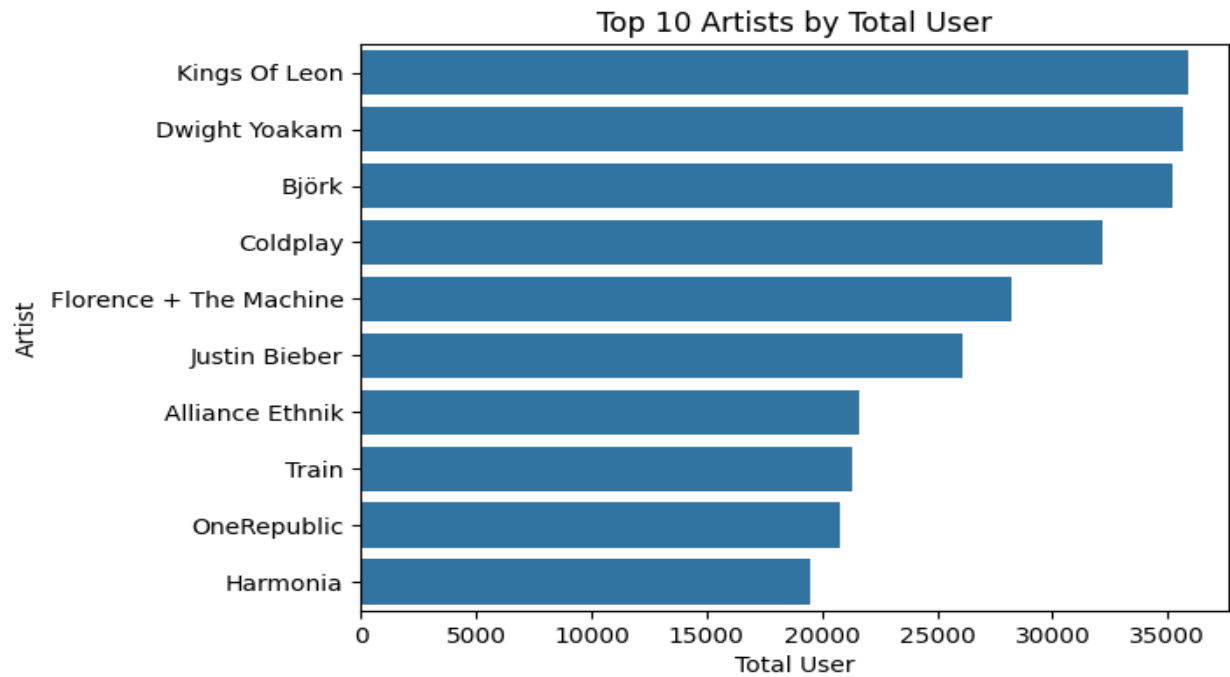


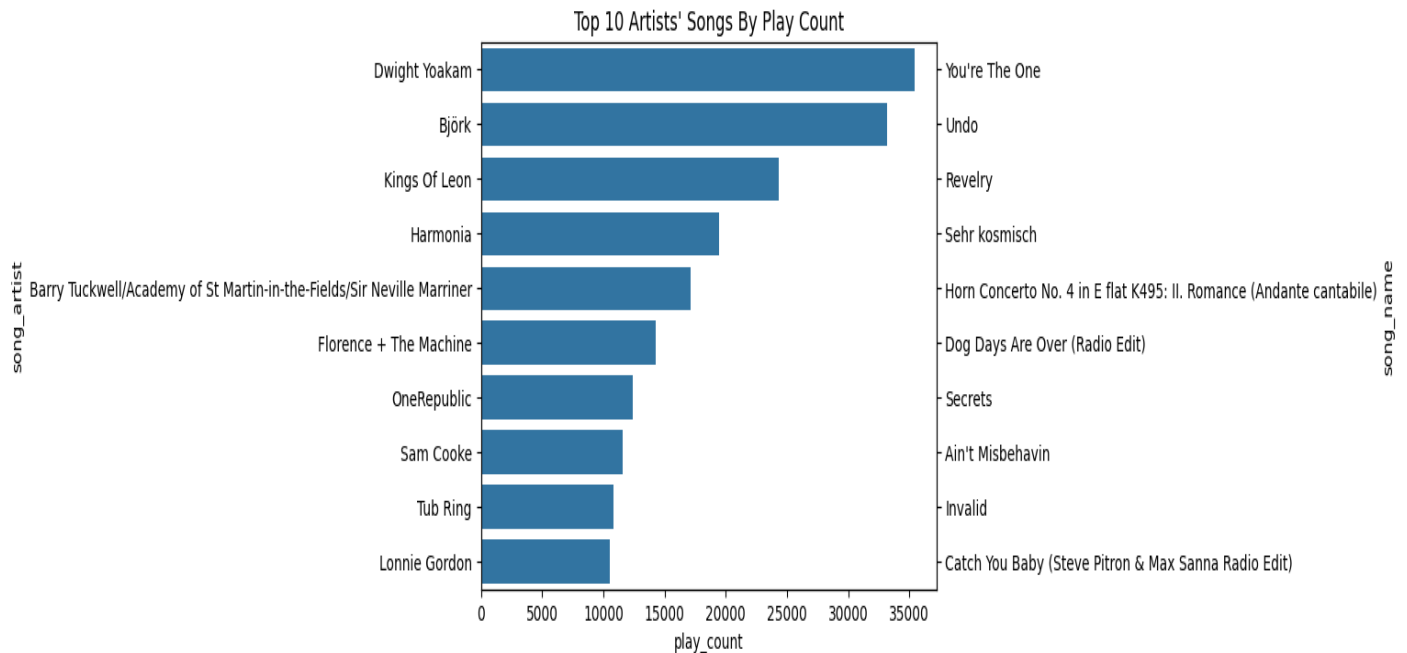
Exploratory Analysis

Addressed the following questions: What users listen to the most? How many play counts? How many unique songs?

