A corpus analysis of chords in rock music

LTAT.02.015 Music Information Retrieval

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Initial goals

Focus on the analysis of music and not the method of analysis.

Simple steps for a successful projet:

1. Gather an assortment of songs from a certain era or genre (e.g. 80s)
2. Run automatic chord recognition (ACR) on the songs
3. Analyze the results and correlations between chords
4. ???
5. Profit

The songs in the analysis should be from popular music with at least a sample size of n = 100.

Prove that rock uses ‘easier’ chords (in guitar terms).

Difficulties

Choosing a dataset of songs

- Can't just pull music from Spotify, the songs have to be stored locally
- Had to resort to old-school methods...

Picking a suitable automatic chord recognition (ACR) system

- Implementing my own would've been a major hassle and most likely not well-performing.
- The point of my project was not to create a method for analysis, but to actually analyze music.
- Finding a suitable ACR would prove to be the hardest part.

Chord AI - Real-time chord recognition

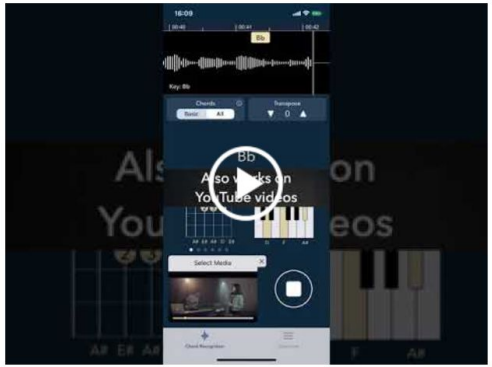
Chord AI Music & Audio ★★★★★ 2,554

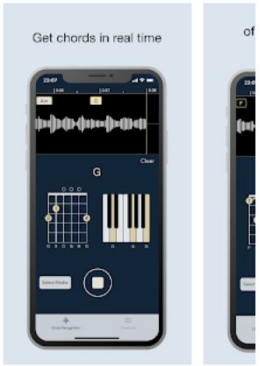
Everyone

Offers in-app purchases

This app is available for all of your devices

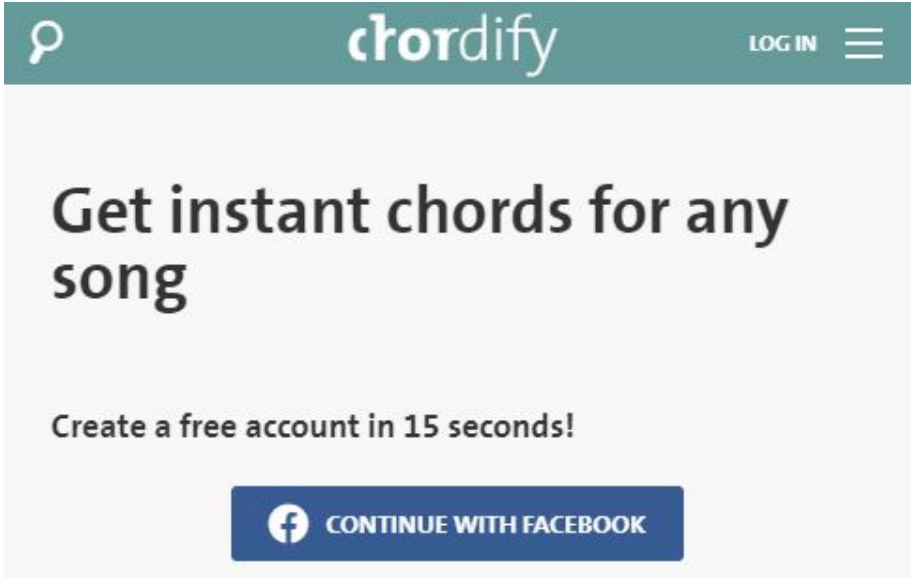
Add to Wishlist Install





Chord AI uses recent advances in AI to give you the chords of any song automatically and reliably. You won't need to look for the chords of a song on the web anymore!

Chord AI listens to the music played from your device, from any video/audio streaming service or played live around you, and detects the chords instantly. Then it shows you the finger positions to play the song on your Guitar, Piano or Ukulele.



