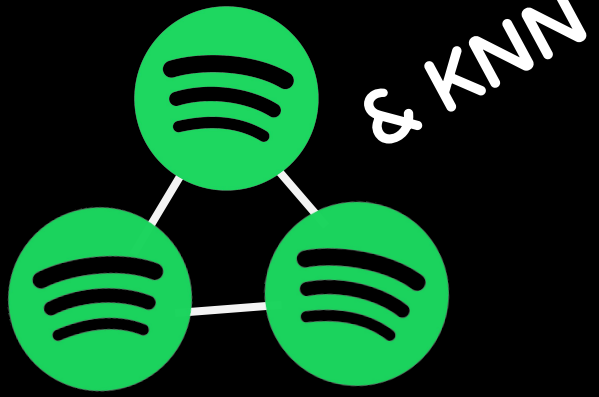
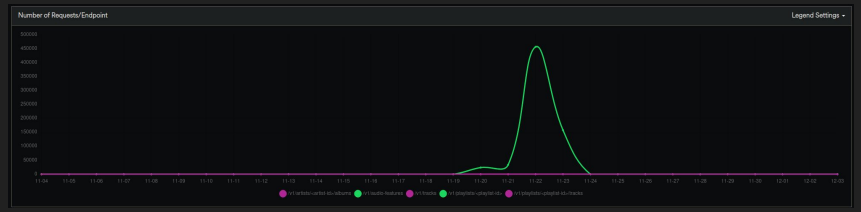
Spotify®

