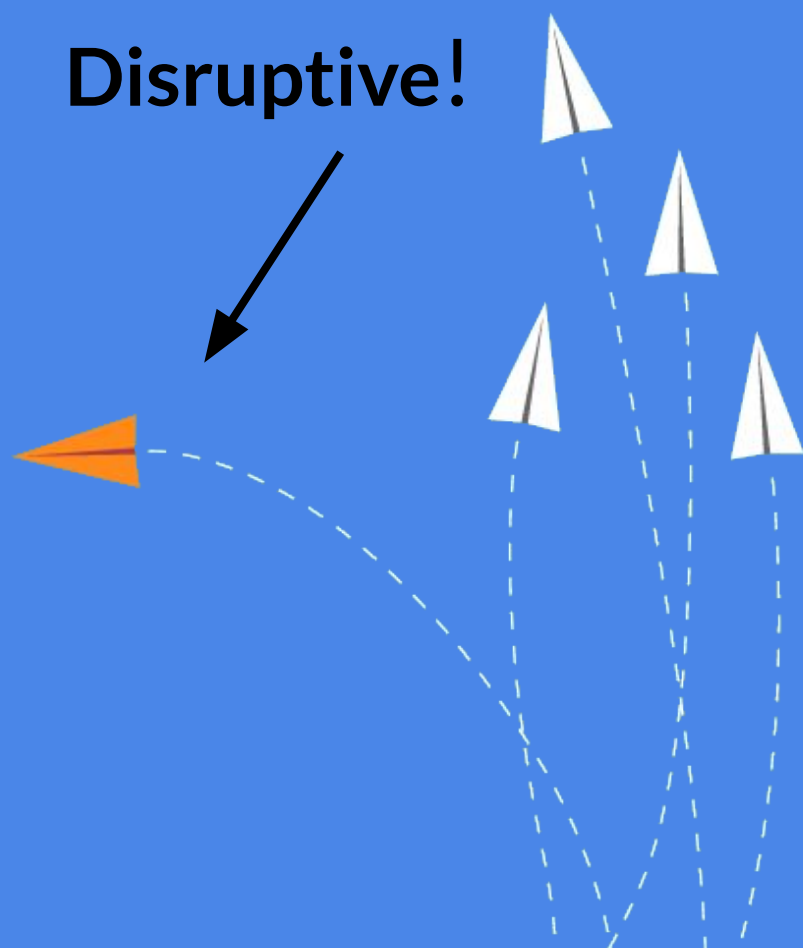# Measuring disruption in song similarity networks

