based on the prototypes that were created previously.

**User Testing:** The product will be shared with a group in order to get feedback and determine if any changes need to be made. If so, those changes will be made and then the product will be considered complete.

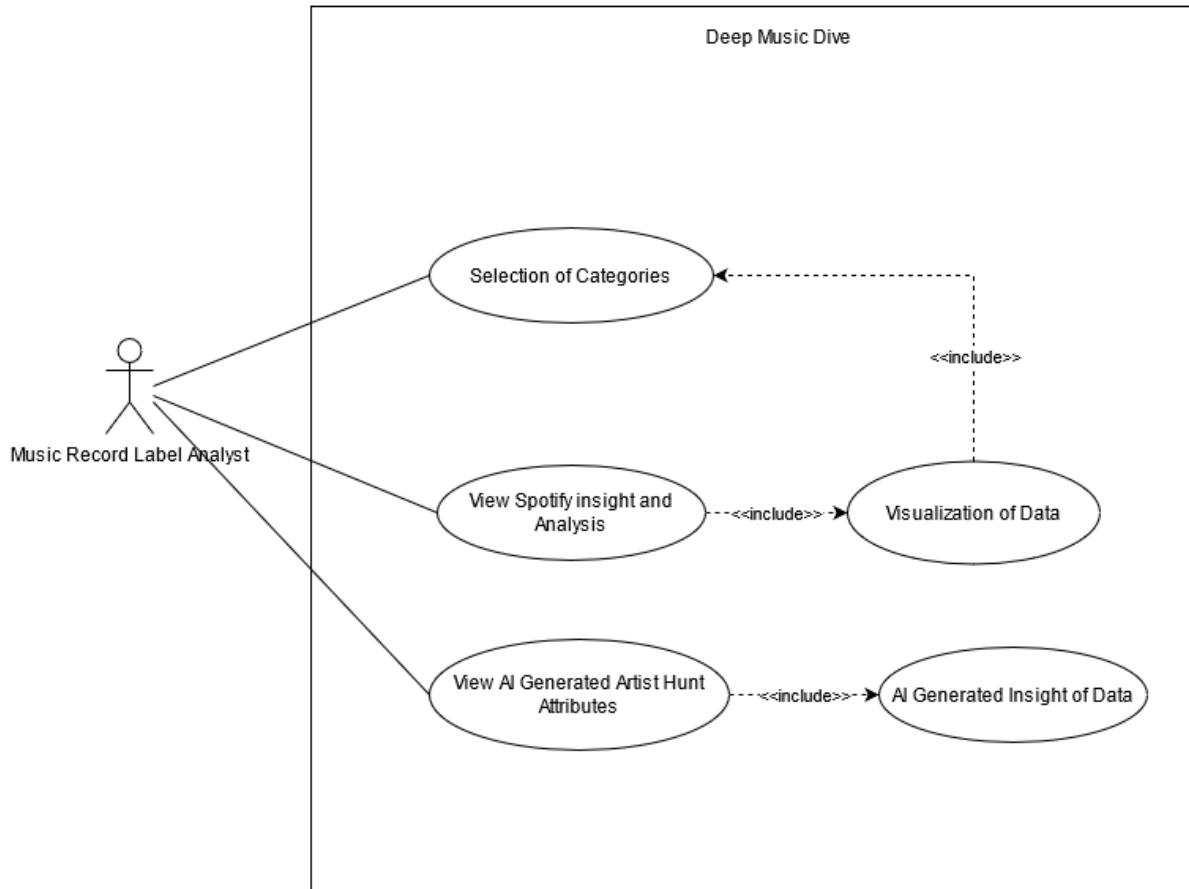
### 3.3 2.3 Resource Table

Task	People
<b>Brainstorming</b>	Tim Williams Prasheeth Venkat Kumar Cameron Stanley Nathan Williams
<b>Proposal</b>	Tim Williams Prasheeth Venkat Kumar Cameron Stanley Nathan Williams
<b>Pitch</b>	Tim Williams Prasheeth Venkat Kumar Cameron Stanley Nathan Williams
<b>Crazy 8</b>	Tim Williams Prasheeth Venkat Kumar Cameron Stanley Nathan Williams
<b>Solution Sketches</b>	Tim Williams Prasheeth Venkat Kumar Cameron Stanley Nathan Williams
<b>User Stories</b>	Nathan Williams Tim Williams
<b>Lo-Fi Prototype</b>	Nathan Williams