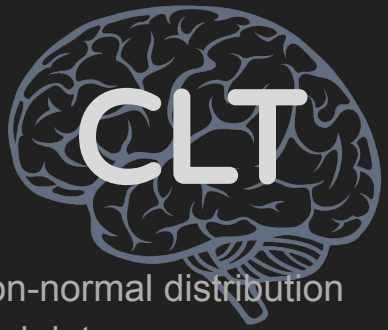


Playlist Clustering

Data and EDA

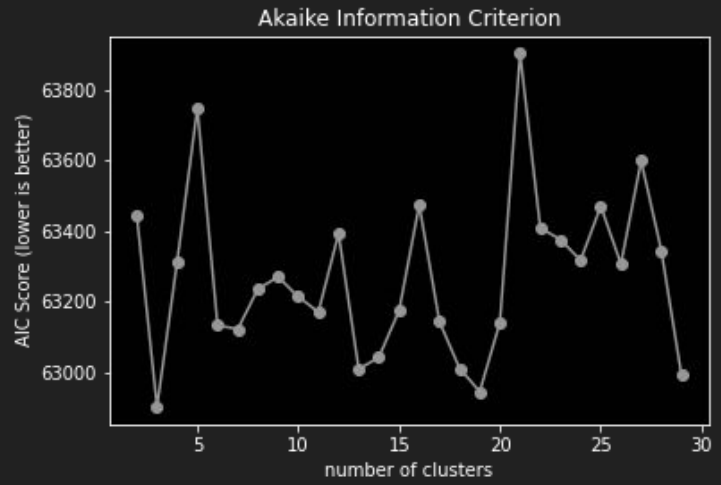


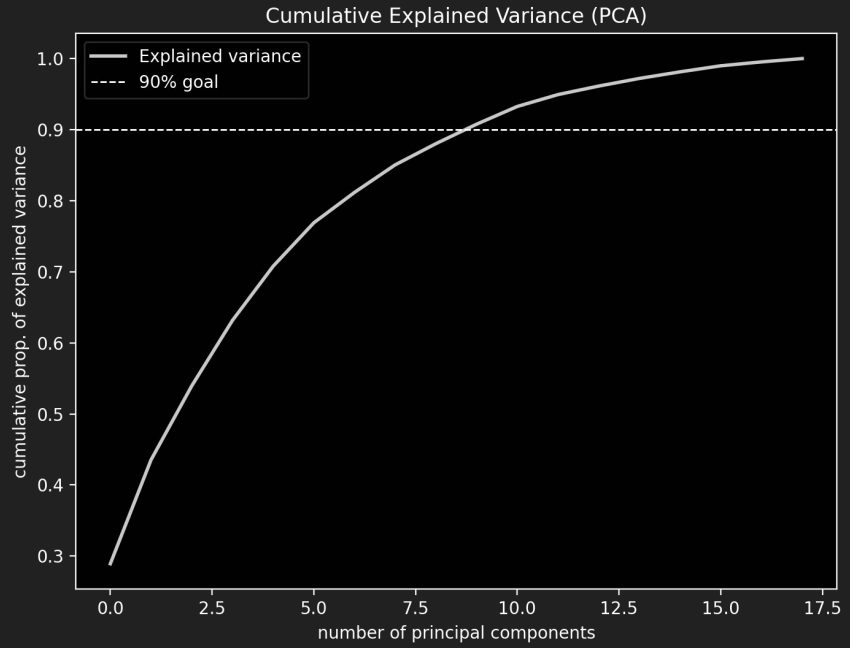
- Playlist Data - 1M Playlists from Kagge (.JSON)
- Spotify API request for song analysis
  - Danceability, loudness, mode, speechiness, acousticness, instrumentalness, liveness, valance, tempo
  - Goal - cluster playlists using only these features
  - Learn more about song analysis
- Feature Selection
  - Take mean, std of song features in each playlist
  - Initially used min,max values but removed later on due to non-normal distribution
  - Method I ultimately chose works well with normally distributed data
  - Compromise between describing playlists better, and improving cluster shapes
  - 18 total features



Selecting Best Methods

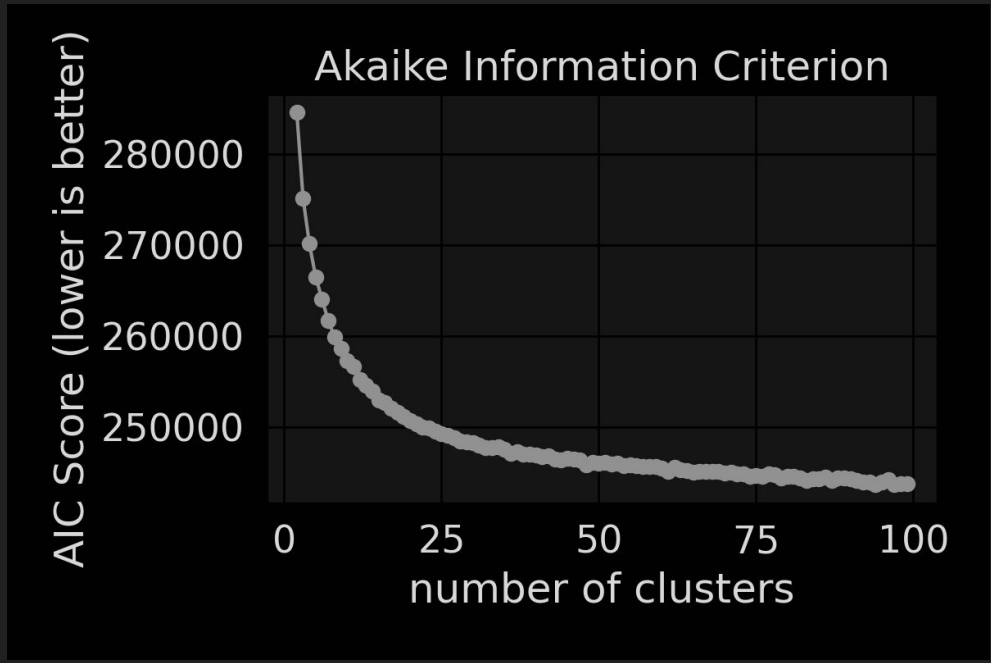
- MinMaxScaler vs StandardScaler
- PCA vs NMF
- Kmeans
- DBSCAN
- Gaussian Mixture
- Bayesian Gaussian Mixture