Felipe Falcão, Nazareno Andrade, Flávio Figueiredo, Diego Silva, Fábio Morais
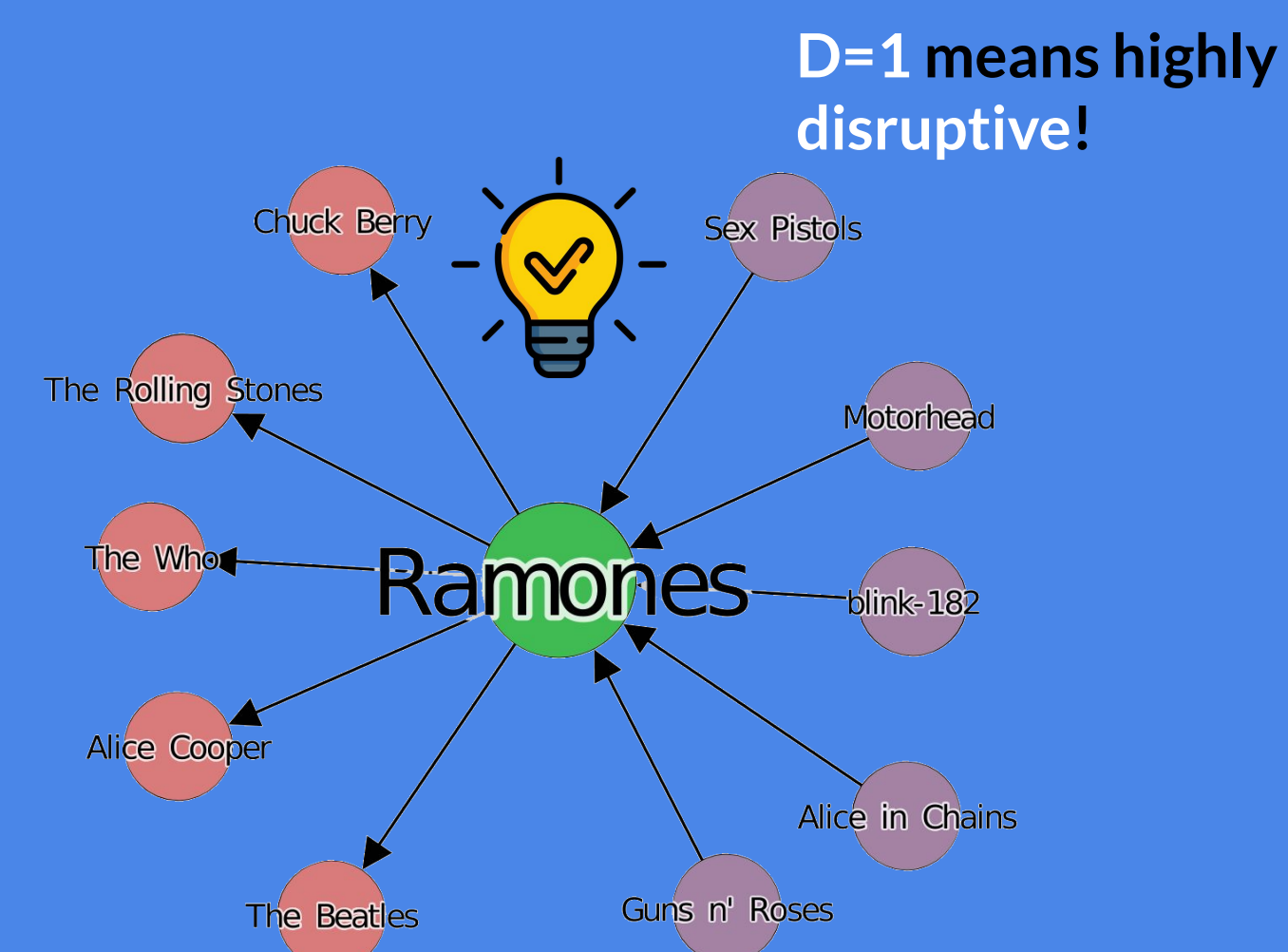
UFCG — Universidade Federal de Campina Grande · SUPRA OMNES LUX LUCIS

ufSCar · UFMG — Universidade Federal de Minas Gerais

What is disruption and how to measure it using similarity networks?

Disruptive!

Disruption index (D)