Top 10 Artists By Users // My Naïve Recommendation for users to listen to these artists



Top 10 Songs // Naïve Recommendation for a new net user



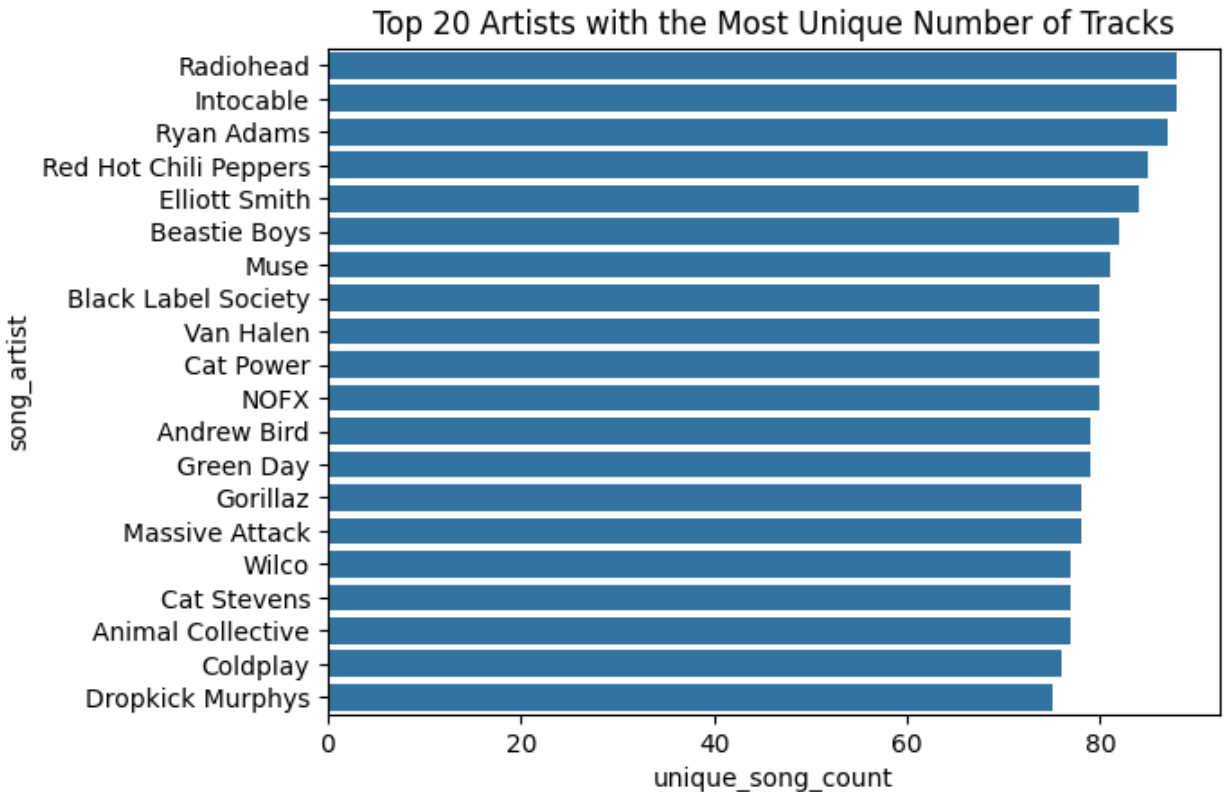
Issue of Data Sparsity (Lots of Users and Items, but few interactions)

```

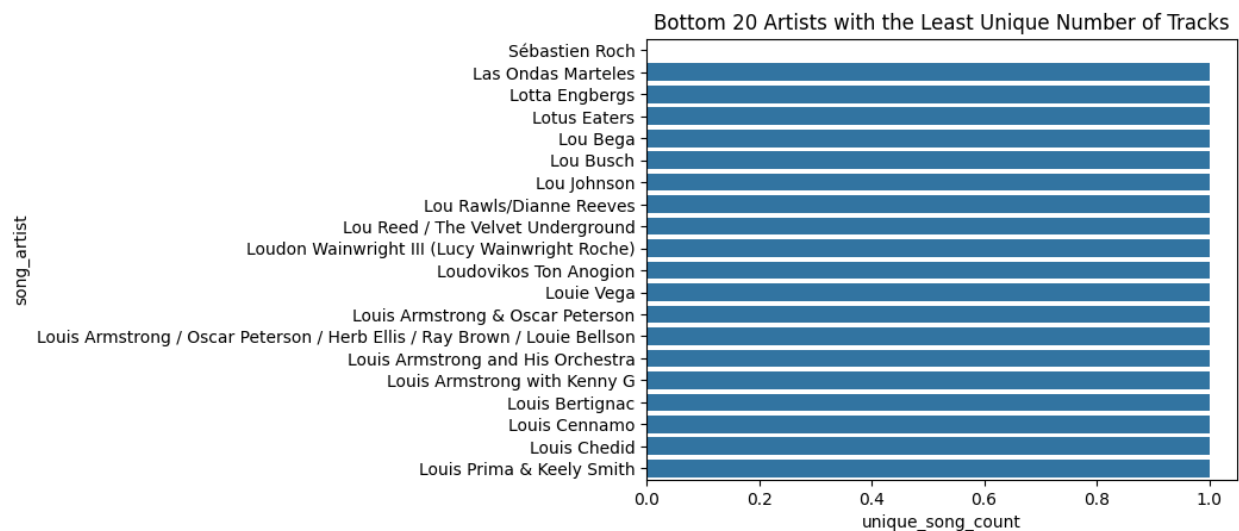
No. of unique users: 110002
No. of unique songs: 163220
No. of unique play counts: 299

```

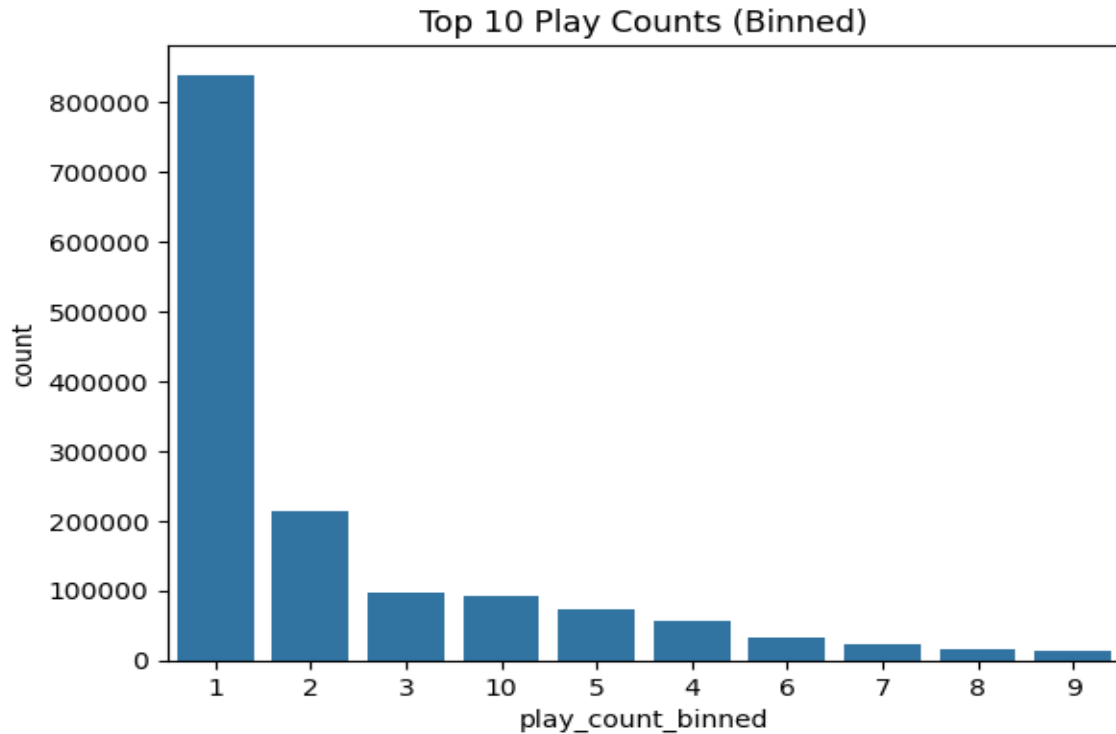
Another Naïve Recommendation for users if they want to see diversity for artists