	Prasheeth Venkat Kumar
<b>Hi-Fi Prototype</b>	Nathan Williams Prasheeth Venkat Kumar Tim Williams Cameron Stanley
<b>DFD Diagram</b>	Prasheeth Venkat Kumar
<b>Use Case Diagram</b>	Nathan Williams
<b>Final Product Implementation</b>	Cameron Stanley Nathan Williams Prasheeth Venkat Kumar Tim Williams
<b>User Testing</b>	Cameron Stanley Nathan Williams Prasheeth Venkat Kumar Tim Williams

## 4 System Design

### 4.1 Use Case Diagram



### 4.2 System Analysis Use Cases (possible extra credit)

Use Case Name:	Selection of Categories
Actor(s):	Music Record Label Analyst
Summary Description:	Music Record Label Analyst wants to select a certain category to view visual analysis
Priority:	High
Status:	Medium level of detail

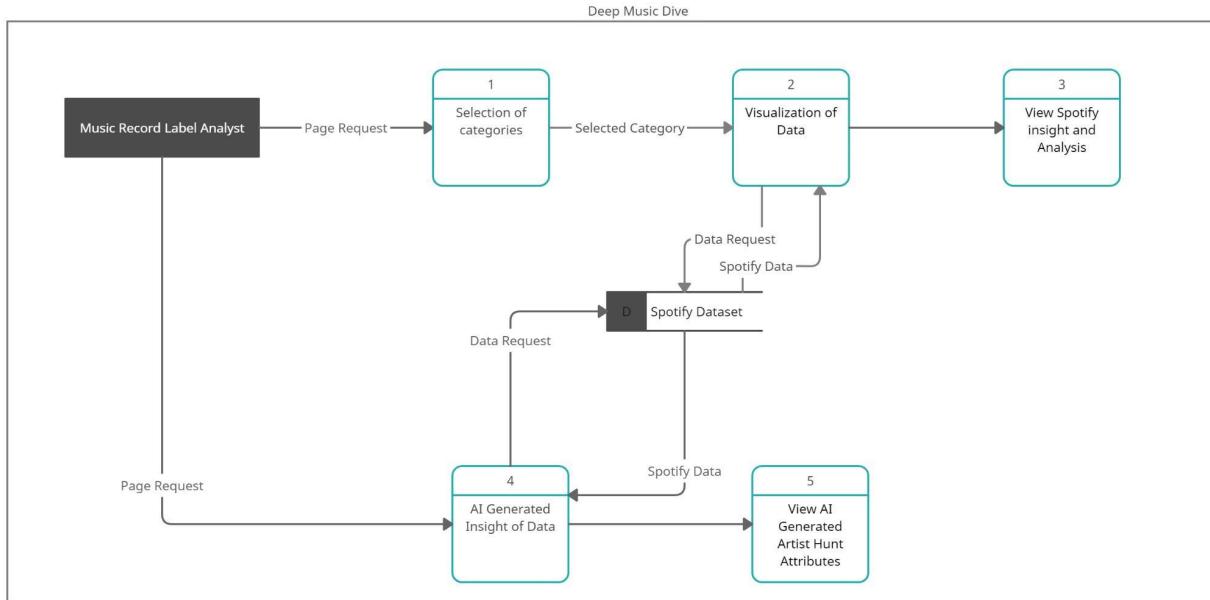
Pre-Condition	<ul style="list-style-type: none"> <li>The DMD website is available to the music record label analyst.</li> </ul>
Post-Condition	<ul style="list-style-type: none"> <li>The data of the category selected is processed and visualized</li> <li>The processed and visualized data is presented to the user on the website.</li> </ul>
Basic Path:	<ol style="list-style-type: none"> <li>“Music Record Label Analyst” sends a “page request” to “selection of categories”</li> <li>“selection of categories” sends “selected category” to “Visualization of Data”</li> <li>Visualized data is presented in “View spotify insight and analysis”</li> </ol>
Alternative Path:	N/A
Business Rules:	N/A
Non-functional requirements	N/A

