



NTDS TEAM 52: Mood Changing Playlist Generator

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Presentation Outline

1. Introduction
2. Data Collection & Preprocessing
3. Similarity Graph
4. Playlist Generation
5. Personalization
6. Demo - MVP
7. Conclusion

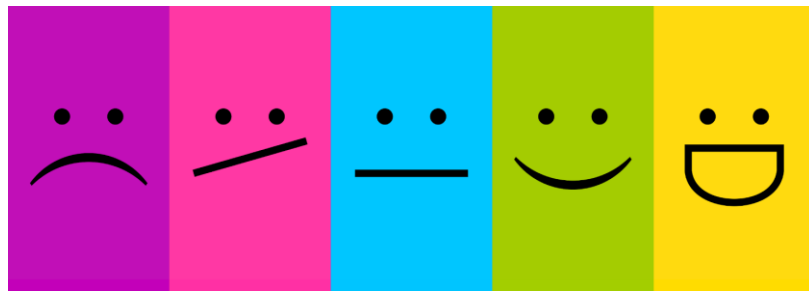


1. Introduction

Introduction

Objective:

- ▷ Generate a Playlist to Change Users' Mood
- ▷ Smooth transitions, while respecting user's preferences



Sad → Happy

Introduction

Mood Dimensions:

- ▷ Fontaine et al. (2007): certain dimensions contain the emotional response of a human to a song
- ▷ Fourth dimension was ignored

Fontaine et al. Dimension	Corresponding Echonest Audio Feature Dimension
Pleasantness Valence	Valence
Potency Control	Danceability
Activation Arousal	Energy
Novelty/ Unpredictability	-

2.

Data Collection & Preprocessing

Data Collection & Preprocessing

The logo for the Free Music Archive (FMA) is an orange rounded square with the text "FREE MUSIC ARCHIVE" in white, stacked vertically.

FREE
MUSIC
ARCHIVE

The FMA logo is a light blue chevron pointing to the right, with the letters "FMA" in black in the center.

FMA

Did not contain
user preferences

Data Collection & Preprocessing

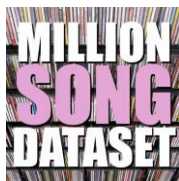
FREE
MUSIC
ARCHIVE



FMA

User History
Dataset

Did not contain
user preferences



- ▷ userID
- ▷ trackID
- ▷ counts

Data Collection & Preprocessing

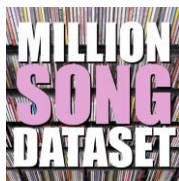


FMA

User History
Dataset

Spotify
API

Did not contain
user preferences



- ▷ userID
- ▷ trackID
- ▷ counts

- ▷ Metadata
- ▷ Audio features
- ▷ 30-second
Preview audio
file

Data Collection & Preprocessing



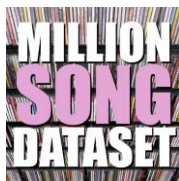
FMA

User History
Dataset

Spotify
API

Librosa
Features

Did not contain
user preferences



- ▷ userID
- ▷ trackID
- ▷ counts

- ▷ Metadata
- ▷ Audio features
- ▷ **30-second
Preview audio
file**

Data Collection & Preprocessing



FMA

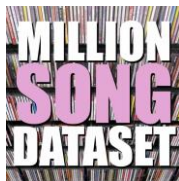
User History
Dataset

Spotify
API

Librosa
Features

Final
Dataset

Did not contain
user preferences



- ▷ userID
- ▷ trackID
- ▷ counts

- ▷ Metadata
- ▷ Audio features
- ▷ 30-second
Preview audio
file

1. User's History
2. Metadata
3. Echonest
4. Librosa

3.

Similarity Graph Creation

Graph Creation

Similarity Graph:

▷ Similarity Graph Based on:

1. Librosa Features

2. Users' Preferences

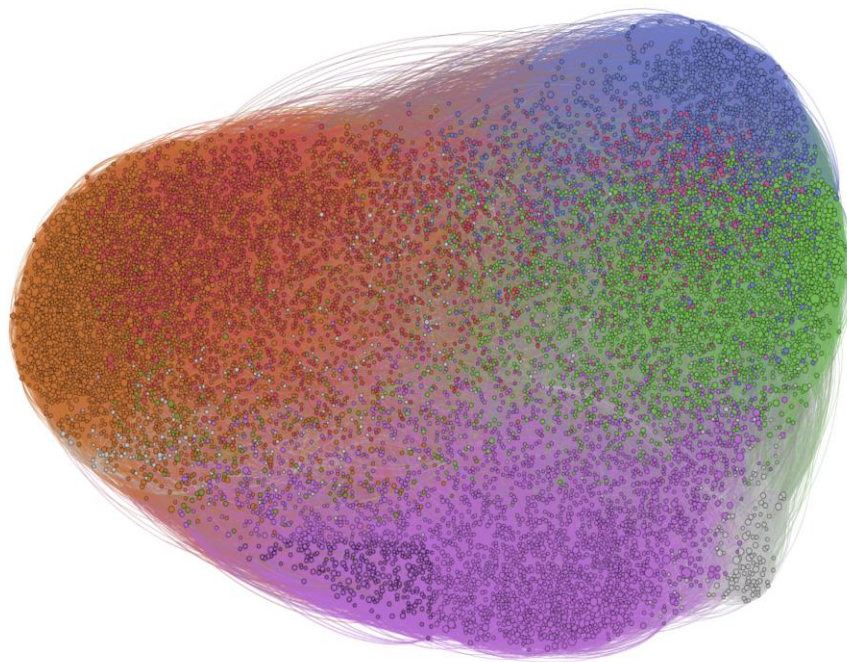
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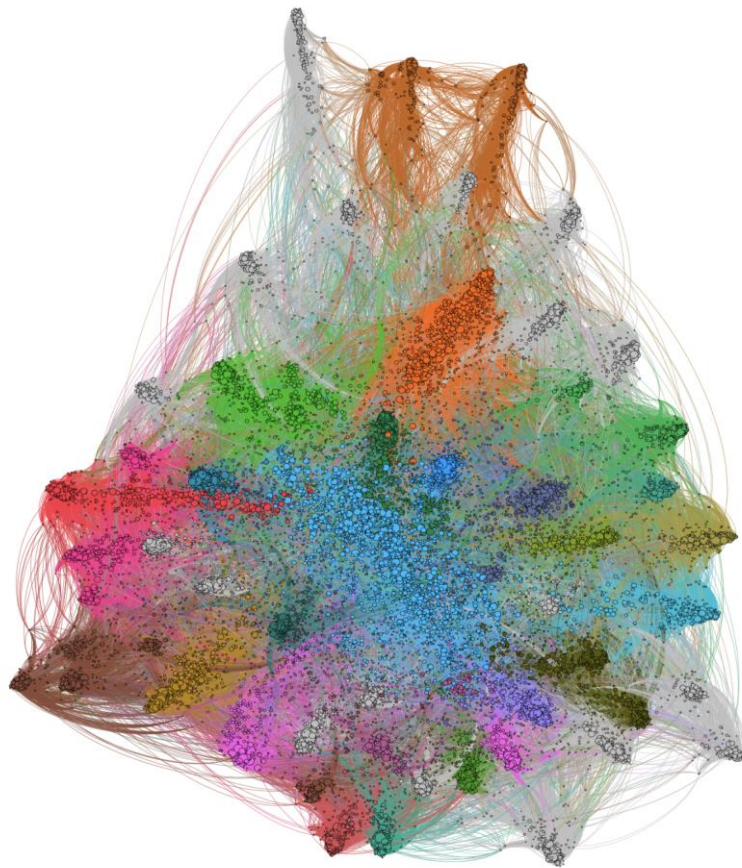
Graph Creation

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Graph Creation

Similarity Graph:

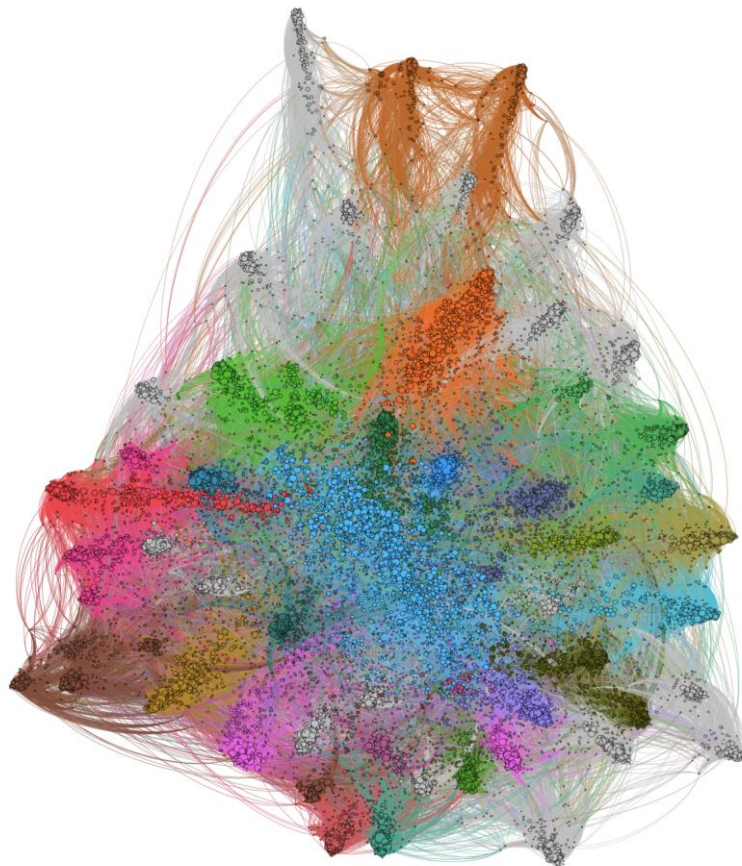
▷ Similarity Graph Based on:

1. Librosa Features

2. Users' Preferences

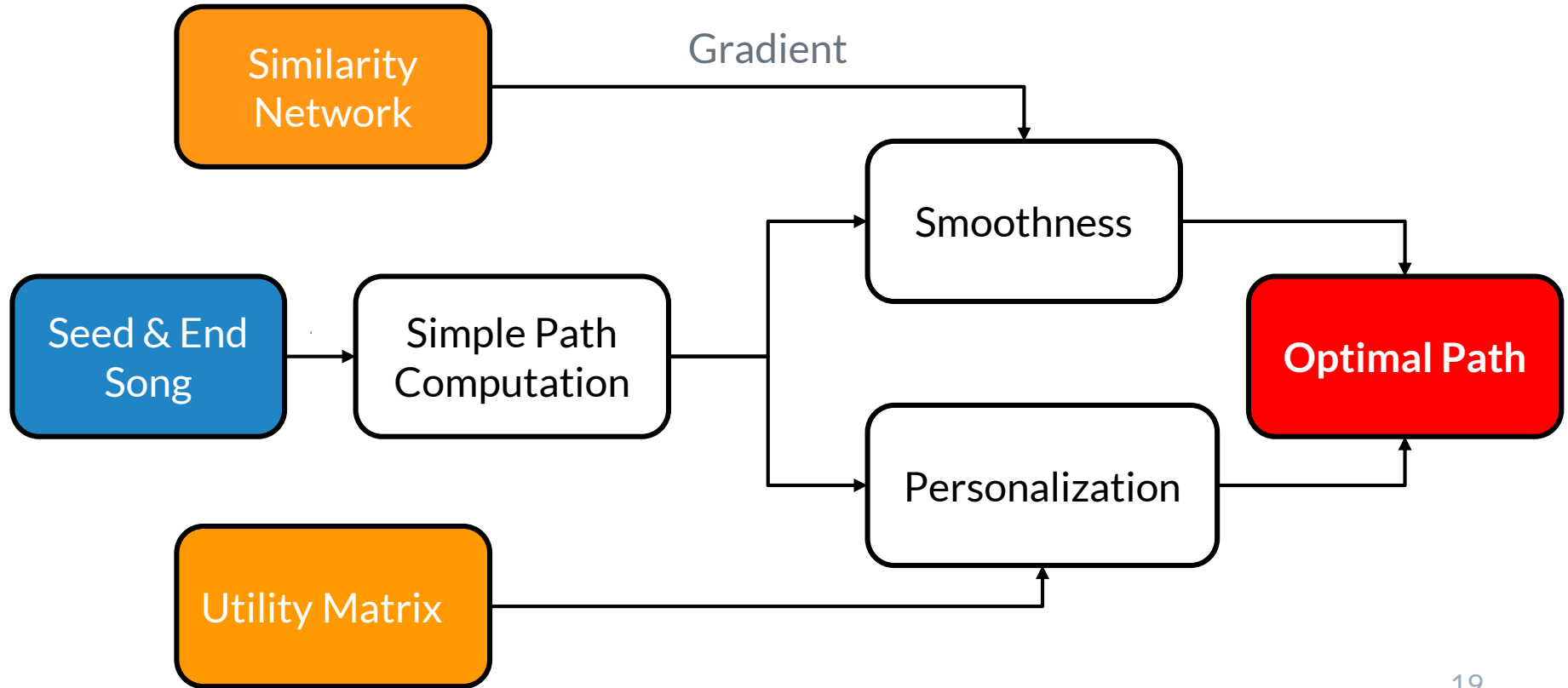
▷ Sparsification:

- 30 strongest edges
- Threshold: 0.1 and 0.2

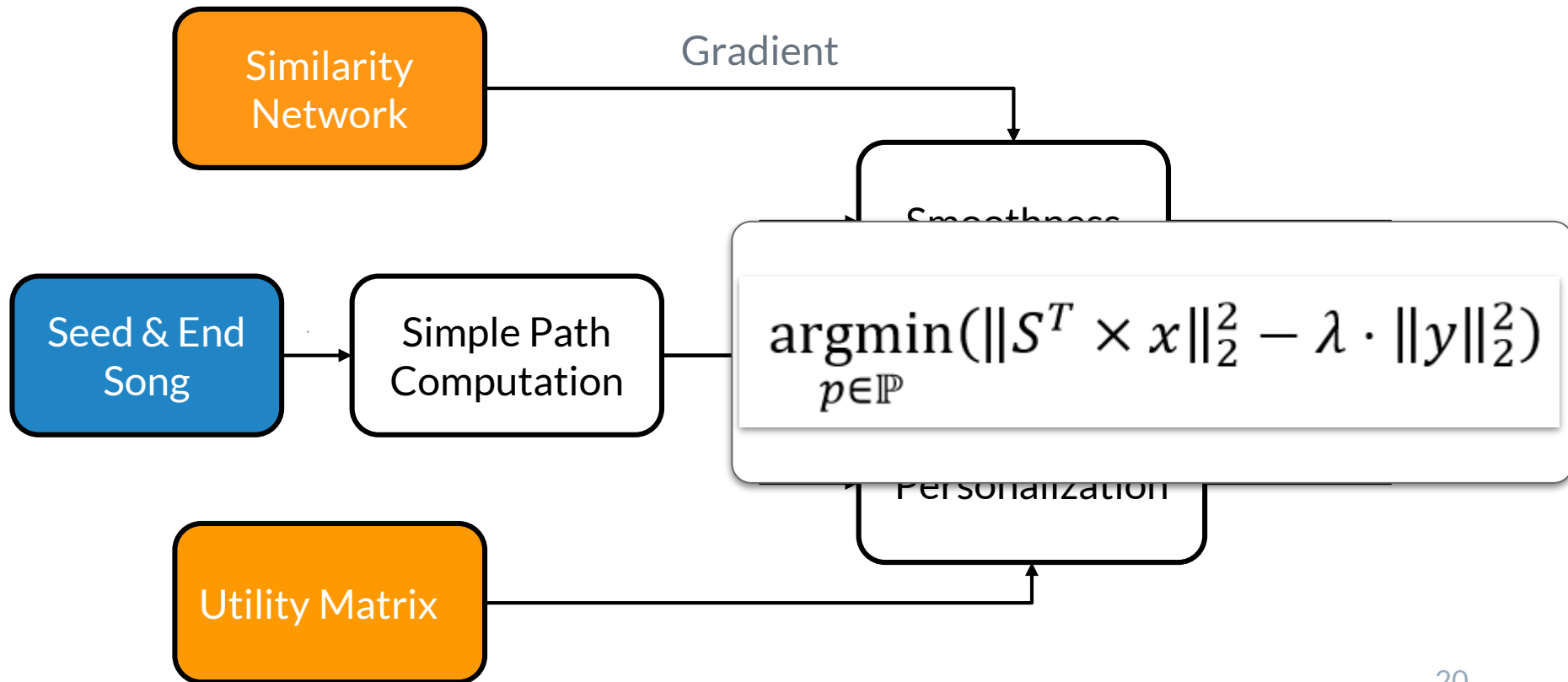


4. Playlist Generation

Playlist Generation - Path



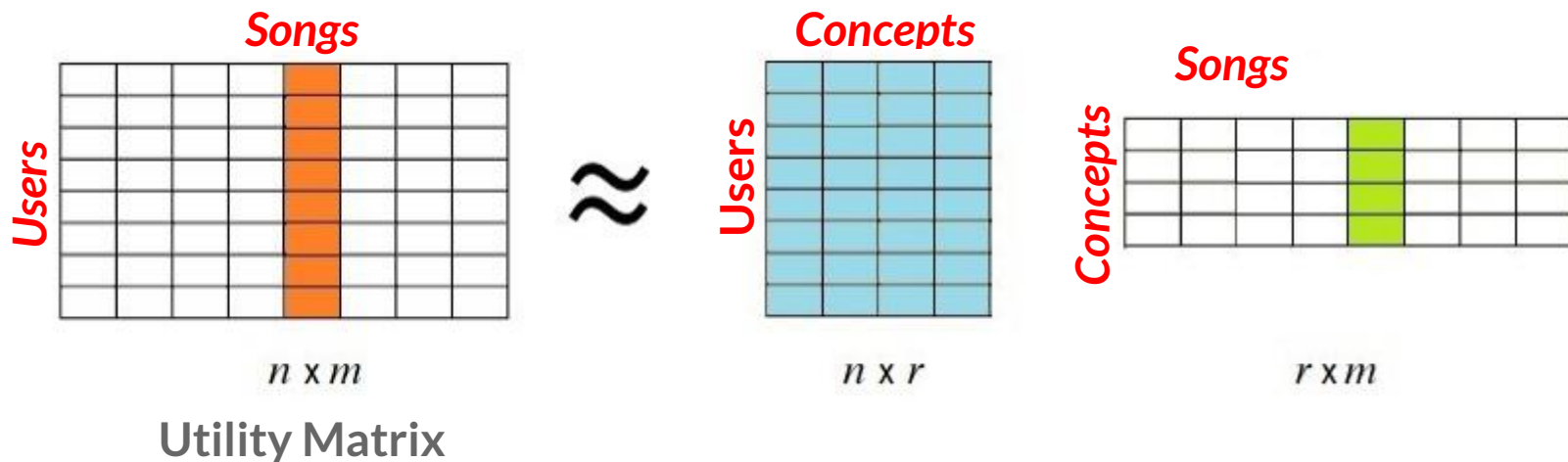
Playlist Generation - Path



5. Personalization

Personalization

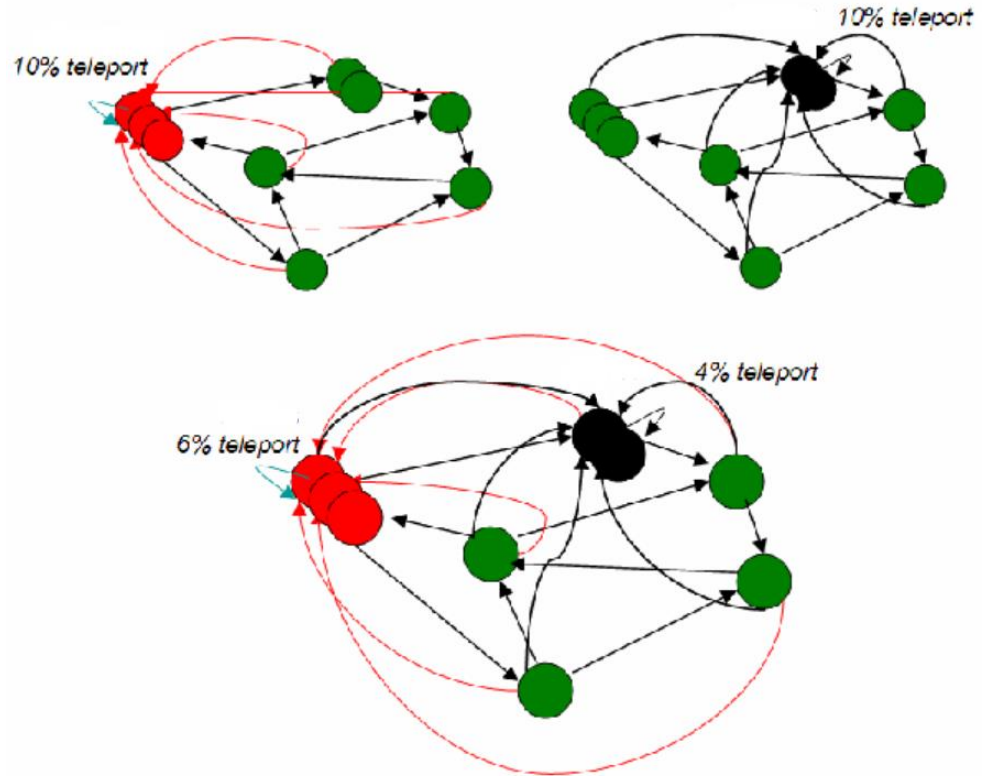
Non-negative Matrix Factorization (NMF)



Personalization

Personalized PageRank

- ▷ Page rank itself is the probability of landing on a specific page in the stationary state
- ▷ Personalized vector of the individual user from the Utility Matrix as the input



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$$PR(u) = \alpha \cdot \sum_{v \in B_u} \frac{PR(v)}{L(v)} + (1 - \alpha) \cdot \frac{1}{N}$$

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- ▷ Personalized vector of the individual user from the Utility Matrix as the input

$$PR(u) = \alpha \cdot \sum_{v \in B_u} \frac{PR(v)}{L(v)} + (1 - \alpha) \cdot \frac{1}{N}$$

6.