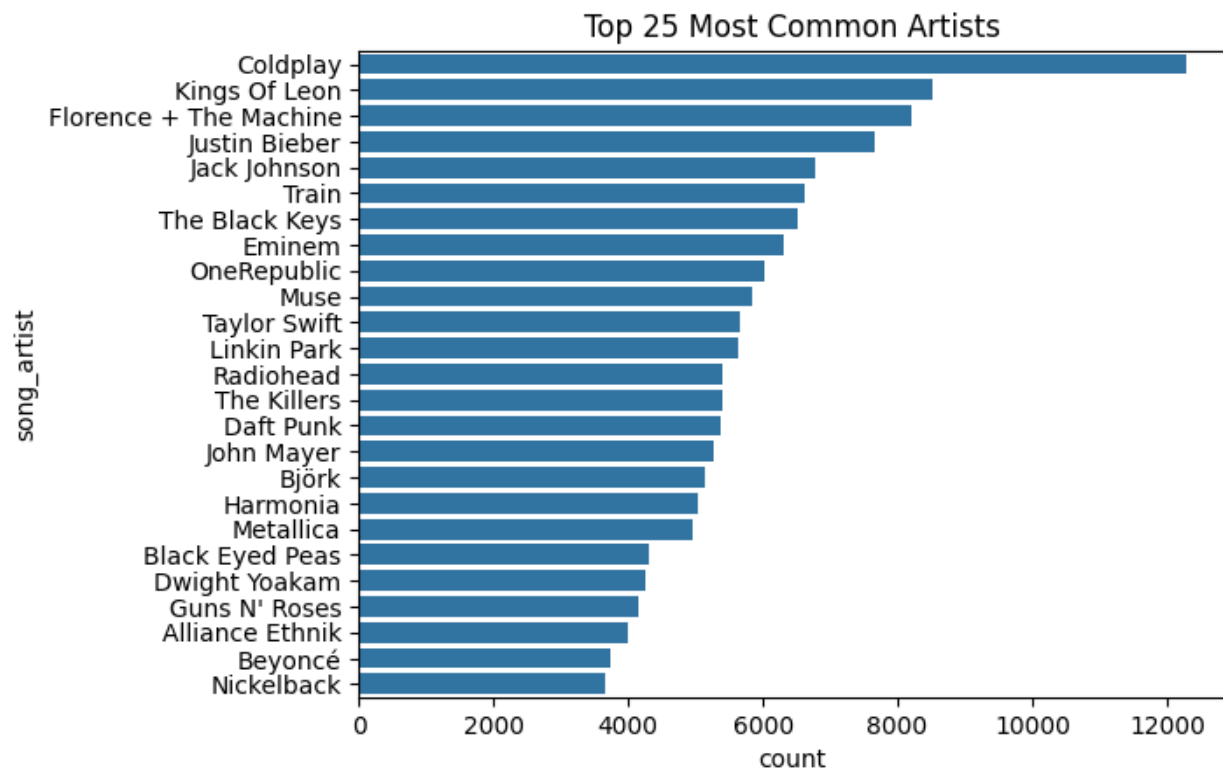
Introduction to underground artists



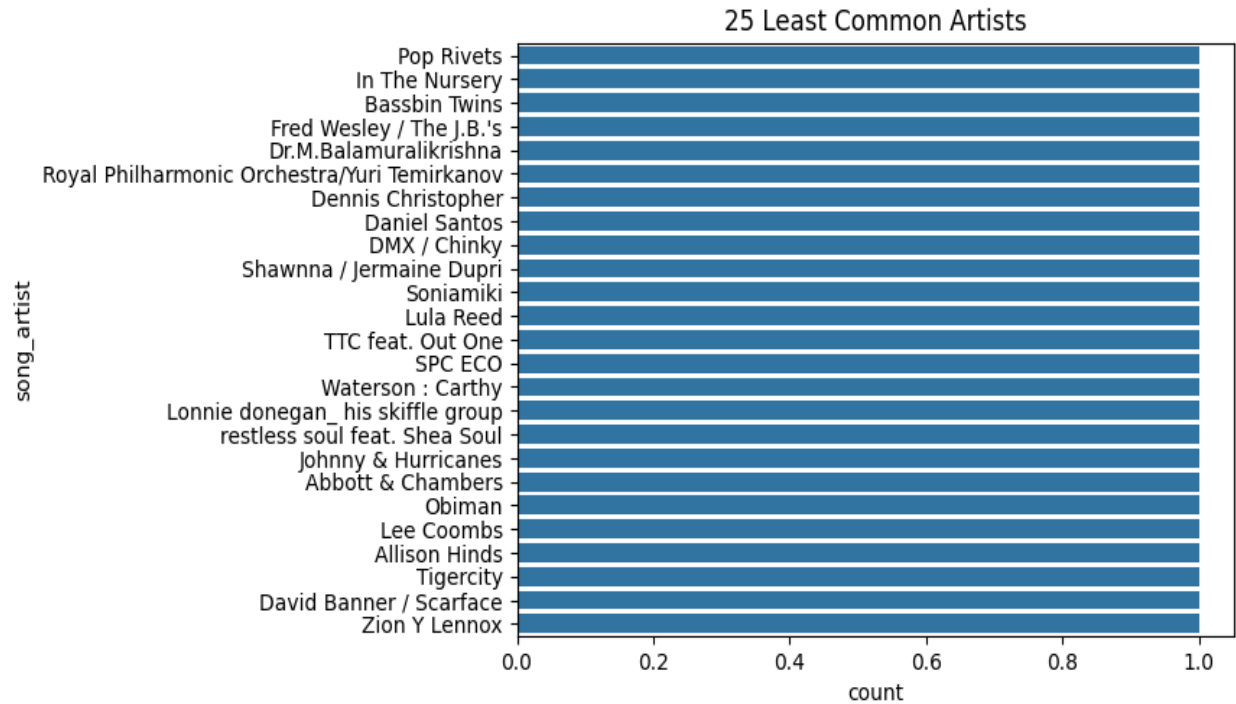
Distribution of ratings



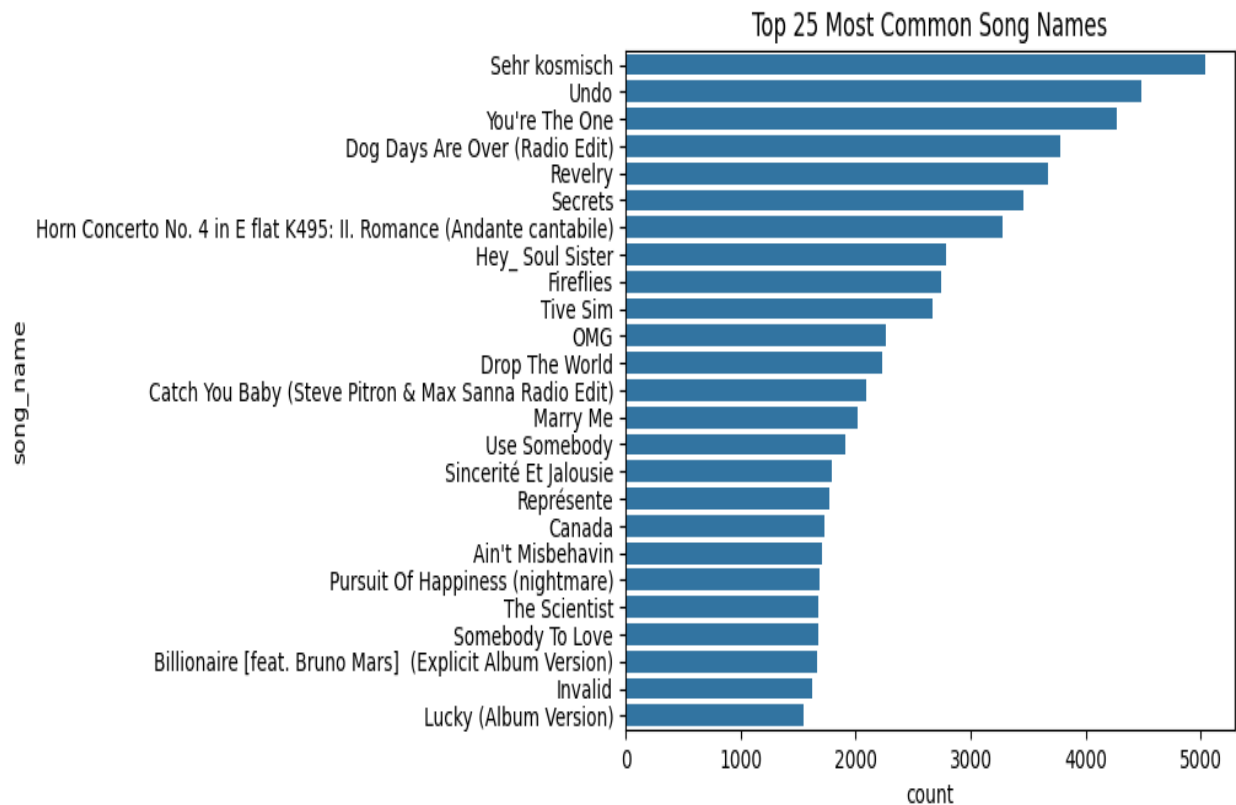
Top 25 most common artists by count // naïve recommendation



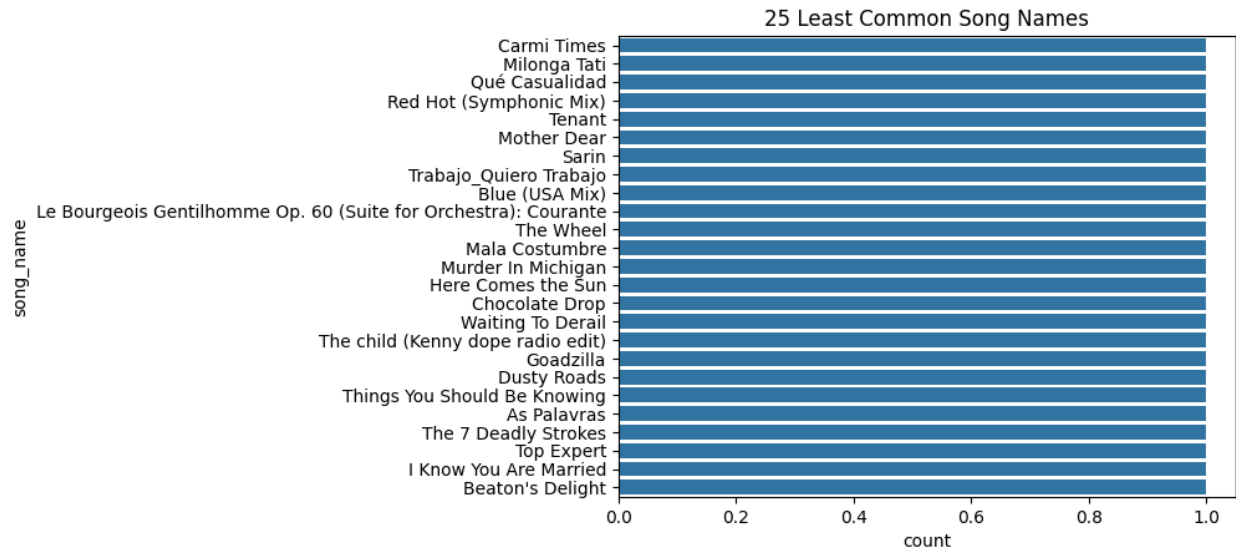
Introduction to underground artists



Top 25 song names by count // naïve recommendation



Introduction to unheard of song names



BaselineOnly() SVD without K-Fold

I created a very basic model without hyper parameterizing nor turning the variables to see what potential this model stands in regard to performance and accuracy, and how we can make improvements.