Use Case Name:	View Spotify Insight and Analysis
Actor(s):	Music Record Label Analyst
Summary Description:	Customer wants to view the generated spotify insight and analysis
Priority:	High
Status:	Medium level of detail
Pre-Condition	<ul style="list-style-type: none"> <li>The DMD website is available to the music record label analyst.</li> <li>The data of the category selected is processed and visualized</li> </ul>
Post-Condition	N/A
Basic Path:	<ol style="list-style-type: none"> <li>“Music Record Label Analyst” sends a “page request” to “selection of categories”</li> <li>“selection of categories” sends</li> </ol>

	<p>“selected category” to “Visualization of Data”</p> <p>3. Visualized data is presented in “View spotify insight and analysis”</p>
Alternative Path:	N/A
Business Rules:	N/A
Non-functional requirements	N/A

Use Case Name:	View AI Generated Artist Hunt Attributes
Actor(s):	Music Record Label Analyst
Summary Description:	Music Record Label Analyst wants to learn about song attributes that they should look for in their targeted artists' songs
Priority:	High
Status:	Medium level of detail
Pre-Condition	<ul style="list-style-type: none"> <li>• The DMD website is available to the music record label analyst</li> <li>• AI generates insight of data</li> </ul>
Post-Condition	N/A
Basic Path:	<ol style="list-style-type: none"> <li>1. “Music Record Label Analyst” sends a “page request” to “AI Generated Insight of Data”</li> <li>2. “AI Generated Insight of Data” is presented in “View AI Generated Artist Hunt Attributes”</li> <li>3.</li> </ol>
Alternative Path:	N/A
Business Rules:	N/A
Non-functional requirements	N/A