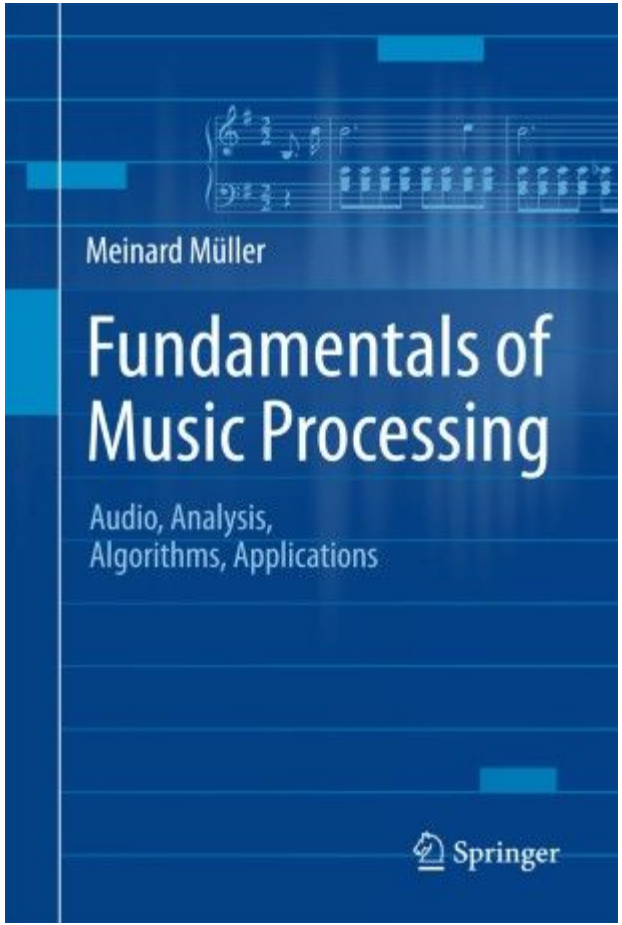
The Bible of MIR?

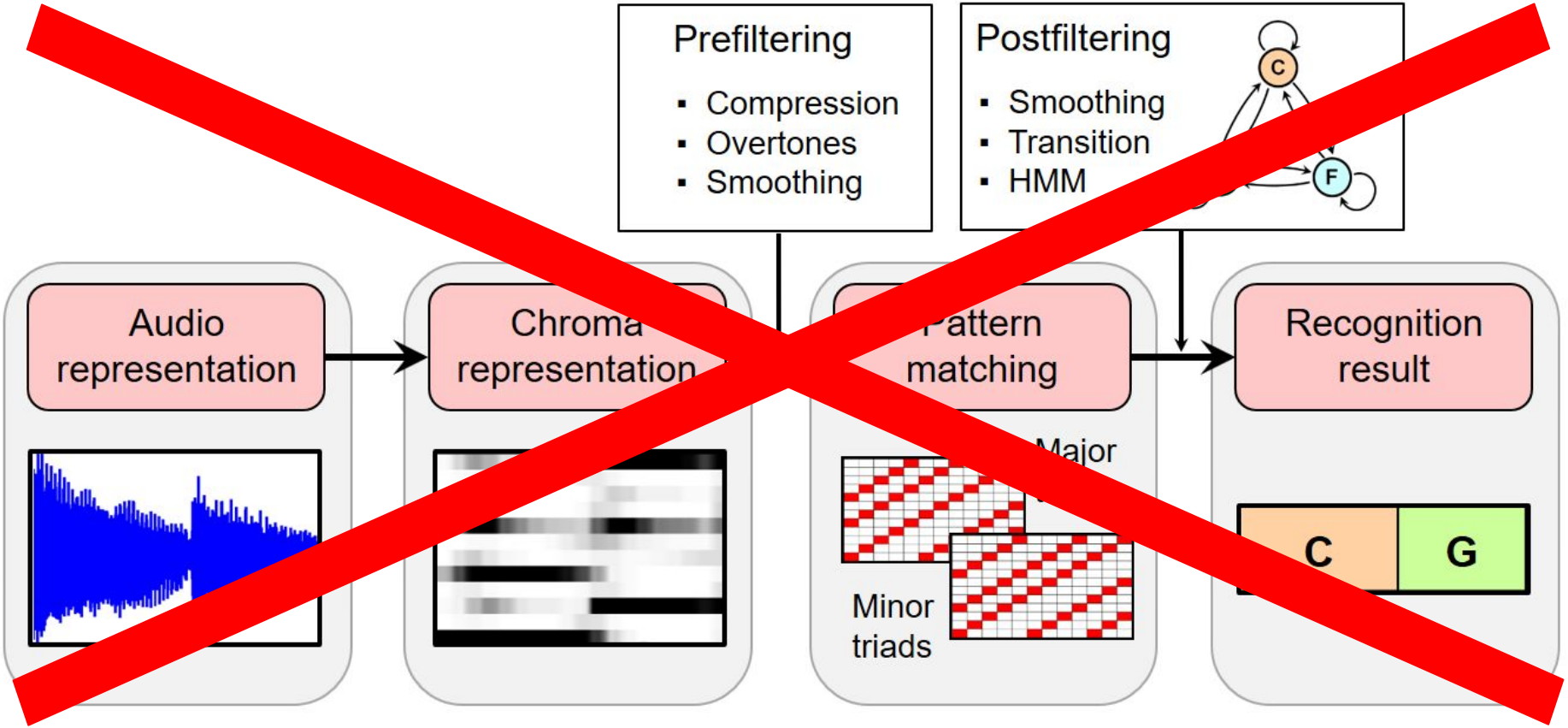
I stumbled through **many** articles that focused on creating an ACR

Found a book with in-depth tutorials for many processes in MIR

Even found a notebook that has the code for implementing an ACR

It was not meant to be...