Difference in metrics

Evaluating SVD recomender model:

RMSE: 2.3077

MAE: 1.6329

Evaluating SVD vs. Baseline:

RMSE: 2.3077 VS. baseline: 2.2845

MAE: 1.6329 VS. baseline: 1.6139

MUSIC RECOMMENDER APPENDIX

My Song List

track_id	song_id	song_artist	song_name
TRMMFIS128E078EDEA	SOYURIX12A6701E960	Aerosmith	Cryin'
TRMSGKF128E07862CC	SOFTFOR12A67020DB3	DMX	Ruff Ryders Anthem
TRGFXNI128F9350567	SOCYCKL12A58A79B1B	Lauryn Hill	Tell Him
TRGETEF128F4262DD0	SOXVVHB12CF54662D9	Michael Jackson	Man In The Mirror
TRRIRCF128F426A606	SOFRVOH12A8C132F50	Michael Jackson	You Are Not Alone
TRBIGLJ12903CBAC47	SOXYSIC12CF5827361	Michael Jackson	Rock With You
TRBIKAA128F42AEAED	SORRTVA12D0219AA06	T-Pain	I'm Sprung
TRFASZI128F93229B7	SOYFLSE12D021936ED	Lil Wayne	A Milli
TRFLCLG128F425FD9B	SOXIDFH12CF5CFD5B9	Michael Jackson	P.Y.T. (Pretty Young Thing)
TRQPEVG128F427A4D0	SOARVJQ12CF5F87C41	Aerosmith	I Don't Want To Miss A Thing

My First Recommendation

	song_id	play_count	track_id	song_artist	song_name
0	SOQBUFQ12A6D4F7F4C	9.839235	TRUBGXP128F1462C9D	Sev Statik	MIC (Speak Life Album Version)
1	SOKCXXE12A6D4F5A04	9.807645	TRJWLYE128F14716EE	Sugar Pie DeSanto	Soulful Dress
2	SOXXSVC12A582A242D	9.757063	TRTAVWJ128E078DA2A	Jake Hess	Death Ain't No Big Deal (Tribute To Jake Hess ...
3	SONDKOF12A6D4F7D70	9.737093	TRVSHJE128F1475018	Alceu Valença	Recado Falado (Metrô Da Saudade)
4	SOUZRZK12A8C13FF59	9.704871	TRJJETI128F42A6A5E	The Spill Canvas	The Tide (LP Version)
5	SOCVOVH12A6D4FB912	9.626734	TREBYCO128F422F249	Streetlight Manifesto	Keasbey Nights (LP Version)
6	SOGIABD12A6D4F6F98	9.530560	TRNINLH128F14992E6	Emerson Drive	I Should Be Sleeping
7	SODHOQC12AB018247D	9.429525	TRTYAFF128F92FC35E	Ring_ Cicada	I Remember
8	SOVMADB12A8C137B96	9.423878	TRTRVEP128F428F617	Pearl Jam	Encore Break
9	SOTVZIB12A6D4F694A	9.382961	TRNMQIL128F145CF27	Blondie	Atomic '98 (Xenomania Mix)

Predictions and Addressing Accuracy

I highlight the poor performance of the model with some tables of songs that my peer and I had. Along with some songs from other users to see where things went wrong.