#### 4.3 DFD diagram



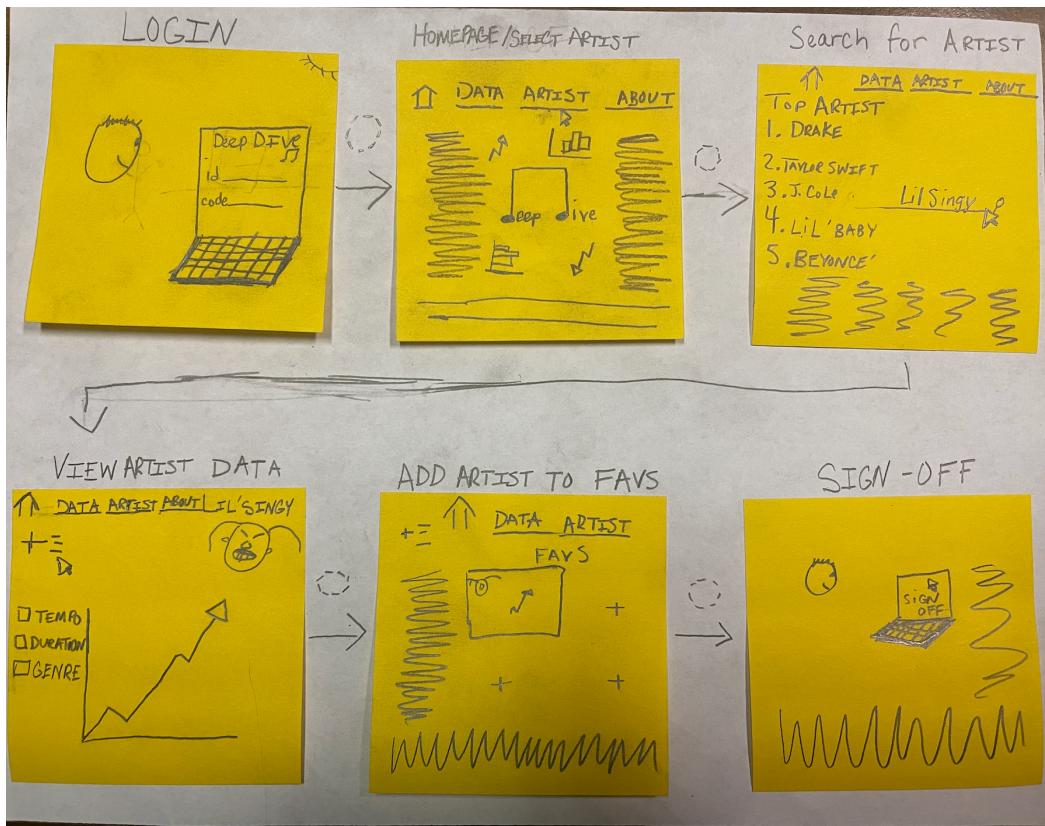
#### 4.4 User Stories

1. As a record label analyst, I want to see the relationship between dancability and popularity.
2. As a record label analyst, I want to see the relationship between genres and popularity.
3. As a record label analyst, I want to see the relationship between whether a song is acoustic and popularity.
4. As a record label analyst, I want to see the relationship between key signature and popularity.
5. As a record label analyst, I want to see the relationship between loudness and popularity.-
6. As a record label analyst, I want to see the relationship between tempo and popularity.
7. As a record label analyst, I want to be able to see the different data in different styles of graphs and charts
8. As a record label analyst, I want to be able to be able to get feedback on what attributes I should strive for when picking out an artist to sign
9. As a record label analyst, I want to be able to cross analyze different song attributes

#### 4.5 Feature List

- AI Generated Artist Hunt Attributes
- Clean and Intuitive UI
- Interactive Graphs and Charts
- Selection of desired data to be viewed by user
- Breakdown of trends in data
- Easy to use navigation bar

## 4.6 Storyboard



## 5 Prototyping (possible extra credit)

### 5.1 Low Fidelity Prototype

Home Visual Analysis Attribute Analysis

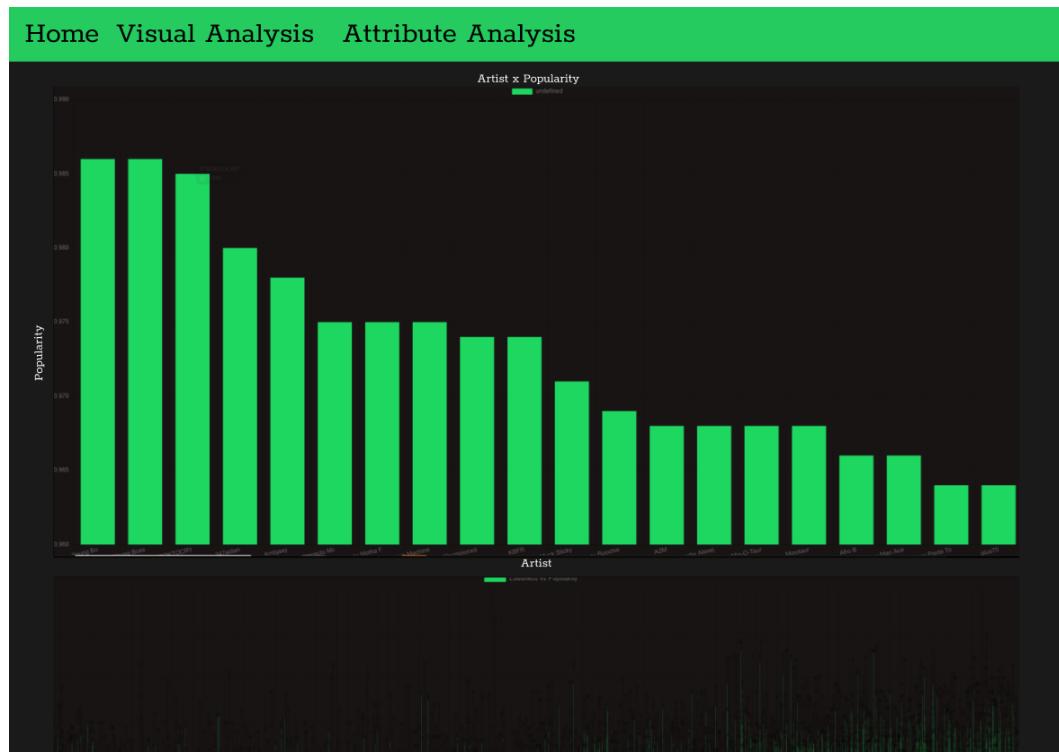
# Deep Music Dive

## Welcome!

Deep Music Dive is a web-based product that provides insight towards upcoming trends and artists using graphs, charts, and other power visualizations of data. Here you can view trends in the music industry and use that information to pick out the next big artist.