Disrupting D = 1   Neutral D = 0   Developing D = -1

$$D = \frac{n_i - n_j}{n_i + n_j + n_k}$$
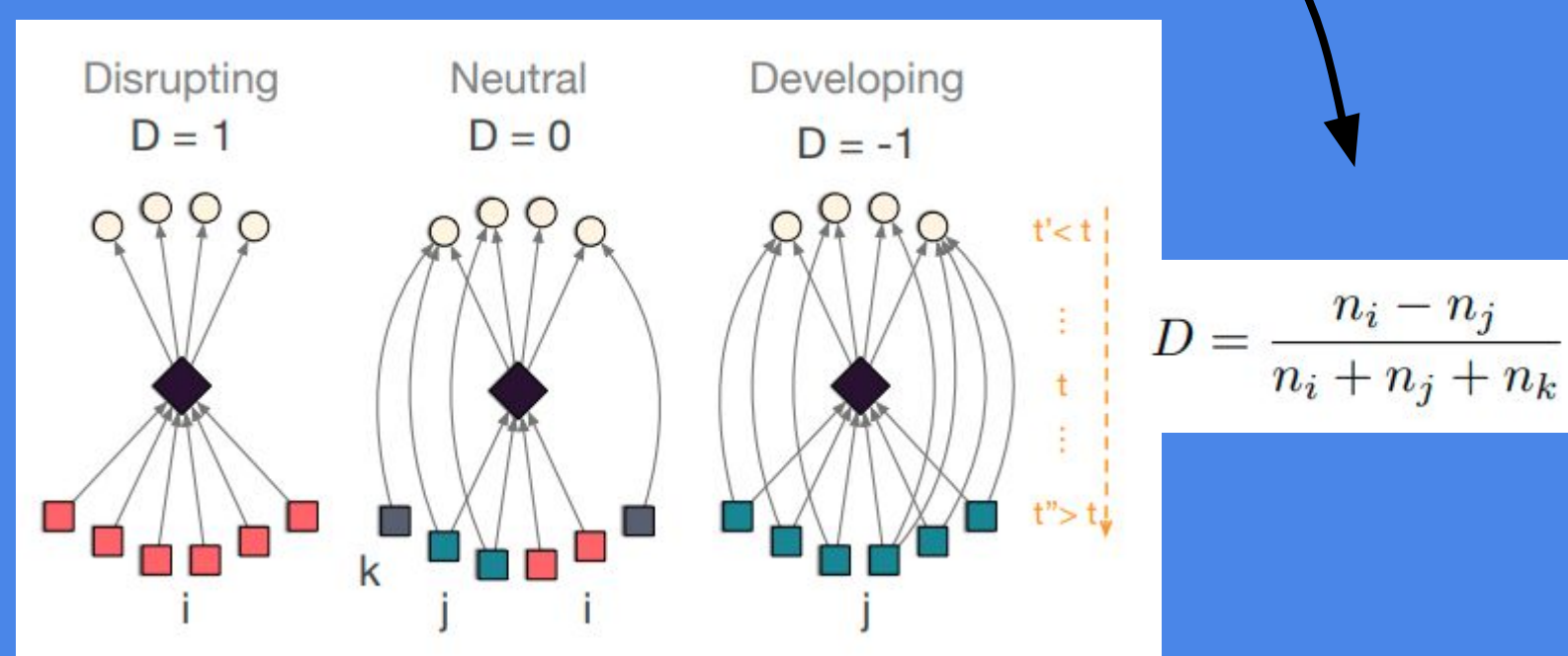
F. Figueiredo and N. Andrade, "Quantifying disruptive influence in the allmusic guide," in ISMIR, 2019

D=1 means highly disruptive!