Lack of diversity in music recommendations

```
-- Top 10 Song Recommendations for : 5fdc7aachbaede00fee1111fa7f45396b2d89faa1 --
:Jake Hess: Death Ain't No Big Deal (Tribute To Jake Hess Album Version): SOXXSVC12A582A242D: 8.5125 :
:Julie London: You'd Be So Nice To Come Home To: SOXQWU512A58A7B236: 7.9885 :
:Joyce Cooling: It's Time I Go (Jazz): S0MTZYU12AB017D632: 7.7815 :
:The fFormula: Cold Blooded (Acid Cleanse): S0ANQW12A58A793D2: 7.7357 :
:Gym Class Heroes: Kissin' Ears [feat. The-Dream] (Explicit Album Version): S0IDMQZ12A58A7D6BF: 7.7131 :

-- Top 10 Song Recommendations for : 2cd80a9eae6c6470565bd4b7b03adfa60366fc1 --
:Jake Hess: Death Ain't No Big Deal (Tribute To Jake Hess Album Version): SOXXSVC12A582A242D: 8.0668 :
:Kings Of Leon: Revelry: S0SXLTC12AF72A7F54: 8.0341 :
:Seine: So far so long: SONXUQR12AB0186C9F: 7.9390 :
:Old 97's: Victoria (LP Version): S0S3SSU12A6D4F8F41: 7.9338 :
:Clara Hill: Clara meets Slope - Hard To Say: S0J5XJY12A8C13E32E: 7.8945 :

-- Top 10 Song Recommendations for : 6fb97573741fc13680b76c2cf884f7c70f4d83a2 --
:keller williams: 221: SOACBLB12AB01871C7: 8.3362 :
:Rise Against: Nervous Breakdown: S0UIKSL12A6701D19A: 8.2464 :
:Kix: Girl Money: SOCHWPT12AB0184F15: 8.1106 :
:Groove Armada: Song 4 Mutya (Out Of Control): S0DMFXL12A6D4FB509: 8.0817 :
:Another Sunny Day: Rio: S0TUARP12A8C13CB54: 7.9748 :

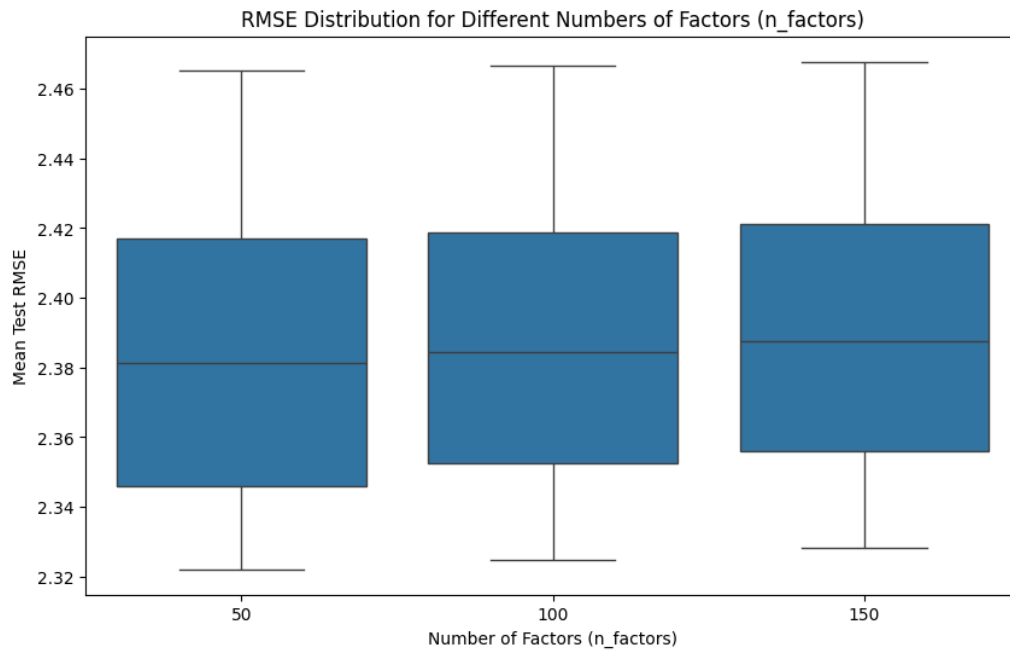
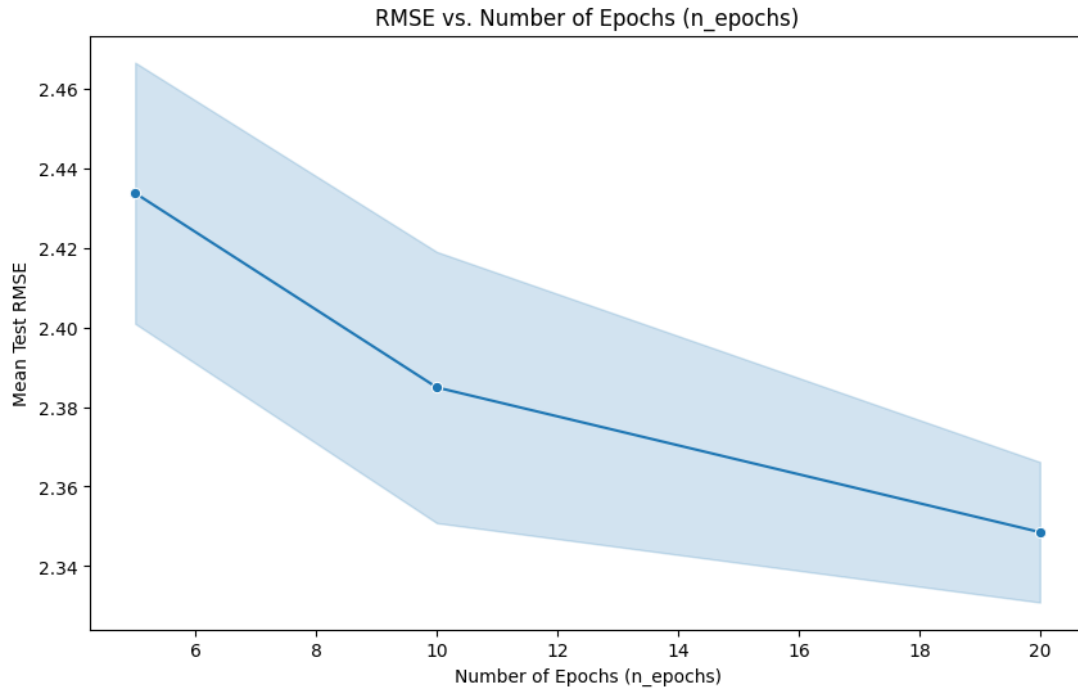
-- Top 10 Song Recommendations for : c06fb9da69529da66fd6004d62ae6d1170260715 --
:The fFormula: Cold Blooded (Acid Cleanse): S0ANQW12A58A793D2: 6.8165 :
:Another Sunny Day: Rio: S0TUARP12A8C13CB54: 6.2754 :
:Jake Hess: Death Ain't No Big Deal (Tribute To Jake Hess Album Version): SOXXSVC12A582A242D: 5.9729 :
:Pavement: Heaven Is A Truck: S0SDVSH12A81356D41: 5.8013 :
:keller williams: 221: SOACBLB12AB01871C7: 5.7665 :

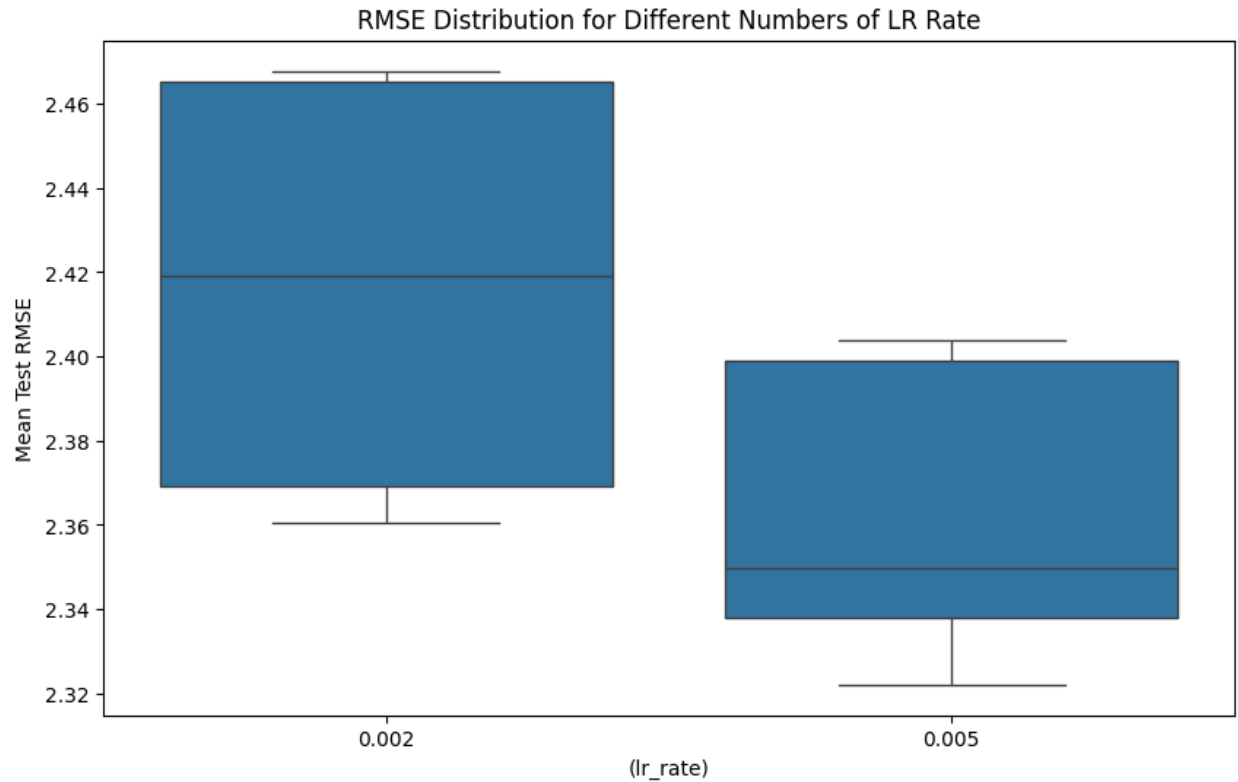
-- Top 10 Song Recommendations for : dfb15eec0b67e646b68eed105261e812be63de8b --
:Disturbed: Numb (Album Version): S0TVLHC12A6701EA31: 9.7602 :
:Streetlight Manifesto: Keasbey Nights (LP Version): S0CVOVH12A6D4FB912: 9.0217 :
:Die Mooskirchner: Frisch und g'sund: S0GLUC12AB018A8FA: 8.8307 :
:Pearl Jam: Encore Break: S0VMADB12A8C137B96: 8.6835 :
:Cancer Bats: Hail Destroyer: S0THFN012A8AE4789B: 8.6597 :
```

BaselineOnly() SVD with K-Fold

I show the best parameters along with the metrics of the model. Then, I make predictions with the model to see what improvements have been made. The differences are small in selecting the right metrics, hence the recommendations won't improve by much.

