

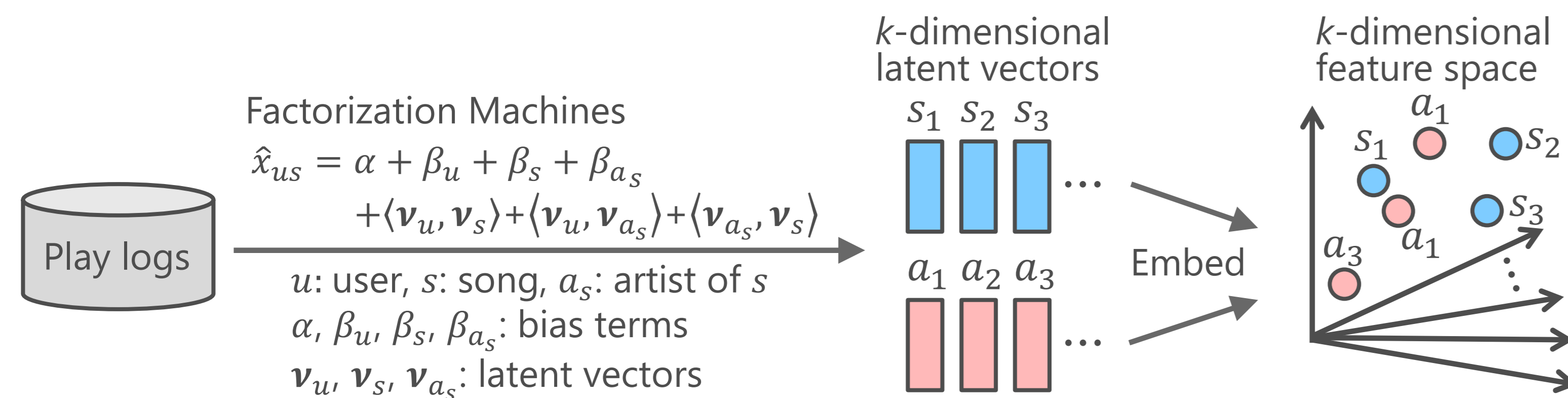
Analysis of Song/Artist Latent Features and Its Application for Song Search

