

# AN MPD PLAYER WITH EXPERT KNOWLEDGE-BASED MUSIC RECOMMENDATION

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# OUR GOAL

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- An album-centered hi-fidelity music player based on the MPD protocol
- Providing music recommendation mechanism for music lovers who do not use online music service
  - No others' logs are available for the recommendation models based on the collaborative approach.
  - No full-covered audio contents are available for the content-based recommendation that analyzes acoustic information.

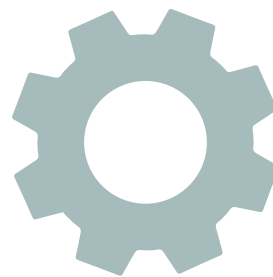
# SOLUTION TO THE PERSONALIZED MUSIC RECOMMENDATION

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- Knowledge Base + Single Individual's Behavior



*Music Knowledge Base*



*Playback Log*



*Personal Music Collection*

# MUSIC KNOWLEDGE BASE

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Entity Type	Instances	Samples
Artist	11,162	The Beatles, Bob Dylan, U2
Album	79,488	Revolver, The Wall, Achtung Baby
Theme	187	Introspection, Reflection, Late Night
Mood	295	Playful, Reflective, Earnest
Style	776	Alternative, Indie Rock
Genre	21	Pop/Rock, R&B, Electronic, Jazz

- A total of 91,929 entities and 527,121 factual triples

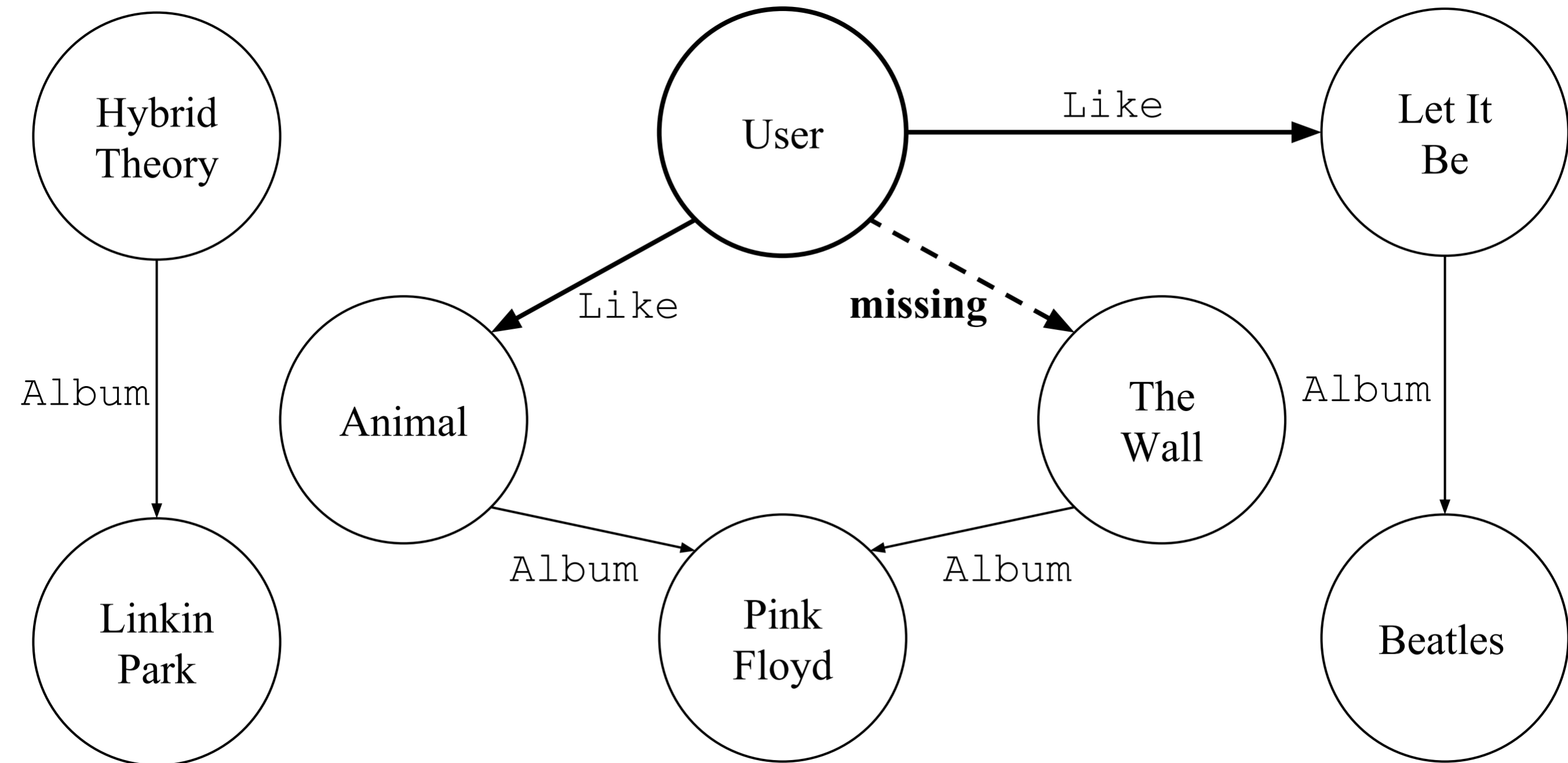
# MUSIC KNOWLEDGE BASE

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Relation Type	Explanation
Albums	The albums of the artist
Influencers	Artists who influenced the artist
Followers	Artists who followed the artist
Group Members	Artists who are the group member of the artist
Associated with	Artists who are associated with the artist
Collaborative with	Artists who have ever collaborated with the artist
Similar	Similar artistsartist
Moods	Moods usually expressed in the artist's albums
Styles	Styles of the artist
Themes	Themes usually cared about by the artist
Genre	Genre of the artist

