

Σεμινάριο: Μουσική και Τεχνητή Νοημοσύνη

Αρετή Ανδρεοπούλου

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Σχεδιάγραμμα μαθήματος

- Ορισμός M.I.R
- Ενδεικτικά παραδείγματα εφαρμογών του κλάδου



Εφαρμογές MIR

- **MIR** (Music Information Retrieval): Ερευνητικό πεδίο που στοχεύει στην ανάπτυξη μεθόδων και τεχνικών για την ανάκτηση και εξόρυξη πληροφορίας από τη μουσική.
- **Ενδεικτικές εφαρμογές:**
 - Source separation
 - Score following
 - Music transcription
 - Music improvisation / Music accompaniment
 - Audio Similarity
 - Music genre / instrument classification
 - Music recommendations
 - Chord recognition


Source Separation



| Eng | Gr |

Nikolaos Mitianoudis

Assistant Professor, Democritus University of Thrace



Menu:

- [Intro](#)
- [Teaching](#)
- [Supervision](#)
- [Research](#)
 - [Image fusion](#)
 - [Source Separation](#)
- [Publications](#)
- [Biography](#)
- [Download](#)

Last updated

October 10th, 2018

Cocktail Party Problem

The problem of Blind Source Separation is more clearly illustrated by the *cocktail party problem*. Imagine the situation of being in a cocktail party with a lot of people talking simultaneously. The cocktail party problem is defined as the problem of using your ears (sensors) to isolate every speaker (source) in the room while suppressing the others. This problem can be extended to the M sensors, N sources case, leading to the general Blind Source Separation case.

Audio Source Separation using Independent Component Analysis

Many methods have been applied to solve BSS. Recently, we have seen the emergence of Independent Component Analysis, that proved to be extremely efficient in the separation of instantaneous mixtures (a very special case of BSS). Our basic research effort is to apply ICA techniques to some other interesting source separation cases (i.e. sources recorded in a real room environment), using fast Newton-type ("fixed-point algorithms"), and extend these techniques to musical instrument separation from audio recordings. Other aspects involved in my project are: ICA using multiresolution analysis, ICA of more sources than sensors and ICA in the presence of noise.

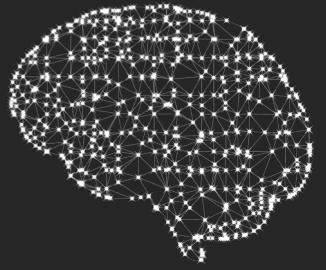
Blind Source Separation demo

You can listen to some audio source separation demos of the algorithms presented in the following papers:

- "Audio source separation of convolutive mixtures", IEEE Transactions on Speech and Audio processing, Volume: 11, issue: 5, pages 489-497, September 2003.
- "New fixed-point solutions for convolved mixtures", 3rd International Conference on Independent Component Analysis and Source Separation, San Diego, California, December 2001
- "A fixed point solution for convolved audio source separation", IEEE workshop on Applications of Signal Processing on Audio and Acoustics, New Paltz, New York, October 2001.