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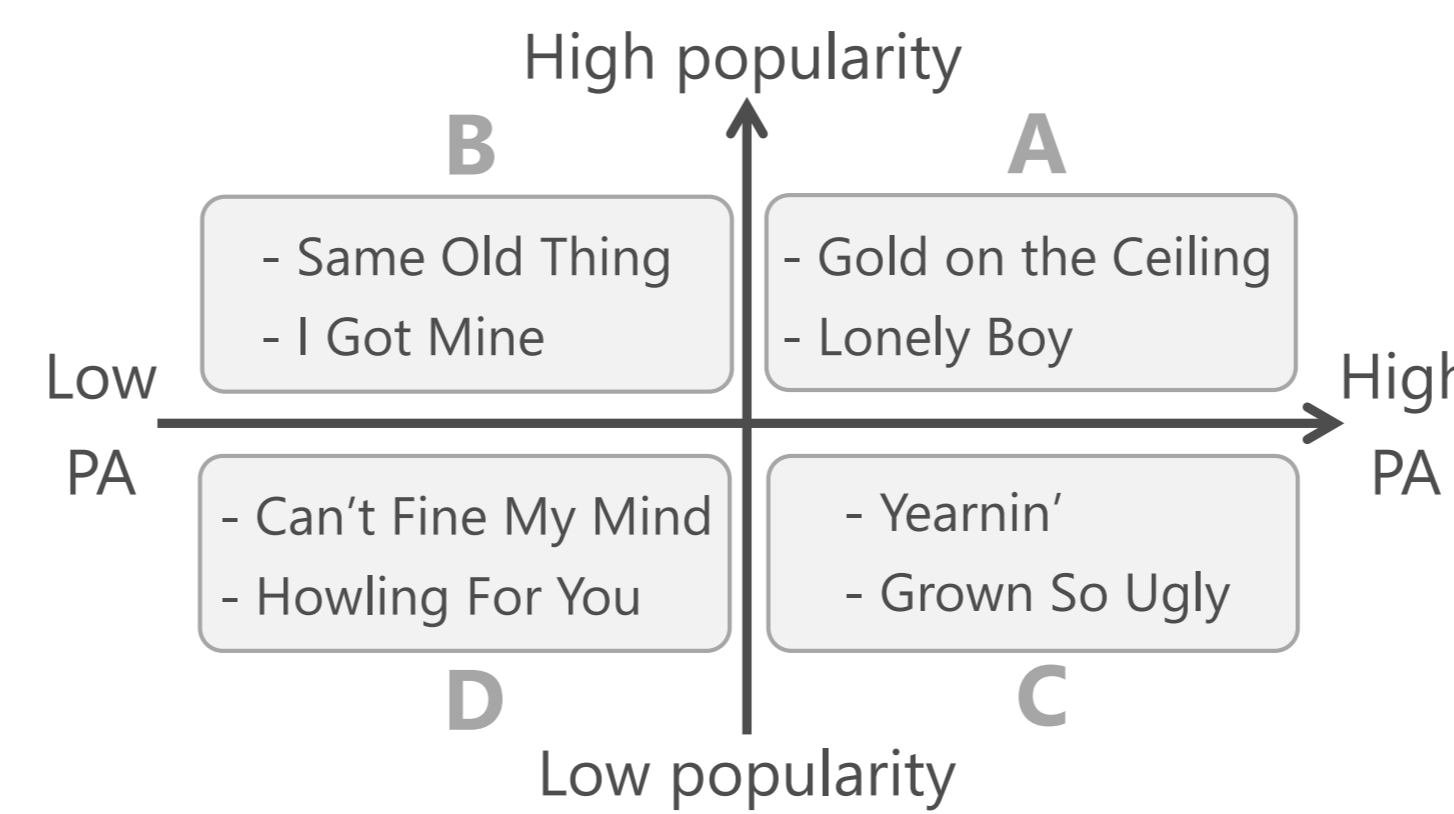
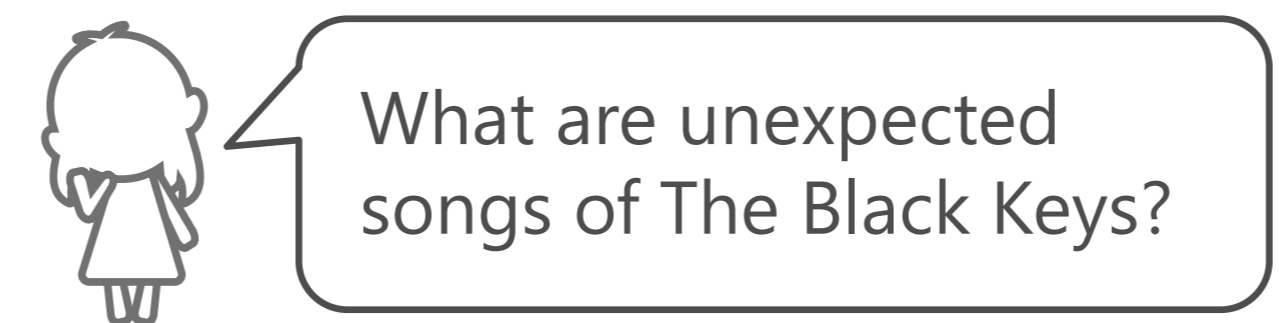
1 Embed song/artist vectors into the same feature space

- In music recommendation, **artists and songs are represented by latent vectors**
- The vectors are usually used only to compute a user's preference toward a song
- We embed song/artist vectors in the same feature space to leverage the vectors **for realizing new song search applications**