## How to Use

Click on the Tabs above to get started. Visual Analysis will show you charts and graphs comparing the popularity of an artist to attributes of their songs, such as danceability, loudness, etc. Attribute Analysis will show you AI generated attributes that are associated with the most popular artists.



## Attributes to target in songs:

### Description

When trying to find the next big artist, it's important to analyze the attributes present in their songs. Through machine learning, the attributes above have been generated for ideal popular songs. It would be advisable to follow the pattern presented by the attributes to check if they match with the targeted artist's songs.

### Possible Attributes

- Acoustic / Non-Acoustic
- Danceable / Non-Danceable
- Loud / Medium / Quiet
- Slow/Medium/Fast Tempo
- Key Signatures

### AI Suggested Attributes

- Non-Acoustic
- Danceable
- Loud
- Medium Tempo: 100
- Key of C

## 5.2 High Fidelity Prototype

<https://www.figma.com/file/wxNCeVlqtGNQJXp1ndG5nY/High-Fidelity?node-id=0%3A1>

## 6 User Tests

### 6.1 Test procedure

For this testing session, a group of four people were gathered. We gave them an early version of the website and told them to complete a task that is featured in a user story. We then monitored the testers to see how they performed the task. If a tester needed assistance in completing the task, we would give them small hints in order to see how much information they would need in order to complete the task. Results were recorded in a table that can be seen below.

### 6.2 User Test and Results

#	User Story	Test Results
1	As a record label analyst, I want to see the relationship between dancability and popularity.	Tester performed the action intuitively
2	As a record label analyst, I want to see the	Tester performed the action intuitively

	relationship between genres and popularity.	
3	As a record label analyst, I want to see the relationship between whether a song is acoustic and popularity.	Tester performed the action intuitively
4	As a record label analyst, I want to see the relationship between key signature and popularity.	Tester performed the action intuitively
5	As a record label analyst, I want to see the relationship between loudness and popularity.	Tester performed the action intuitively
6	As a record label analyst, I want to see the relationship between tempo and popularity.	Tester performed the action intuitively
7	As a record label analyst, I want to be able to see the different data in different styles of graphs and charts	User performed the action after minimal instruction. After telling the user to read the how to section of the home menu, they were able to complete the task.
8	As a record label analyst, I want to be able to be able to get feedback on what attributes I should strive for when picking out an artist to sign	Tester performed the action intuitively
9	As a record label analyst, I want to be able to cross analyze different song attributes	The ability to cross analyze different song attributes was not complete at the time of testing, so the user was not able to perform the task. This feature will continue to be worked on.

### 6.3 Conclusion

Out of the nine test cases, the tester performed seven of the tests intuitively without any assistance. On one of the tests, the tester clicked the wrong tab to see the data. We then told the tester to read the “How To” section of the homepage. After reading this section, the user was able to complete the task. While we don’t think this will be an issue for many users, it might be worth it to make the “How To” section stand out a bit more. An issue that we encountered was not having the ability to custom pick song attributes to cross analyze implemented. As a result, the tester was not able to complete the ninth test. We are working on completing this feature, so it should not be a problem in the final version of the website.

## 7 Lessons Learned

- Learned how to manage teams using Trello
- Learned further about how to operate sprints
- Learned about data visualization in different forms such as charts, graphs, etc

- Learned how to implement machine learning predictions to song data
- Learned how to implement agile method
- Learned better team cooperation