Prefiltering
Compression
Overtones
Smoothing
Postfiltering
Smoothing
Transition
HMM
C
F
Audio representation
Chroma representation
Pattern matching
Recognition result
Major
Minor triads
C
G

...the tough get going!

By some miracle, I finally found an implementation of ACR that could predict chords for more than 1 chord at a time.

Got it to work after some tweaking (e.g. CuPy -> Numpy).

Runtime was pretty short (a few seconds for a 90s clip).

Got the implementation working on my system 24h before project presentations.

Xiao-Ming

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README.md

Automatic Audio Chord Recognition with MIDI-Traind Deep Feature and BLSTM-CRF Sequence Decoding Model

The source codes used for the experiments presented in our chord recognition work are presented here. Please refer to the following instructions if you want to reproduce the experiments.

Methodology

Dataset is KISW (Rock of Seattle's) Top 750 Rock songs.

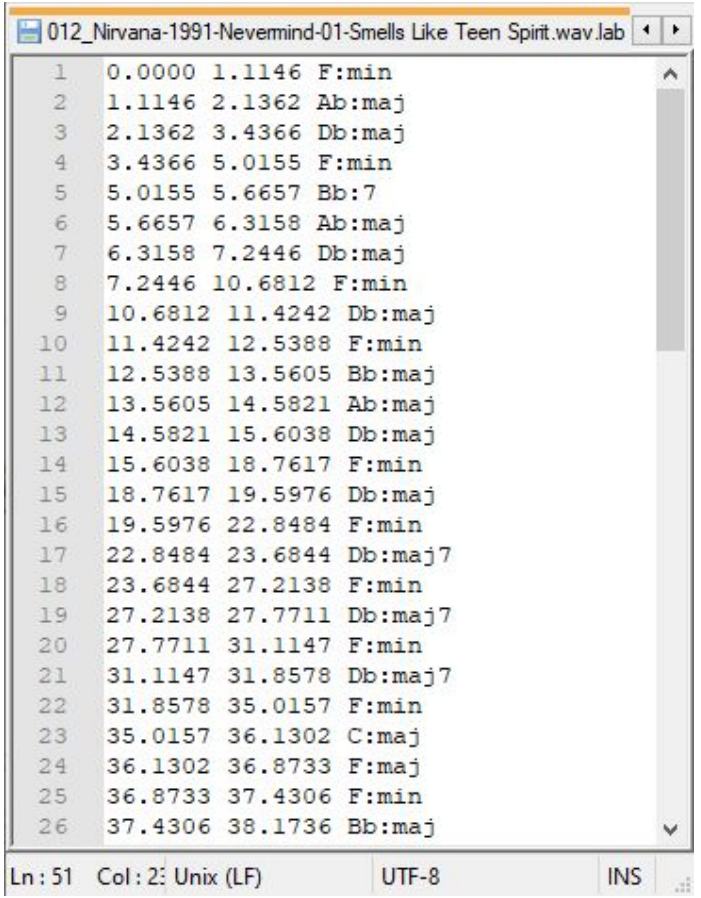
Converted songs from .mp3 to .wav.