Chuck Berry · Sex Pistols · The Rolling Stones · Motorhead · The Who · Ramones · blink-182 · Alice Cooper · Alice in Chains · The Beatles · Guns n' Roses
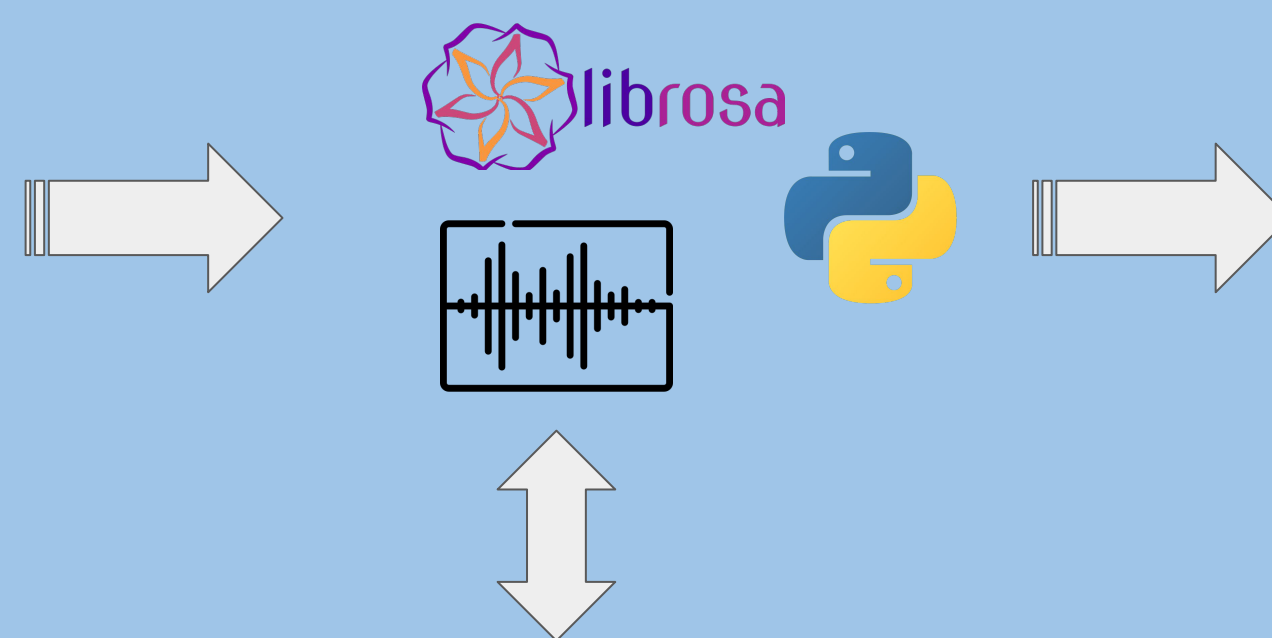
" (...) inarguably the most relevant band in punk history" (AllMusic guide)

Data collection and pre-processing

FORRÓ DE VINIL.COM

Crawled data
- 31,485 songs;
- 836 artists;
- 2,449 albums;
- 1945 to 2016

librosa · Python

Ze Paraiba - So danco com voce · Marines - Maria Aurora · Jackson do Pandeiro - Boi de canga · Eraldo Lucena - Casei-me com ela · Alcymar Monteiro - Pedro e po · Jackson do Pandeiro - Alo, alo, Campina Grande · Ary Lobo - Deixa a Onda Passar · Genival Lacerda - Benzinho · Elino Juliao - Carregado de amargura · Erivaldo de Carira - Coracao sofrido