Result: Demo - Minimum
Viable Product (MVP)

Demo: Playlist Generation



Selecting seed song

```
seed_song=song_selection(0.5,0.8,0.05)  
seed_song
```

Danceability (med), Energy (high), Valence (small, **Sad**)

Selecting end song

```
end_song=song_selection(0.1,0.3,0.9)  
end_song
```

Danceability (small), Energy (small), Valence (High, **Happy**)

Demo: Playlist Generation



Selecting seed song

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seed_song=song_selection(0.5,0.8,0.05)  
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```

Danceability (med), Energy (high), Valence (small, **Sad**)

Selecting end song

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Danceability (small), Energy (small), Valence (High, **Happy**)

	positionID	trackTitle	artistName	artistFollowers	releaseDate	topGenre1	audio_Duration_ms
51038	0	Too Bad - GH Version	Nickelback	3286956.0	2013	Metal	232987
18164	1	Another Night Alone	SR-71	52268.0	2001	Pop	213760
3634	2	Pickin' Wildflowers	Keith Anderson	166750.0	2005	Country	185920
23357	3	Feel That Fire	Dierks Bentley	1620405.0	2009	Country	201507
10223	4	I Understand It - Radio Edit	Idlewild	31306.0	2005	Pop	208920
49579	5	See Saw	Eskimo Joe	55327.0	2004	Rock	191067
24356	6	James	Josh Rouse	37395.0	2003	Country	301707
26329	7	Earthquake	David Holmes	24661.0	2007	Hip-hop	95200

Demo: Playlist Generation



PLAYLIST

Team 52

Created by Palm Vision • 8 songs, 27 min

PLAY ...

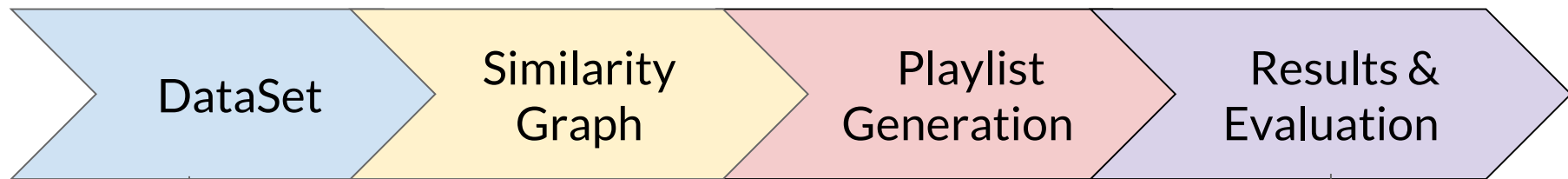
FOLLOWERS 0

Filter Download

	TITLE	ARTIST	ALBUM		
+	Too Bad - GH Version	Nickelback	The Best Of Nickelback V...	3 minutes ago	3:53
+	Another Night Alone	SR-71	Now You See Inside	3 minutes ago	3:34
+	Pickin' Wildflowers	Keith Anderson	Three Chord Country and ...	2 minutes ago	3:06
+	Feel That Fire	Dierks Bentley	Feel That Fire	2 minutes ago	3:22
+	I Understand It - Radio Edit	Idelwild	I Understand It	a minute ago	3:29
+	See Saw	Eskimo Joe	From The Sea	a minute ago	3:11
+	James	Josh Rouse	1972	a minute ago	5:02
▶ +	Earthquake	David Holmes	Music From The Motion Pi...	a few secon... ...	1:35

7. Conclusion

Conclusion



- ▷ User's History
- ▷ Metadata
- ▷ Echonest
- ▷ Librosa

- ▷ Librosa
- ▷ Sparsifying

- ▷ Mood Smoothness
- ▷ User's Importance
- ▷ Select Best Path

- ▷ Performance
- ▷ Limitations
 - Computation time for long playlist
 - Imperfections
- "Quantifying songs"



**Thank
you!**

Any questions?