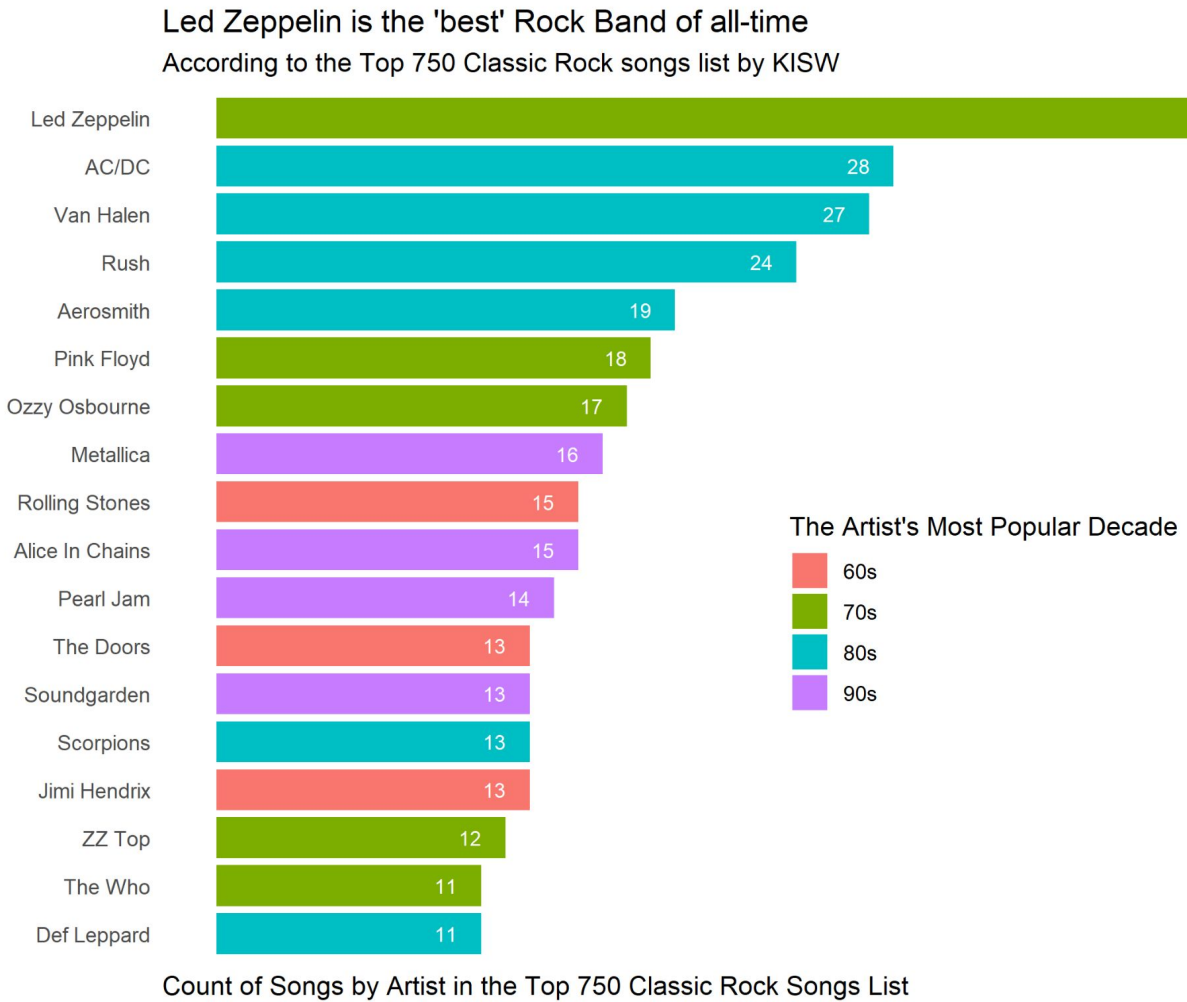
Spliced each song from 30s to 120s (for a total duration of 90s).

Ran Automatic Chord Recognition on each spliced song.

Received start and end timestamps and chords (with modes!).

Joined metadata to the ACR dataset.





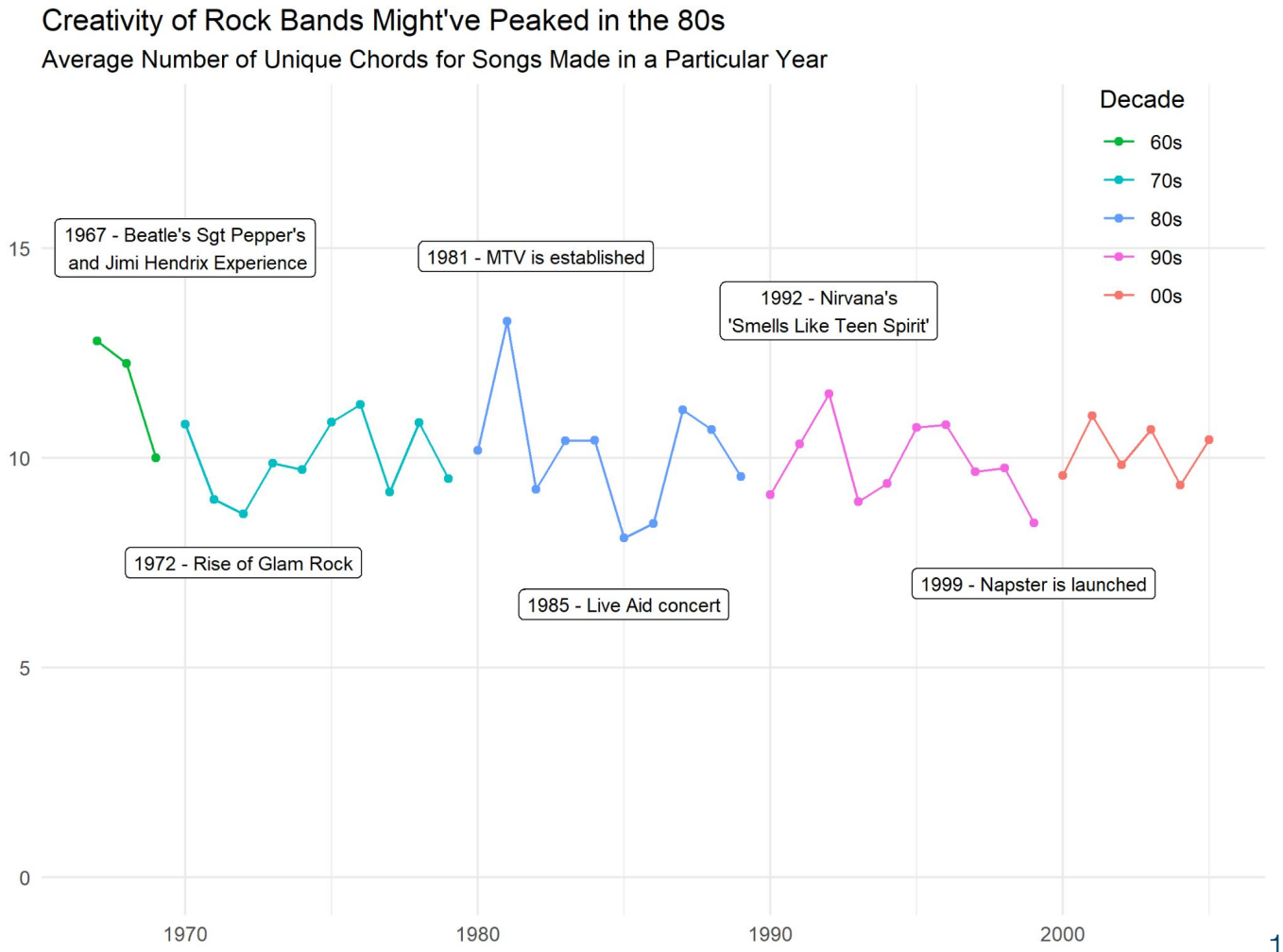
Anyone would be biased in choosing songs for a TOP list