MUSIC RECOMMENDER APPENDIX





Predictions and Addressing Accuracy

I address the recommendations of the model by looking at tables, and highlight the growing concerns of model performance.

My second recommendation

song_id	play_count	track_id	song_artist	song_name
SOBMKJU12A6D4F7128	10	TRXKJKY128F14543EF	Cliff Richard & The Shadows	Nine Times Out Of Ten (1998 Digital Remaster)
SOCSCRC12AB017C60C	10	TRCCVBK128F92E156B	Mobin Master Feat. Robin S.	Show Me Love
SODAEAR12A6D4FA4BC	10	TRIRKZO128F42312A5	Gus Gus	Purple [Sasha Midnight In Reykjavik]
SODCNEE12A6310E037	10	TRCGKRC128E0781A0E	David Bowie	Sorrow (1997 Digital Remaster)
SOMCAFM12A58A7B024	10	TRTMINZ128F147EB20	Foolish Things	Who Can Compare
SOMRYYN12A6310F0F3	10	TRFWGOJ128E0780C8B	Coldplay	In My Place
SOPGYCQ12A6D4FB4DC	10	TROYTES128F148C87E	Days Of The New	Provider
SORHUJT12A8C13B85E	10	TRBJFDB128F428DF1E	Looptroop	Long Arm Of The Law
SOSDVSH12A81356D41	10	TREUVXG12903CA6D2C	Pavement	Heaven Is A Truck
SOSGEGU12AB018188A	10	TROEMKB128F92F6AE2	Armin van Buuren	Never Say Never

MUSIC RECOMMENDER APPENDIX

Eric's Song List

user_id	song_id	play_count	play_count_binned	track_id	song_artist	song_name
ERIC M	SONLSKL12A8C13CF26	10	10	TRICZCQ128F429EC43	Paramore	Misery Business (Album Version)
ERIC M	SOLVQGA12A8C1399CA	10	10	TRQFEDD128F9340645	Paramore	crushcrushcrush (Album Version)
ERIC M	SOEYVHS12AB0181D31	10	10	TRQUJJJ128F93450B9	Lady GaGa	Monster
ERIC M	SOJLNE12A8C13E5C3	10	10	TRMSOXX128F42B84FB	Beyoncé	Deja Vu
ERIC M	SONKGOD12A58A79778	10	10	TRKNOQB12903CACF1A	Beyoncé	Halo
ERIC M	SOMOGQW12A8C142044	10	10	TREZTLT128F92F8550	Beyoncé	Diva
ERIC M	SOZRZFX12A6D4F814E	10	10	TRINXEH128F145F695	Selena	Bidi Bidi Bom Bom
ERIC M	SOJOZMG12AF72A1FB8	10	10	TREQXVP128F1468078	Selena	Como La Flor
ERIC M	SOQJTRZ12A6D4F674A	10	10	TRNTLVB128F146660F	Selena	No Me Queda Mas

Eric's second recommendation

song_id	play_count	track_id	song_artist	song_name
SOXXSVC12A582A242D	5.854369	TRTAVWJ128E078DA2A	Jake Hess	Death Ain't No Big Deal (Tribute To Jake Hess ...
SOJSXJY12A8C13E32E	5.556248	TRHRTYE128F427EA7D	Clara Hill	Clara meets Slope - Hard To Say
SOJZSWQ12A8C13BD47	5.420008	TRIQRMM128F427227A	León Gieco	Canción Para Luchar
SOTGNIO12AB0184317	5.399520	TRCCXZQ128F930DE80	Delegation	One More Step To Take
SOACBLB12AB01871C7	5.396599	TRXBOYH12903CAE41F	keller williams	221
SOANOQW12A58A793D2	5.290985	TRXRALT128F932D8F6	The fFormula	Cold Blooded (Acid Cleanse)
SOSDVSH12A81356D41	5.211559	TREUVXG12903CA6D2C	Pavement	Heaven Is A Truck
SOZJUSJ12A8C13C249	5.148599	TRYASXH128F428D988	Black Oak Arkansas	Swimmin' In Quicksand (2006 Remastered LP Vers...
SOURSIU12A8C140B9A	5.138238	TRRPUKB128F92F2E4B	Gaz Nevada	I C Love Affair
SOWYRXW12A8C1351CA	5.137471	TRMLIKM128F425F622	Joe Christmas	Bedroom Suite

Repeating Song Recommendations for Random Users

```
-- Top 5 Song Recommendations for : 7d90be8dfdbde170f036ce8a4b915440137cb11c --
:Jake Hess: Death Ain't No Big Deal (Tribute To Jake Hess Album Version): SOXXSVC12A582A242D: 5.5158 :
:The fFormula: Cold Blooded (Acid Cleanse): SOANOQW12A58A793D2: 5.2316 :
:Rachel Stevens: Spin That Bottle: SOISKJL12A6D4F8494: 5.1874 :
:Old 97's: Victoria (LP Version): SOSJSSU12A6D4F8F41: 5.1859 :
:Damero feat. Nevis Peak: Gestern_Morgen: SOXQIUR12A8AE4654A: 5.0421 :

-- Top 5 Song Recommendations for : 0f8308935bcbb9a1e04ebb7c4d41c037e5f23b90 --
:David Bowie: Sorrow (1997 Digital Remaster): SODCNEE12A6310E037: 6.8523 :
:León Gieco: Canción Para Luchar: SOJZSWQ12A8C13BD47: 6.4268 :
:Clara Hill: Clara meets Slope - Hard To Say: SOJSXJY12A8C13E32E: 6.1861 :
:Looptroup: Long Arm Of The Law: SORHUJT12A8C13B85E: 5.8572 :
:My Chemical Romance: Welcome To The Black Parade (Album Version): SOQQAQ12A67ADE34D: 5.8395 :

-- Top 5 Song Recommendations for : 03ad93fdb01506ce205f4708decf8e4b1ae90fff --
:The fFormula: Cold Blooded (Acid Cleanse): SOANOQW12A58A793D2: 6.3472 :
:Ron Carter: I CAN'T GET STARTED: SOUNZHU12A8AE47481: 6.2947 :
:Another Sunny Day: Rio: SOTUARP12A8C13CB54: 6.2516 :
:Alceu Valença: Recado Falado (Metrô Da Saudade): SONDKOF12A6D4F7D70: 6.2375 :
:Angels Of Light & Akron/Family: Oceanside: SOAZZRU12AB0182B0E: 6.1515 :

-- Top 5 Song Recommendations for : d30e18323f15426c3cdc8585252ed34459916f51 --
:Vienio & Pele: Automotywacja: SOGBOQX12A8C139DF7: 6.8972 :
:Disturbed: Numb (Album Version): SOTVLHC12A6701EA31: 6.8897 :
:Delegation: One More Step To Take: SOTGNI012AB0184317: 6.7640 :
:Clara Hill: Clara meets Slope - Hard To Say: SOJSXJY12A8C13E32E: 6.3857 :
:Shaggy / Samantha Cole: Luv Me_ Luv Me: SOJYISZ12A8C135F5A: 6.0777 :

-- Top 5 Song Recommendations for : 2e424b28bff1f62a2dae22a918f09f9c30c06d1b --
:keller williams: 221: SOACBLB12AB01871C7: 6.1256 :
:Base Ball Bear: Sayonara-Nostalgia: SOQCGHN12AB0181246: 5.7725 :
:George Dalaras: Bros Sto Rimagmeno Spiti (2003 Digital Remaster): SOFWKCI12A8C13A22A: 5.7468 :
:Jake Hess: Death Ain't No Big Deal (Tribute To Jake Hess Album Version): SOXXSVC12A582A242D: 5.7189 :
:Clara Hill: Clara meets Slope - Hard To Say: SOJSXJY12A8C13E32E: 5.5951 :
```