**How do we validate our features?**

- SVM classifiers trained with Forró data
  - Artist classifier: Accuracy of **79%**
  - Album classifier: Accuracy of **88%**
- SVM uses **RBF distance** to define **similarity**
  - And so do we!
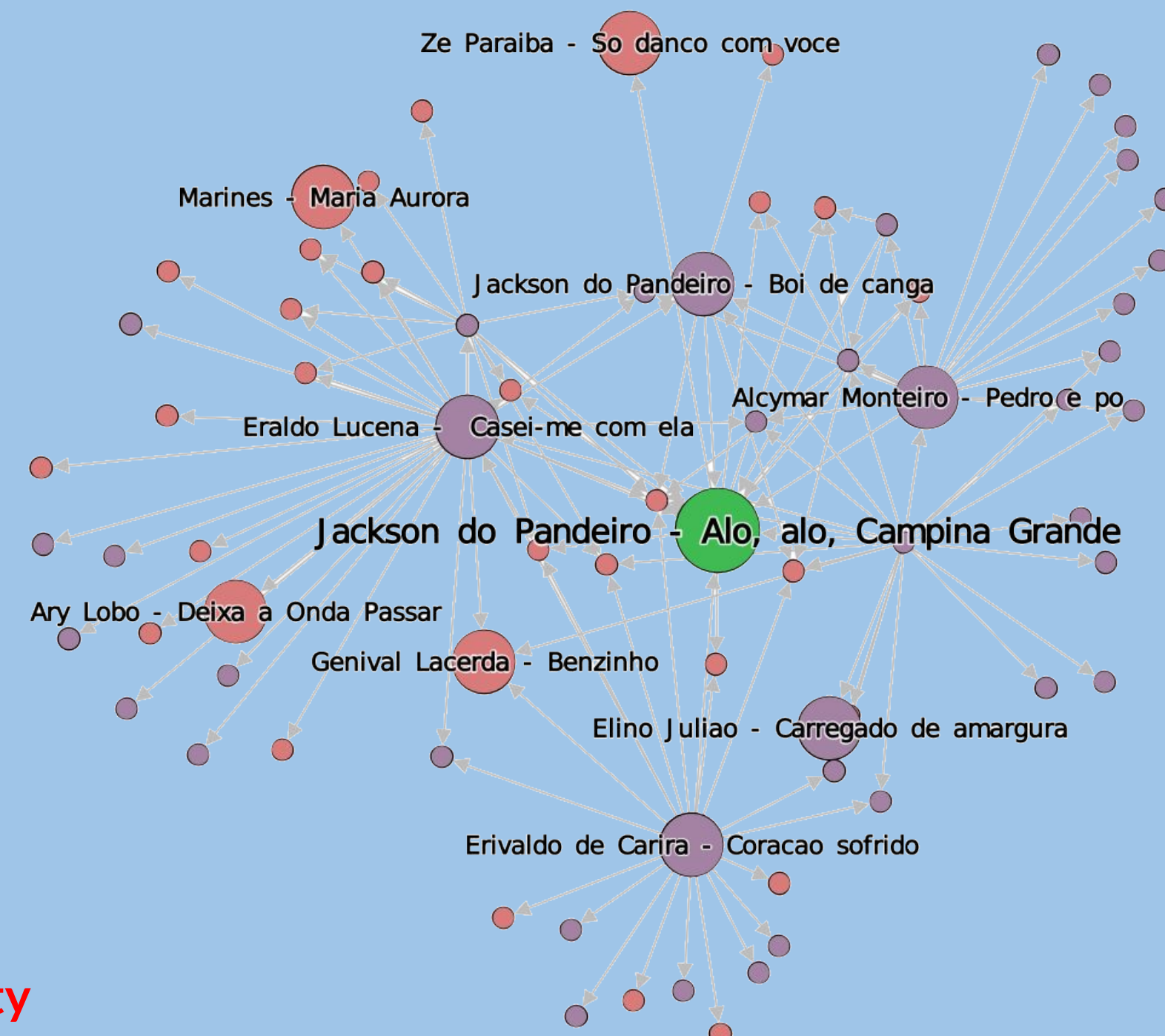
Disruption results

What do the disruption indexes extracted from the network unveil about the history of Forró?

Top-5 most disruptive artists (5 to 95 percentiles over time)