Many house-hold names missing

Is Beatles rock?
Is Fleetwood Mac rock?
Is Genesis rock?
...etc.

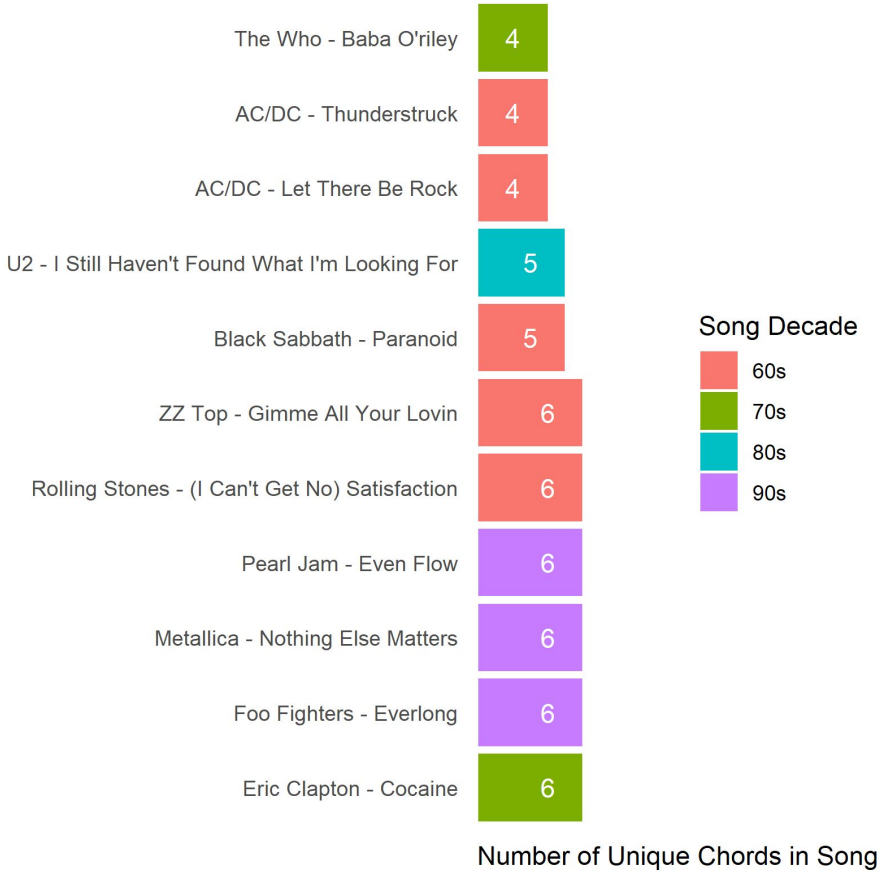
American bias

- Deviations could come from small sample size per year
- No decade is particularly more boring than others
- Surprisingly high number of unique chords on average