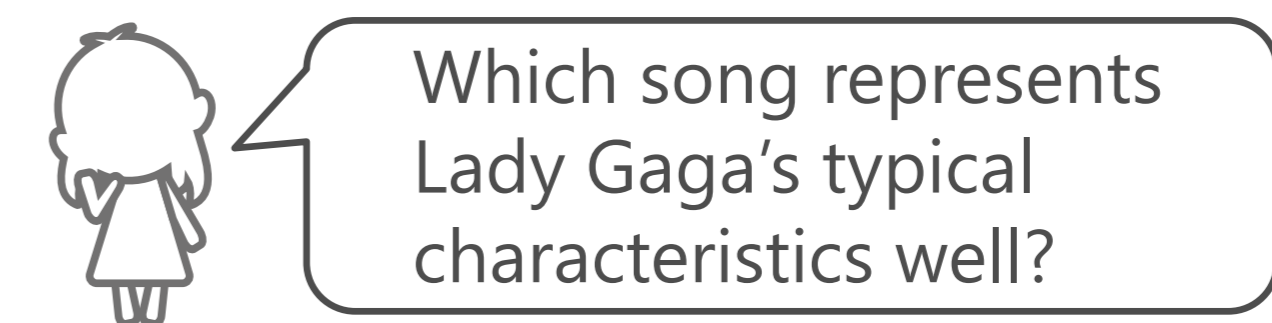
3 Application examples

Familiarity-oriented search



- A: for users **who are not familiar with the artist**
- B: for users **who want to know the artist's diversity**
- C: for users **who want to listen to unexpected songs**
- D: for users **who want to become an artist devotee**

Typicality-oriented search



Query: Lady Gaga

Rank	Song by OS
1	California Curls / Katy Perry
2	Racy Lacey / Girls Aloud
3	Gimme More / Britney Spears
4	Cannibal / Ke\$ha
5	Piece of Me / Britney Spears

- Given artist a , **all songs in the dataset can be ranked** in terms of OS or PA
- By showing such songs to a user who is a fan of Lady Gaga, she may be **willing to listen to unfamiliar songs because they are highly related to Lady Gaga**

Analogy search

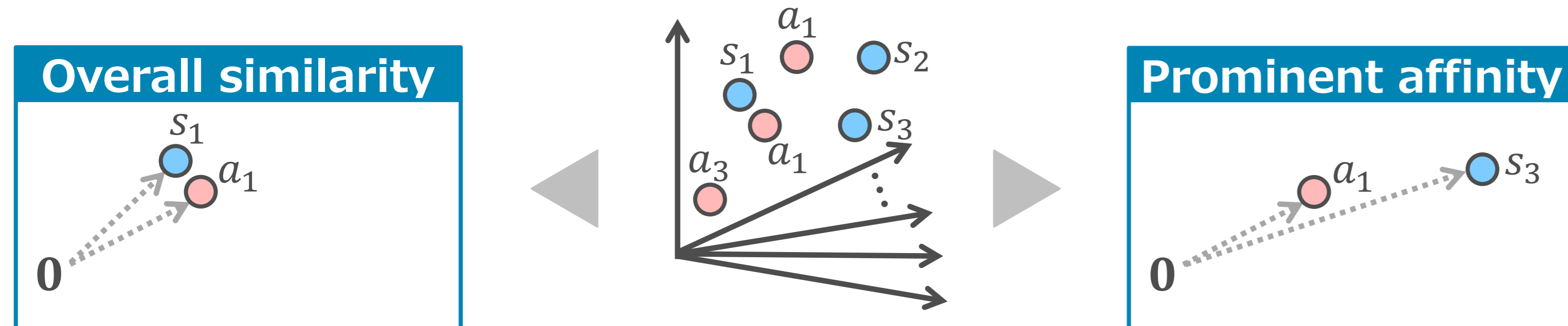


Query	
Source artist	The Beatles
Source song	That Means A Lot
Target artist	Aerosmith

Rank	Song
1	Milk Cow Blues
2	Face
3	Temperature

- Search for the target artist's songs **that have a similar relationship between the source artist and the source song**
- The similarity is defined by **the angle between vectors and the ratio of vector lengths**

2 Overall similarity (OS) and prominent affinity (PA)



- When a song is fairly close to an artist, **the song is similar overall to the artist**
- Overall similarity is defined by the **closeness between an artist and a song**
- When a song is fairly close to the extended position of an artist, **the song prominently represents the artist's characteristics**
- Prominent affinity is defined by the **inner product of an artist and a song**

Artist: The Beatles

Rank	Song
1	I'm So Tired
2	Get Back
3	The End
4	Sun King
5	Here Comes the Sun

Artist: The Beatles

Rank	Song
1	Something
2	All You Need Is Love
3	Come Together
4	Hey Jude
5	I Am the Walrus

4 Contributions

Propose the concepts of overall similarity and prominent affinity
 Relationships between songs and artists in a latent feature space

Show characteristics of overall similarity and prominent affinity
 Latent vectors are generated by using Last.fm play logs for two years

Demonstrate three applications for music information retrieval
 Familiarity-oriented search, typicality-oriented search, and analogy search

We want other researchers to leverage our proposed concepts and realize useful music information retrieval systems