Luiz Gonzaga · Marinês · Sivuca · Genival Lacerda · Dominguinhos · Flávio José
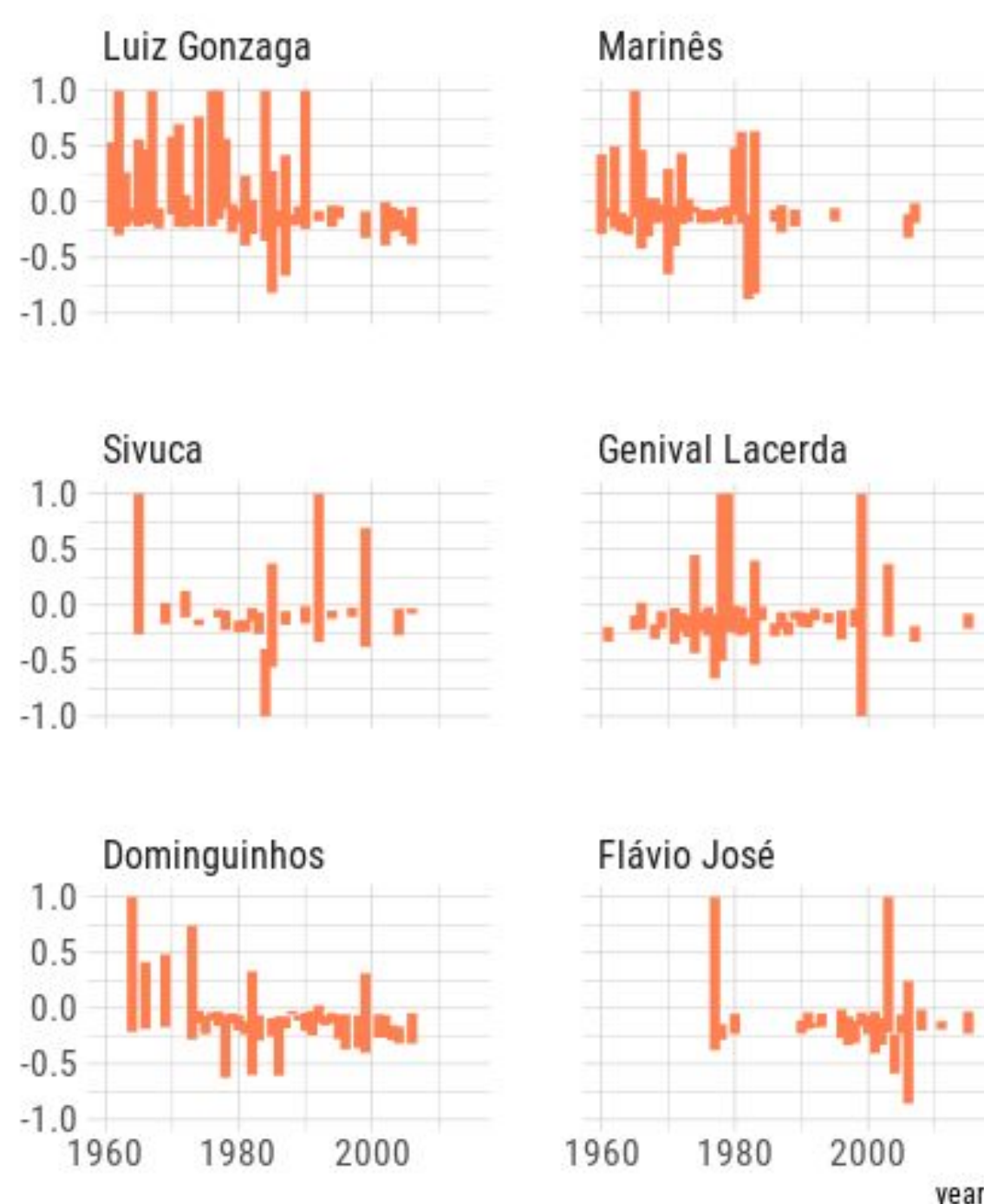
Top-5 most disruptive songs (n_i is the tiebreaker)

n_i is the tiebreaker

Song	Artist	Year	D	Possible reason
Padrinho Cícero do Juazeiro	Trio Juazeiro	1982	1	Clear and complex **accordion arrangement**
Namorada deJoão	Coroné Narcisinho	1969	1	Very noticeable **triangle** as part of the percussive setup
Sem vergonheira	Marinês	1972	1	Marinês is one of the **first female Forró singers**
Derramaro o gai	Luiz Gonzaga	1962	1	Refined **accordion melodies**
Lembranças	Flávio José	1977	1	Possible **introduction of acoustic guitar** in the instrument set