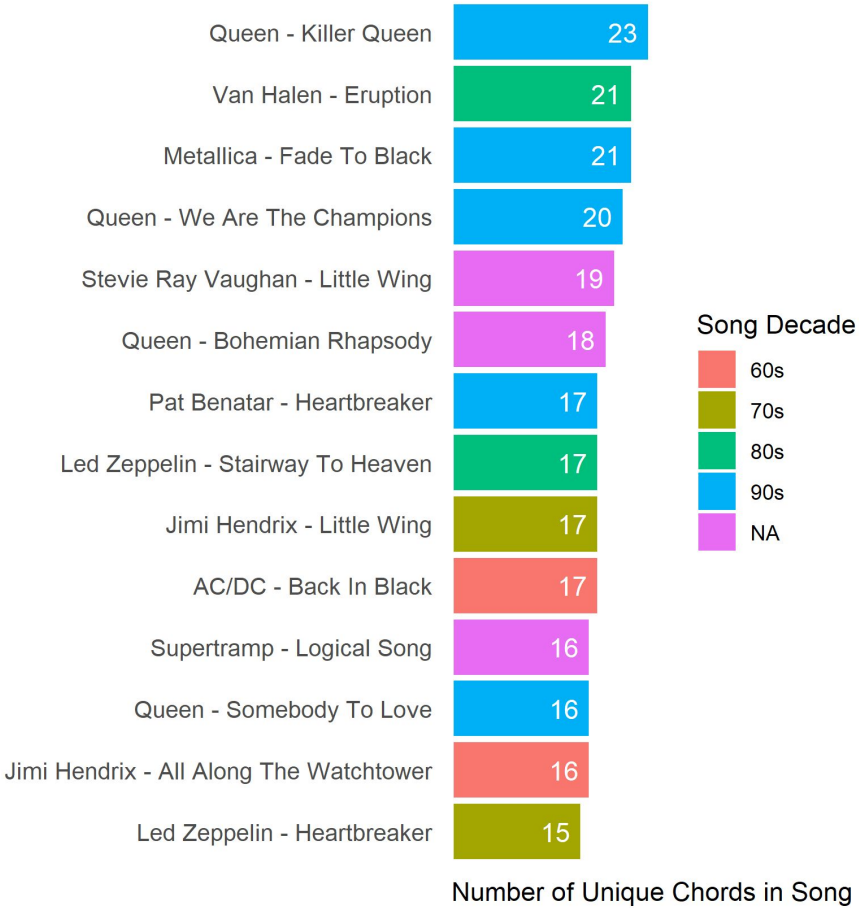
A rock musician plays 3 chords for 1000 people, while a jazz musician plays 1000 chords for 3 people

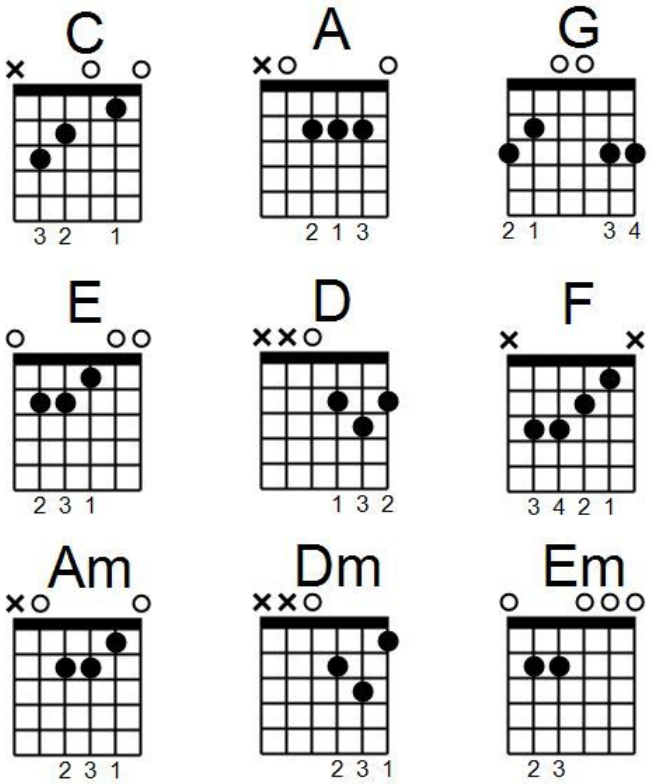
Number of Unique Chords in Popular Songs with few unique chords