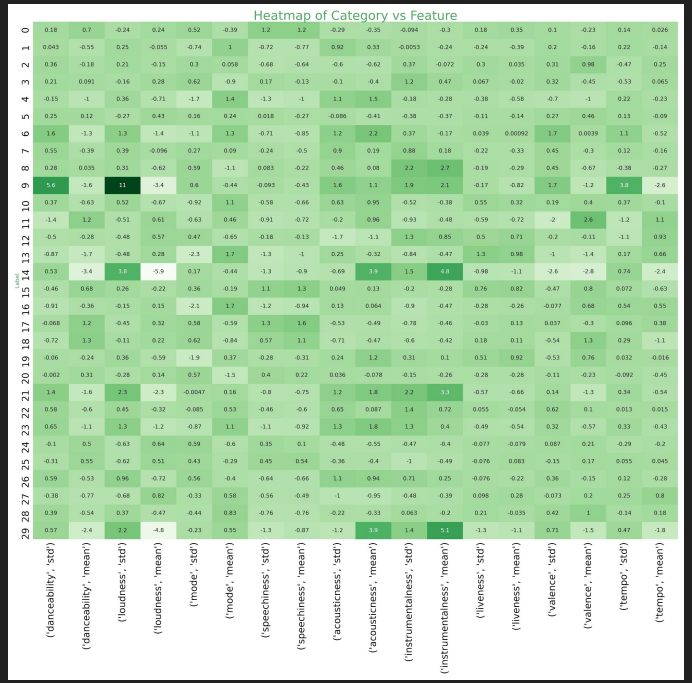
Finalization

- Gaussian Mixture Model
- Use full dataset: 70,000 playlist, 6.3M songs
  - More than 5 followers, more than 20 songs
- Run at many K values and choose best (AIC Score)
- Scalability concerns - $O(NKD^3)$
- Try reducing complexity in the future - **Fast Incremental Gaussian**



Evaluating Labels

- Train at K=30, append labels
- Heatmap to evaluate labels by their features (training on all 18 features)
- Fit KNN to identify nearest neighbors to cluster centers, grouped by artist count



Hannibal Buress
Bill Burr
Mitch Hedberg
Louis C.K.
Jim Gaffigan
Daniel Tosh
Mike Birbiglia
Bill Engvall
Kevin Hart
Tom Segura
Jim Jefferies
John Mulaney
Nick Swardson
Tommy Johnagin
Pablo Francisco
Jeff Dunham
Chris Porter
Robin Williams
Eddie Murphy
Patton Oswalt
Patrice O'Neal
Doug Stanhope
Aziz Ansari
Jeff Foxworthy, Bil
Ron White
Dave Attell
Dane Cook
Joe Rogan
Nine Inch Nails
Tim Wilson
Natasha Leggero
Todd Snider
Napoleon XIV
Anthony Jeselnik
Matthew Broussard
Greg Warren
Bill Hicks
Brian Regan
Chris Rock
Christopher Titus
David Cross
Maria Bamford
Demetri Martin
Jerry Seinfeld
Kim Sozzi
Wyatt Cenac
Hard 'n Phirm
Norm MacDonald
Scorpions
Jim Norton

Drake
Kendrick Lamar
Lil Uzi Vert
J. Cole
Future
Kanye West
Kevin Gates
Migos
Rae Sremmurd
Big Sean
G-Eazy
Post Malone
Young Thug
Kodak Black
Eminem
Gucci Mane
A$AP Rocky
Lil Wayne
Travis Scott
Wiz Khalifa
21 Savage
Fetty Wap
Logic
JAY Z
2 Chainz
Tyga
Chance The Rapper
Mac Miller
Lil Yachty
Childish Gambino
ScHoolboy Q
Meek Mill
The Weeknd
Kid Cudi
2Pac
Ty Dolla $ign
A Boogie Wit da Hoodie
DJ Khaled
Yo Gotti
A$AP Ferg
DRAM
Nicki Minaj
Chris Brown
Kid Ink
French Montana
T.I.
Juicy J
MadeinTYO
KYLE
50 Cent

Linkin Park
AC/DC
Three Days Grace
Red Hot Chili Peppers
Metallica
Guns N' Roses
Breaking Benjamin
Nickelback
Nirvana
Disturbed
Avenged Sevenfold
Queen
Shinedown
Five Finger Death Punch
System Of A Down
Led Zeppelin
Papa Roach
Skillet
The Rolling Stones
Seether
Bon Jovi
Aerosmith
Green Day
Fall Out Boy
Van Halen
The Beatles
blink-182
Slipknot
Pink Floyd
Foo Fighters
3 Doors Down
The Offspring
Theory of a Deadman
Korn
Bullet For My Valentine
Lynyrd Skynyrd
Rise Against
Godsmack
Journey
Creedence Clearwater Revival
Limp Bizkit
Jimi Hendrix
Rage Against The Machine
Staind
Black Sabbath
Chevelle
Mötley Crüe
Pearl Jam
The White Stripes
Kid Rock