KNN Recommendations

Show comparing results from the KNN Model, and by the way the data has a small sample size.

Non-personalized recommendations from KNN Model

```
-- Top 5 Song Recommendations for : a73903269e3c4d1054da47c0f746038228bcd9a7 --
:Micheál Ó Súilleabháin: Cearc Agus Coileach / The Hen And Cock: SOAACPJ12A81C21360: 2.5706 :
:Patience & Prudence: A Smile and a Ribbon: SOAADAY12A6D4F9F4C: 2.5706 :
:Gonzalo Rubalcaba: I Remember Clifford: SOAAEKX12A6D4F7E4E: 2.5706 :
:Stellar Kart: Jesus Loves You (Album Version): SOAAFYH12A8C13717A: 2.5706 :
:Melody Gardot: Worrisome Heart: SOAAKSG12A8C136679: 2.5706 :

-- Top 5 Song Recommendations for : 42bc804cef8f195939503a8a7bacc9346b63e312 --
:Micheál Ó Súilleabháin: Cearc Agus Coileach / The Hen And Cock: SOAACPJ12A81C21360: 2.5706 :
:Patience & Prudence: A Smile and a Ribbon: SOAADAY12A6D4F9F4C: 2.5706 :
:Gonzalo Rubalcaba: I Remember Clifford: SOAAEKX12A6D4F7E4E: 2.5706 :
:Stellar Kart: Jesus Loves You (Album Version): SOAAFYH12A8C13717A: 2.5706 :
:Melody Gardot: Worrisome Heart: SOAAKSG12A8C136679: 2.5706 :

-- Top 5 Song Recommendations for : 187ebd2695531c9bf059f8665dc49ab7da5e010a --
:Micheál Ó Súilleabháin: Cearc Agus Coileach / The Hen And Cock: SOAACPJ12A81C21360: 2.5706 :
:Patience & Prudence: A Smile and a Ribbon: SOAADAY12A6D4F9F4C: 2.5706 :
:Gonzalo Rubalcaba: I Remember Clifford: SOAAEKX12A6D4F7E4E: 2.5706 :
:Stellar Kart: Jesus Loves You (Album Version): SOAAFYH12A8C13717A: 2.5706 :
:Melody Gardot: Worrisome Heart: SOAAKSG12A8C136679: 2.5706 :

-- Top 5 Song Recommendations for : 3e138a7ea2a8d24c10ce2cece7e49df5a591e21e --
:Micheál Ó Súilleabháin: Cearc Agus Coileach / The Hen And Cock: SOAACPJ12A81C21360: 2.5706 :
:Patience & Prudence: A Smile and a Ribbon: SOAADAY12A6D4F9F4C: 2.5706 :
:Gonzalo Rubalcaba: I Remember Clifford: SOAAEKX12A6D4F7E4E: 2.5706 :
:Stellar Kart: Jesus Loves You (Album Version): SOAAFYH12A8C13717A: 2.5706 :
:Melody Gardot: Worrisome Heart: SOAAKSG12A8C136679: 2.5706 :

-- Top 5 Song Recommendations for : 3ea56e51e3c92841fb77a3dd1f22d5fbc33718e0 --
:Micheál Ó Súilleabháin: Cearc Agus Coileach / The Hen And Cock: SOAACPJ12A81C21360: 2.5706 :
:Patience & Prudence: A Smile and a Ribbon: SOAADAY12A6D4F9F4C: 2.5706 :
:Gonzalo Rubalcaba: I Remember Clifford: SOAAEKX12A6D4F7E4E: 2.5706 :
:Stellar Kart: Jesus Loves You (Album Version): SOAAFYH12A8C13717A: 2.5706 :
:Melody Gardot: Worrisome Heart: SOAAKSG12A8C136679: 2.5706 :
```

Naïve Recommendation (Cold Start Problem)

Offer my top ten recommendations for a new user with no play count or tracks, addressing the cold start problem.

Naïve Recommendation 1: Top 10 Most Popular Songs by Play Count

MUSIC RECOMMENDER APPENDIX

song_artist	song_name	play_count
Dwight Yoakam	You're The One	35432
Björk	Undo	33179
Kings Of Leon	Revelry	24359
Harmonia	Sehr kosmisch	19454
Barry Tuckwell/Academy of St Martin-in-the-Fie...	Horn Concerto No. 4 in E flat K495: II. Romanc...	17115
Florence + The Machine	Dog Days Are Over (Radio Edit)	14279
OneRepublic	Secrets	12392
Sam Cooke	Ain't Misbehavin	11610
Tub Ring	Invalid	10794
Lonnie Gordon	Catch You Baby (Steve Pitron & Max Sanna Radio...	10515

Naïve Recommendation 2: Most Popular Artists' Most Played Song

Artist	Song	Total Play Count
Dwight Yoakam	You're The One	35432
Björk	Undo	33179
Kings Of Leon	Revelry	24359
Harmonia	Sehr kosmisch	19454
Florence + The Machine	Dog Days Are Over (Radio Edit)	14279
OneRepublic	Secrets	12392
Alliance Ethnik	Représente	9685
Train	Hey_ Soul Sister	8718
Justin Bieber	Somebody To Love	5162
Coldplay	The Scientist	4561