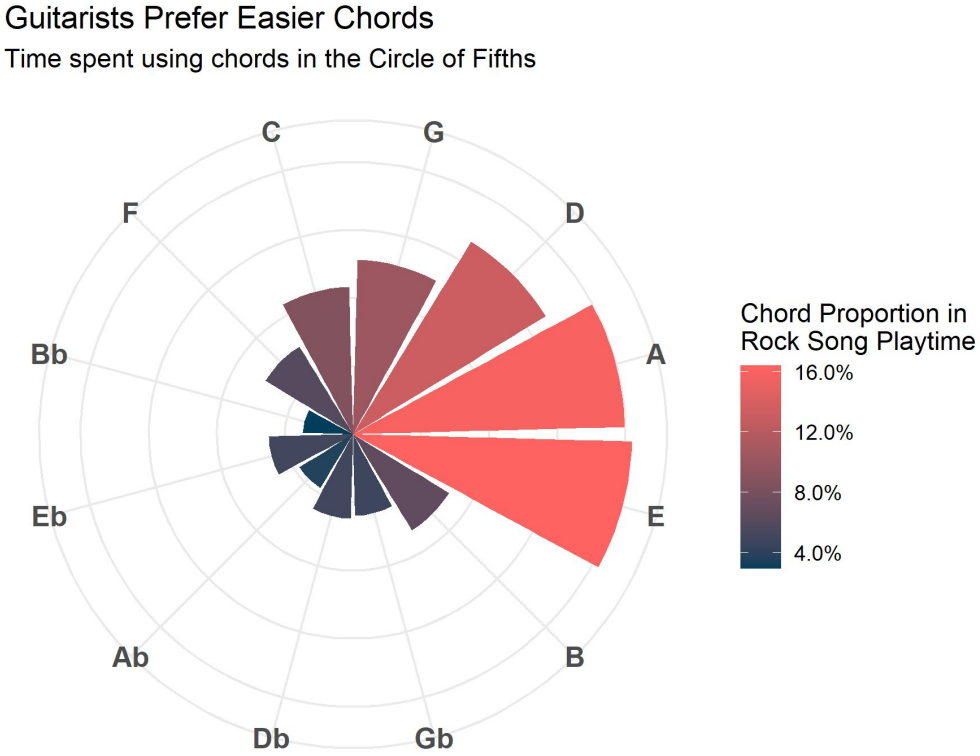


Complicated songs also get a Whole Lotta Love

Number of Unique Chords in Popular Songs with few unique chords

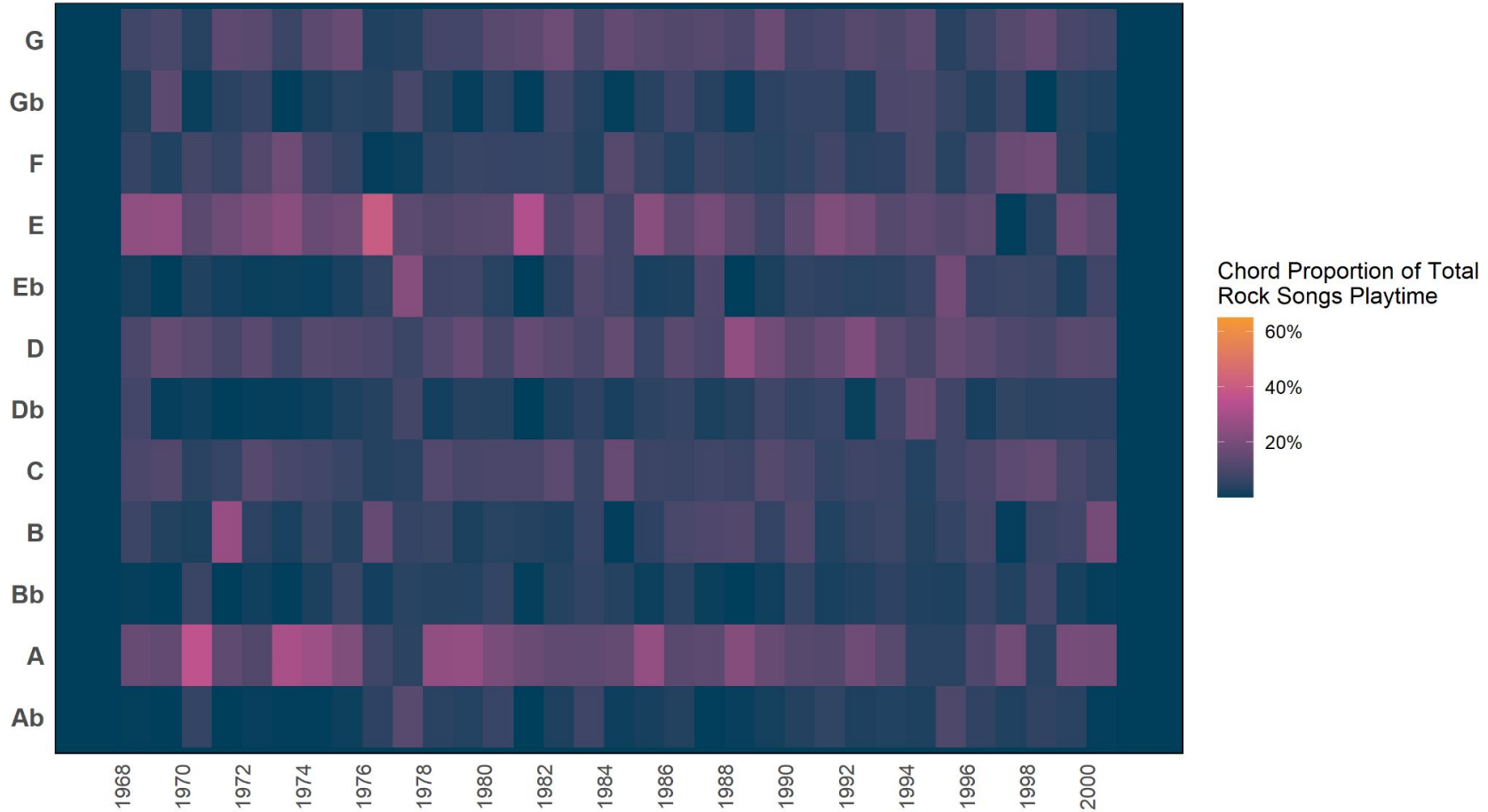



C
3 2 1
A
2 1 3
G
2 1 3 4
E
2 3 1
D
1 3 2
F
3 4 2 1
Am
2 3 1
Dm
2 3 1
Em
2 3


Guitarists Prefer Easier Chords
Time spent using chords in the Circle of Fifths
C
G
D
A
E
B
Gb
Db
Ab
Eb
Bb
F
Chord Proportion in Rock Song Playtime
16.0%
12.0%
8.0%
4.0%