Chris Tomlin
Hillsong United
Casting Crowns
Hillsong Worship
Newsboys
tobyMac
MercyMe
Tenth Avenue North
Lecrae
Phil Wickham
Jeremy Camp
NEEDTOBREATHE
Hillsong Young & Free
for KING & COUNTRY
Matthew West
Shane & Shane
Elevation Worship
Passion
Francesca Battistelli
David Crowder Band
Rend Collective
Matt Maher
Kari Jobe
Lauren Daigle
Big Daddy Weave
Matt Redman
Sidewalk Prophets
Third Day
Switchfoot
Brandon Heath
Kutless
Jesus Culture
Skillet
Crowder
Phillips, Craig & Dean
All Sons & Daughters
Natalie Grant
Steven Curtis Chapman
Britt Nicole
Unspoken
Aaron Shust
Building 429
Hawk Nelson
The Afters
Jason Gray
Shawn McDonald
Trip Lee
Jordan Feliz
Mandisa
Michael W. Smith

Rihanna
Chris Brown
Usher
Beyoncé
Justin Bieber
The Black Eyed Peas
Katy Perry
Jonas Brothers
Kanye West
Britney Spears
Jason Derulo
Miley Cyrus
Nelly
Justin Timberlake
Fergie
T-Pain
Akon
Hannah Montana
Kesha
Avril Lavigne
Ne-Yo
Flo Rida
Soulja Boy
Sean Kingston
Lil Wayne
Gwen Stefani
Jesse McCartney
Maroon 5
Destiny's Child
Drake
50 Cent
Lady Gaga
Kelly Clarkson
Eminem
The All-American Rejects
R. Kelly
High School Musical Cast
T.I.
Trey Songz
*NSYNC
Nelly Furtado
JAY Z
B.o.B
Taylor Swift
Ciara
OutKast
Taio Cruz
Iyaz
Jay Sean
Nicki Minaj

Marco Mengoni
Dario Marianelli
Tiziano Ferro
Louis Armstrong
NEEDTOBREATHE
Italian Mandolin Torna A Surriento
Rockabye Lullaby
Alan Farrington
Billie Holiday
Jazz Band Piano Blues
Italian Restaurant Music of Italy
Etta James
Ziggy Alberts
Sticky Fingers
Otis Redding
Kanye West
Baby K
Jovanotti
Tyler, The Creator
Dinah Shore
Tossing Copper
Dean Martin
Ben Howard
Lorde
Jo Stafford
Ella Fitzgerald
Elliott Smith
Sam Cooke
Arcade Fire
Mumford & Sons
Amber Run
Alexandre Desplat
Mac Demarco
Four Tops
Ocean Alley
Frank Sinatra
Kay Starr
Louis Armstrong & His All-Stars
Nico Muhly
AJJ
Young Thug
The Supremes
Ben Rector
Lana Del Rey
St. Vincent
Artie Shaw
La Paloma Guitars
Simon & Garfunkel
Bear's Den
Craig Armstrong

KNN for Playlist Recommendation

- Input Spotify Playlist URL and locate nearest neighbors
- Discover new music!

```
neighbors= new_playlist('https://open.spotify.com/playlist/6TeyryiZ2UEf3CbLXyztFA', playlist_analysis, playlist_master)
```

artist_name	track_name	album_name
Ted Nugent	Stranglehold	Ted Nugent
Bon Jovi	Livin' On A Prayer	Slippery When Wet
Ozzy Osbourne	Mr. Crowley	The Essential Ozzy Osbourne
Dio	Holy Diver	Holy Diver
Ozzy Osbourne	Crazy Train - Remastered	Blizzard of Ozz (Expanded Edition)
Ozzy Osbourne	N.I.B.	Prince Of Darkness
Guns N' Roses	Knockin' On Heaven's Door	Use Your Illusion II
Mötley Crüe	Wild Side	Girls, Girls, Girls
The Offspring	Defy You	Greatest Hits
The Offspring	Coming for You	Coming for You
Dio	Rainbow In The Dark	Holy Diver
Metallica	One	...And Justice For All
Metallica	The Day That Never Comes	Death Magnetic
Metallica	The Unforgiven III	Death Magnetic