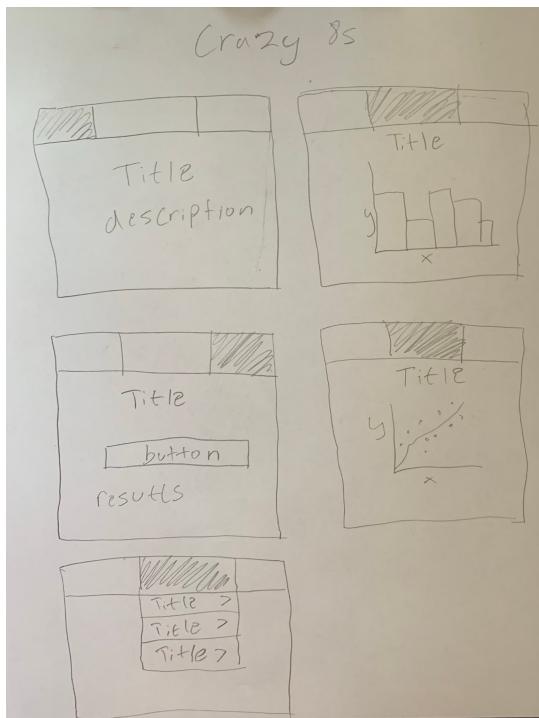
## 8 Future work

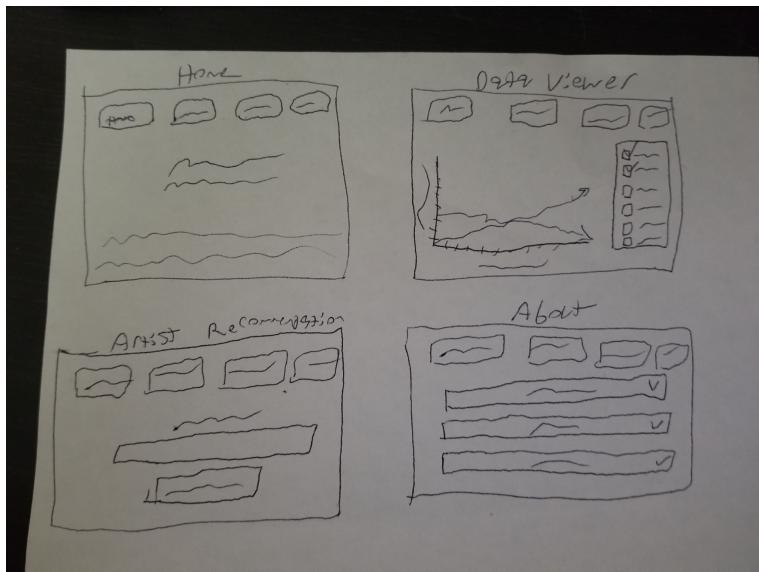
In the future, we will expand on what we already have implemented. One feature that can be added is an artist match feature that uses attributes generated from AI and finds potential matches out of every artist. We should also expand on the amount of data that we use. Currently, we are using 500 out of 60,000 artists to determine trends. We did this due to technological limitations of our website. In the future, we should be able to implement more data in order to get more accurate information and to help our machine learning algorithm find more accurate trends. We can also add more categories that are shown on our website. Categories such as liveliness, speechiness, etc. Lastly, we can expand our audience scope to artists themselves so that they can see what song attributes are trending and apply it to their works.

## 9 Appendices

### 9.1 Sketches

Crazy 8 Sketches:







### Solution Sketches:

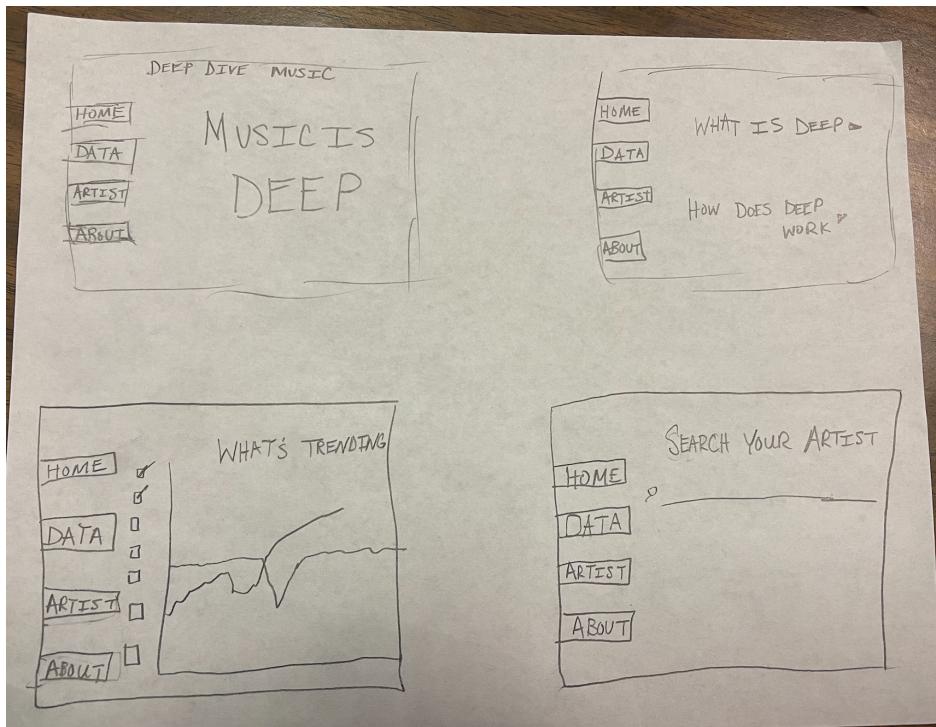
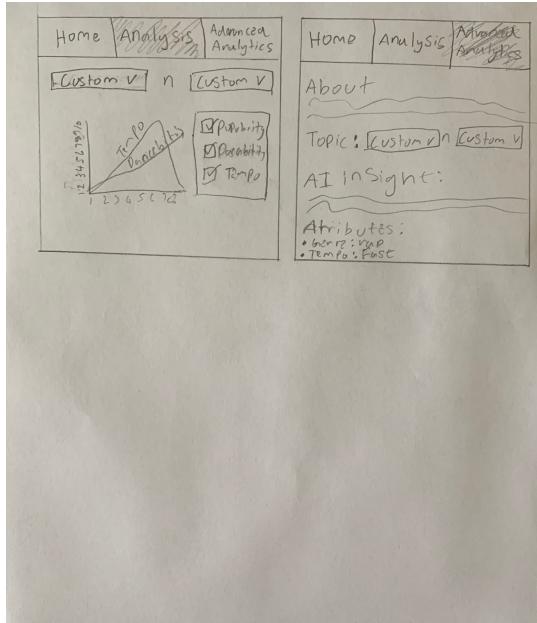
Prasheeth's Solution Sketch : DMD