E and A are all-time favorites

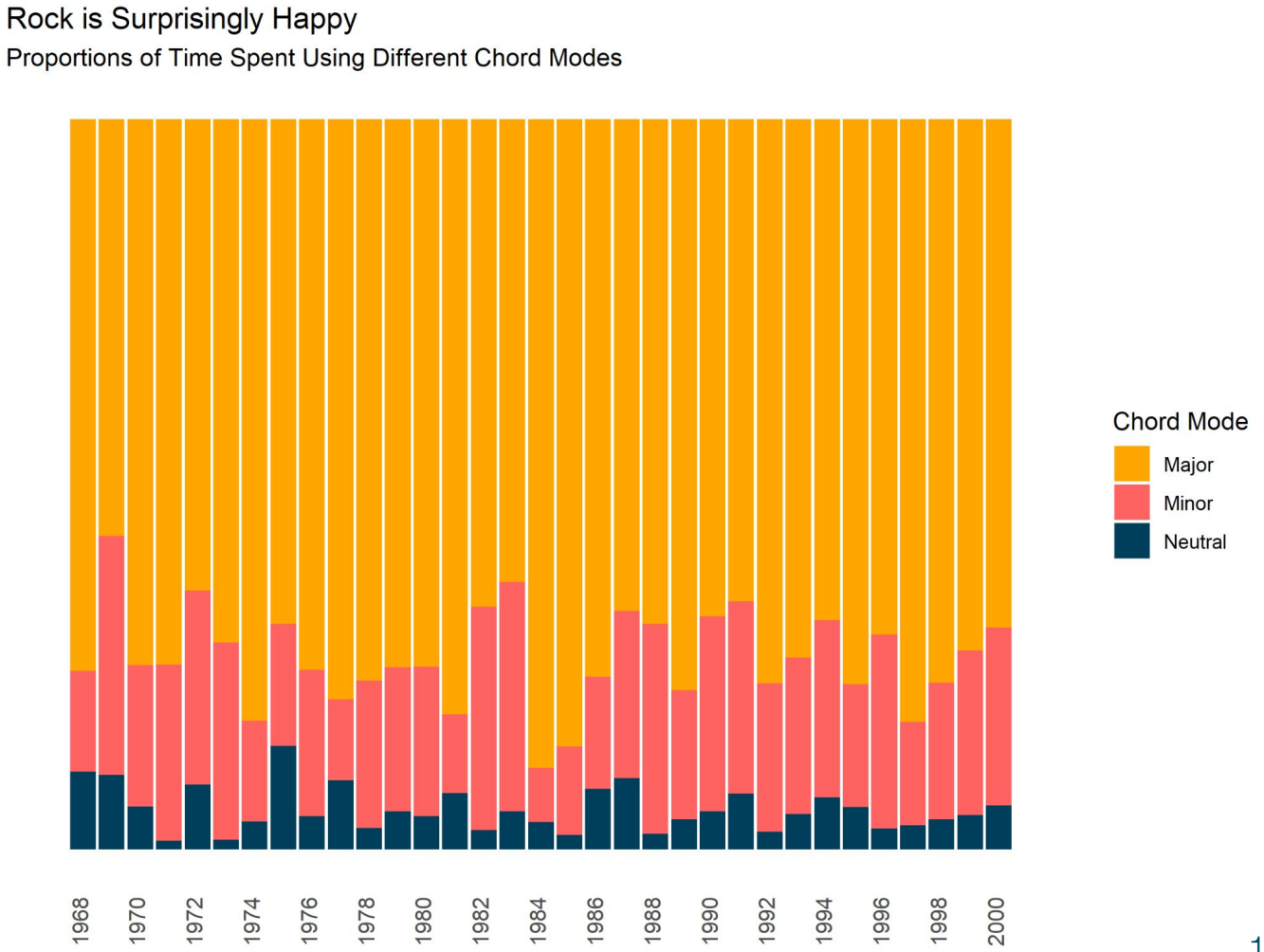
Prevalence of chords during the Age of Rock



Would've expected more neutral chords

Maybe a limitation of the ACR and its training set?

Thought the 1990s would have more minor prevalence with its grunge



Conclusion

Automatic chord recognition (ACR) is a widely tackled problem, but most of the solutions only focus on short 1-instrument samples.

I’m happy that I finally got some kind of ACR working.

Learned a lot about project workflow and common practices in Python.

As I hypothesized, rock music uses mostly ‘easier’ chords.

The joke about a ‘3-chord’ rock song is somewhat based on reality.

A difference in chord usage depending on decade couldn’t be spotted.

Possible development of my own chromagram and chord estimation tool in the summer?

When the going gets tough...

Alternative idea: scrape Ultimate-Guitar for guitar chords and analyse

Found many implementations of UG scrapers

The ones that seemed to work were taken down by UG

Motivation was dwindling