# RECOMMENDATION AS KNOWLEDGE BASE COMPLETION

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Head Entity + Relation  $\approx$  Tail Entity

$\Rightarrow \begin{cases} \text{User} + \text{LIKE} \approx \text{Potentially favorite albums} & \text{for album recommendation} \\ \text{User} + \text{LIKE} \approx \text{Potentially favorite artists} & \text{for artist recommendation} \end{cases}$

# EVALUATION

Task	k	Accuracy	MRR
Next Artist	4	0.667	0.799
Next Artist	10	0.500	0.638
Next Artist	50	0.167	0.290
Next Album	4	0.619	0.802
Next Album	10	0.476	0.666
Next Album	50	0.333	0.475

# IMPLEMENTATION

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- The player is built for MPD (Music Player Daemon), which is the most popular audio streaming protocol for audiophiles.
- The recommendation system is written in Python with the OpenKE toolkit for training the knowledge embeddings.
- The player is written in Python with QT5 with its visual elegance and possibility of cross-domain.
- The player and the recommendation system is open source for the research community and the music lovers.

[https://github.com/hhhuang/mpd\\_player/](https://github.com/hhhuang/mpd_player/)



# THE PLAYER WITH A SLIM, MINIMAL INTERFACE

MPD Player with Expert Knowledge-based Music Recommendation

Options

Pause On The Wing (Part One) Pink Floyd 11/85 pink Clean

Albums Playlist Recommendation

	Title	Aritst	Last Modified
10	Delicate Sound Of Thunder [Disc 1]	Pink Floyd	2013-10-03
11	Animals	Pink Floyd	2013-10-02
12	A Momentary Lapse Of Reason	Pink Floyd	2012-01-27
13	Meddle	Pink Floyd	2012-01-27
14	Pulse [Live] [Disc 1]	Pink Floyd	2012-01-27
15	Pulse [live] [Disc 2]	Pink Floyd	2012-01-27
16	Ummagumma [Disc 2]	Pink Floyd	2012-01-27
17	More (Original Film Soundtrack) [Remaster]	Pink Floyd	2012-01-21

Number of albums: 22, Number of disks: 22, Number of tracks: 223, Total time: 18:28:46








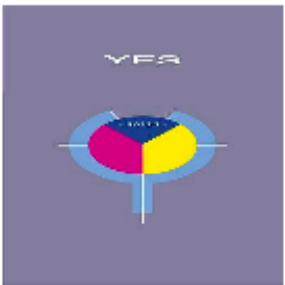

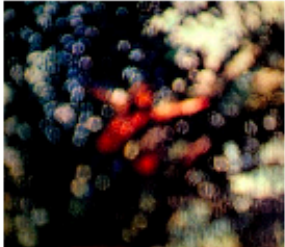
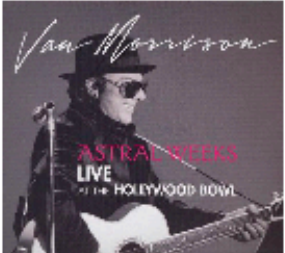




# RECOMMENDATION

MPD Player with Expert Knowledge-based Music Recommendation

Options

Play   Search

Albums Playlist Recommendation

	<p>Never for Ever By Kate Bush Parlophone, 1980 AMG Rating: ★★★</p>		<p>The Piper at the Gates of Dawn By Pink Floyd Capitol, 1967 AMG Rating: ★★★★★</p>		<p>News of the World By Queen Island, 1977 AMG Rating: ★★★☆</p>
	<p>Fade By Yo La Tengo Matador, 2013 AMG Rating: ★★★★★</p>		<p>Hotel California By Eagles Elektra / Asylum, 1976 AMG Rating: ★★★★★</p>		<p>Achtung Baby By U2 Island, 1991 AMG Rating: ★★★★★</p>
	<p>Solo Concert By Ralph Towner Decca / ECM, 1979 AMG Rating: ★★★★★</p>		<p>90125 By Yes Elektra / Rhino, 1983 AMG Rating: ★★★★★</p>		<p>The Joshua Tree By U2 Island, 1987 AMG Rating: ★★★★★</p>
	<p>Obscured by Clouds By Pink Floyd Capitol, 1972 AMG Rating: ★★</p>		<p>Astral Weeks: Live at the Hollywood Bowl By Van Morrison Listen To The Lion Records, 2009 AMG Rating: ★★★★★</p>		<p>Amnesiac By Radiohead Capitol / EMI Records / Parlophone, 2001 AMG Rating: ★★★☆</p>
					

Number of albums: 1848, Number of disks: 2041, Number of tracks: 24705, Total time: 87 days, 15:18:31

# CONTRIBUTIONS

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- An alternative approach to music recommendation
  - Integrating expert knowledge, experimental results show the effectiveness of our model.
- Our model for personalized music recommendation is free from the issue of bandwagon effects
- We release our MPD player with the music recommendation model as an open-source software for the research community and the music lovers who object to be controlled by the giant companies