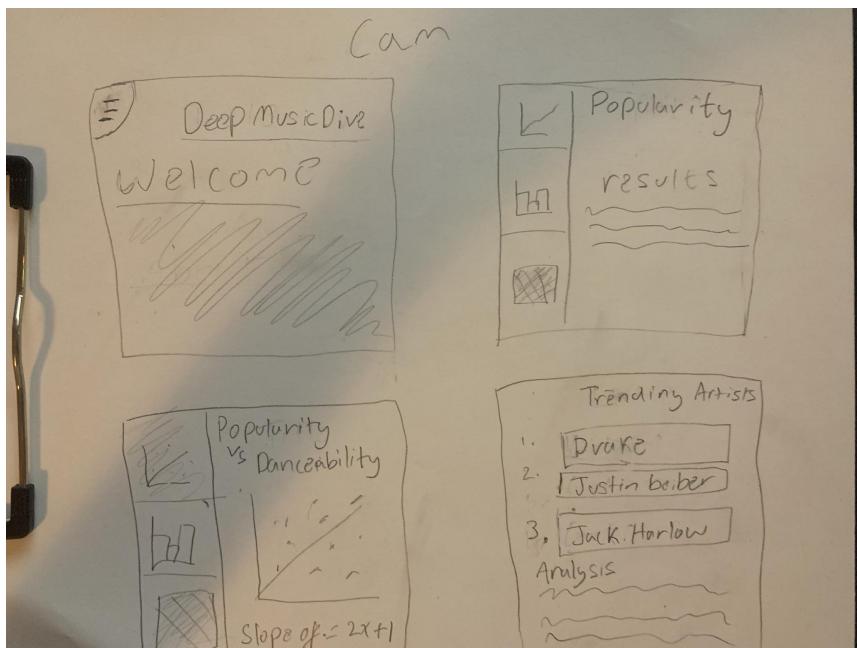
Home	Analysis	Advanced Analytics
Deep Music Dive		
Welcome		
About		

Home	Analysis	Advanced Analytics
	Popularity >	
	Popularity >	
	Danceability >	
	Custom graphs >	

Home	Analysis	Advanced Analytics
	Popularity n Genre Description	
	Bar Chart: RAP, HIP POP, KPOP	

Home	Analysis	Advanced Analytics
	Popularity n Danceability Description	
	Scatter Plot: Popularity vs. Danceability	





## 9.2 Software Repository

Github- <https://github.com/cstanl16/100LoopsWebsite>

## 9.3 WBS tool

Trello - <https://trello.com/b/BBApLXUY>