Disruption over time (5 to 95 percentiles over time)
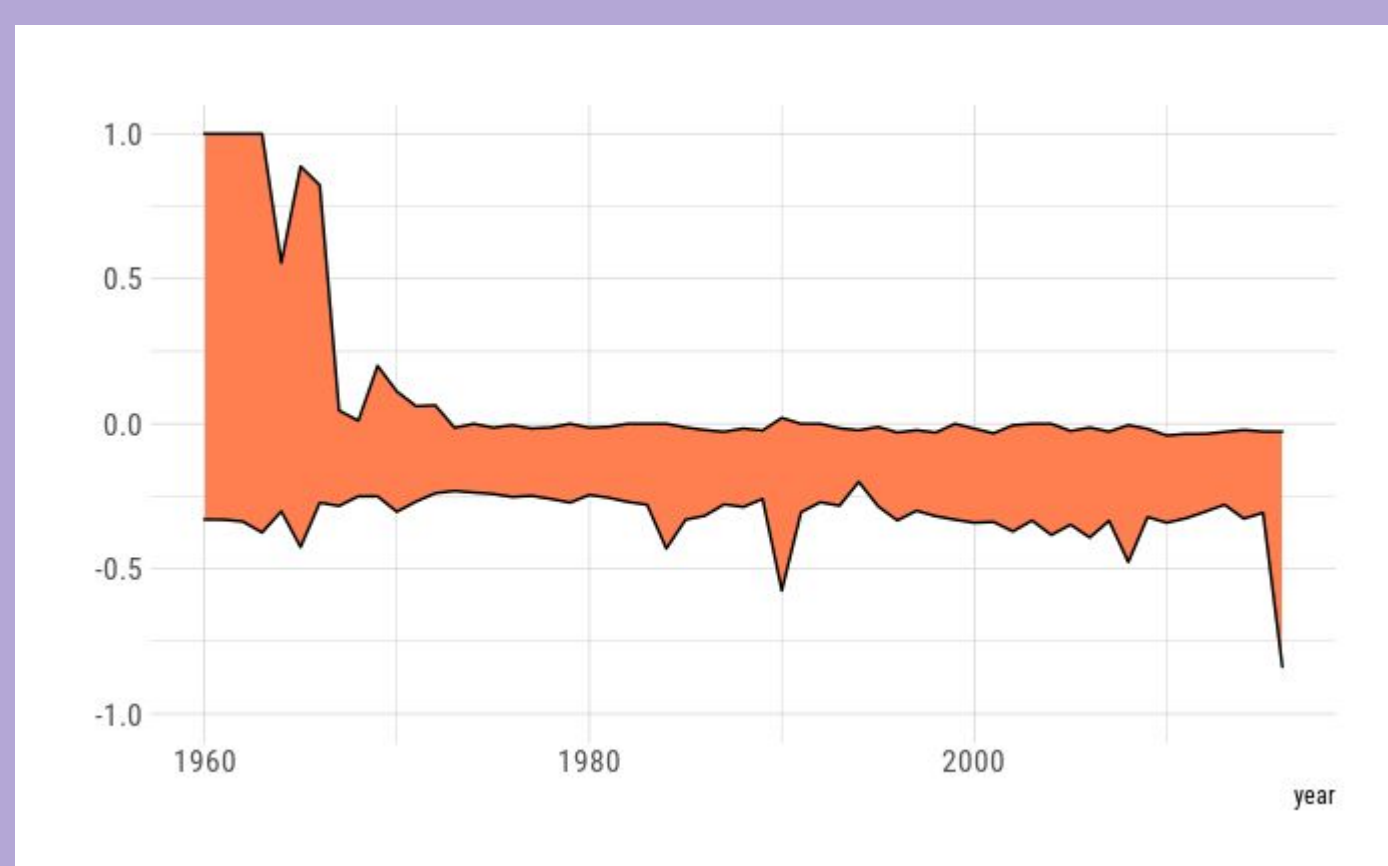
Data & Code

Audio data (MFCCs) and Similarity Network (GEXF format)

Code used during analysis