<http://utopia.duth.gr/nmitiano/separation.html>

Source Separation

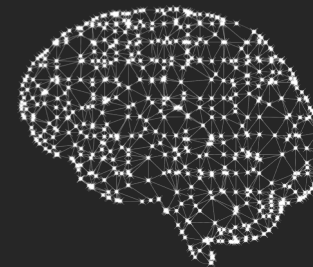


ZYLIA
Studio PRO

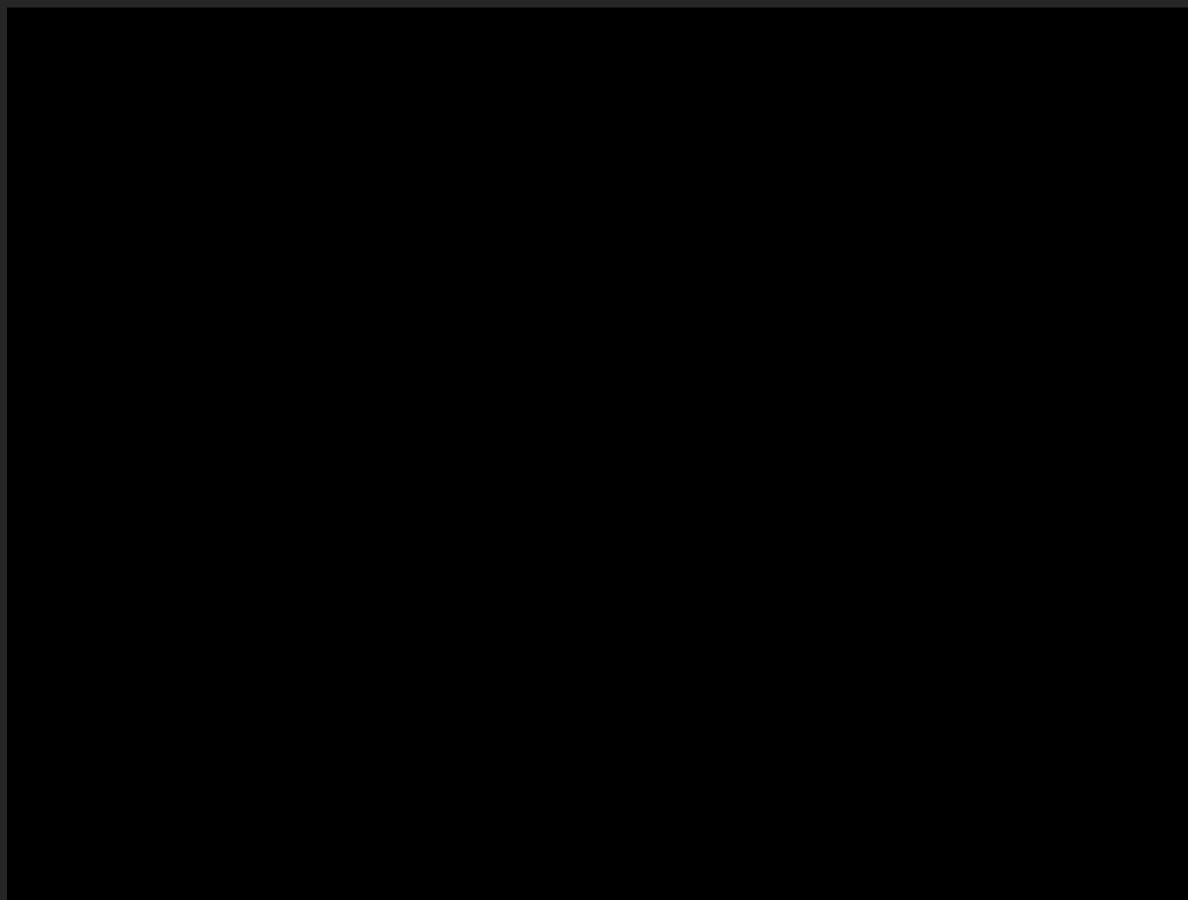


<https://www.youtube.com/watch?v=7-PdjF6wOd4>

Score following



IMuSE



<https://www.youtube.com/watch?v=PIGHeSInCyc>

Score following



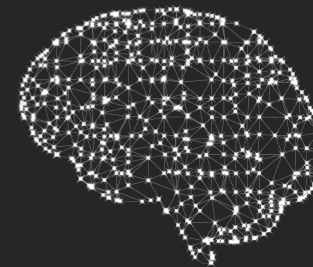
Weezic



weezic

https://www.youtube.com/watch?v=EUVQr6ZDM_4

Score following

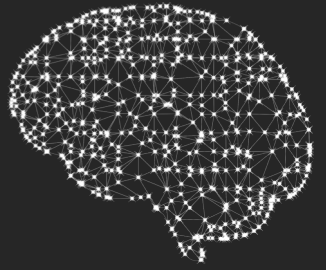


IRCAM
score following
tool



<https://www.youtube.com/watch?v=q55Okme1vTc>

Chord Recognition



**Chordec:
Demo 1**

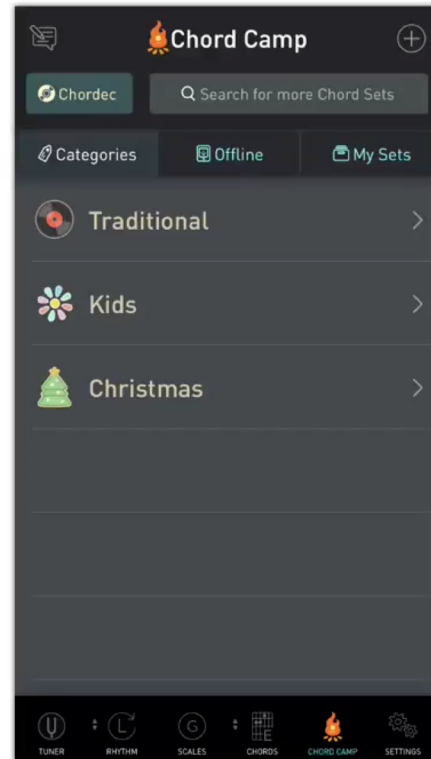


https://www.youtube.com/watch?v=H1_9isNISw8

Chord Recognition



**Chordec:
Demo 2**



Guitar Master
How To Use Chordec Feature

<https://www.youtube.com/watch?v=6Ltb636gvn8>

Chord Recognition



Chordify

chordify

SEARCH ANY SONG

UPLOAD SONG

DISCOVER

CREATE ACCOUNT


PRICING

BLOG

⋮

Get instant chords for any song

Create a free account in 15 seconds!

 CONTINUE WITH FACEBOOK

OR

Or enter your first name

NEXT

[Terms and conditions apply](#)
[Already have an account? Log in here.](#)

<https://chordify.net/>

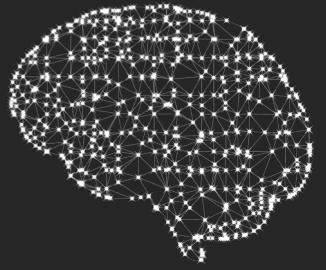
Score searching

musiconn.scoresearch

The screenshot shows the web interface for musiconn.scoresearch. At the top left is the logo "musiconn scoresearch" with the tagline "für vernetzte Musikwissenschaft". To the right is the logo for "BSB Bayerische Staatsbibliothek" with the tagline "Information for Excellence". Below the logos are navigation links: "Search", "About this project", "Help", and "Contact". On the far right, there are language options "DE | EN" and a menu icon. The main search area features a piano keyboard on the left with a red vertical line indicating a selected note, and a musical staff on the right with a red vertical line indicating a selected note. Below the keyboard and staff are two radio buttons: "Find transposed results" (selected) and "Exact search only". A button at the bottom right says "Please give at least 3 notes".

<https://scoresearch.musiconn.de/ScoreSearch/>

Audio fingerprinting



Shazam

SHAZAM MY LIBRARY APPS CHARTS Search for music

Listening

Name any song in seconds

Shazam will identify any music playing around you.

GET IT NOW

I Like It
Cardi B & Bad Bunny & J Balvin
6,099,114 Shazams

MUSIC OPEN

Query by humming



Sound Hound



SoundHound

Discover, search, and play any song --
featuring voice control.

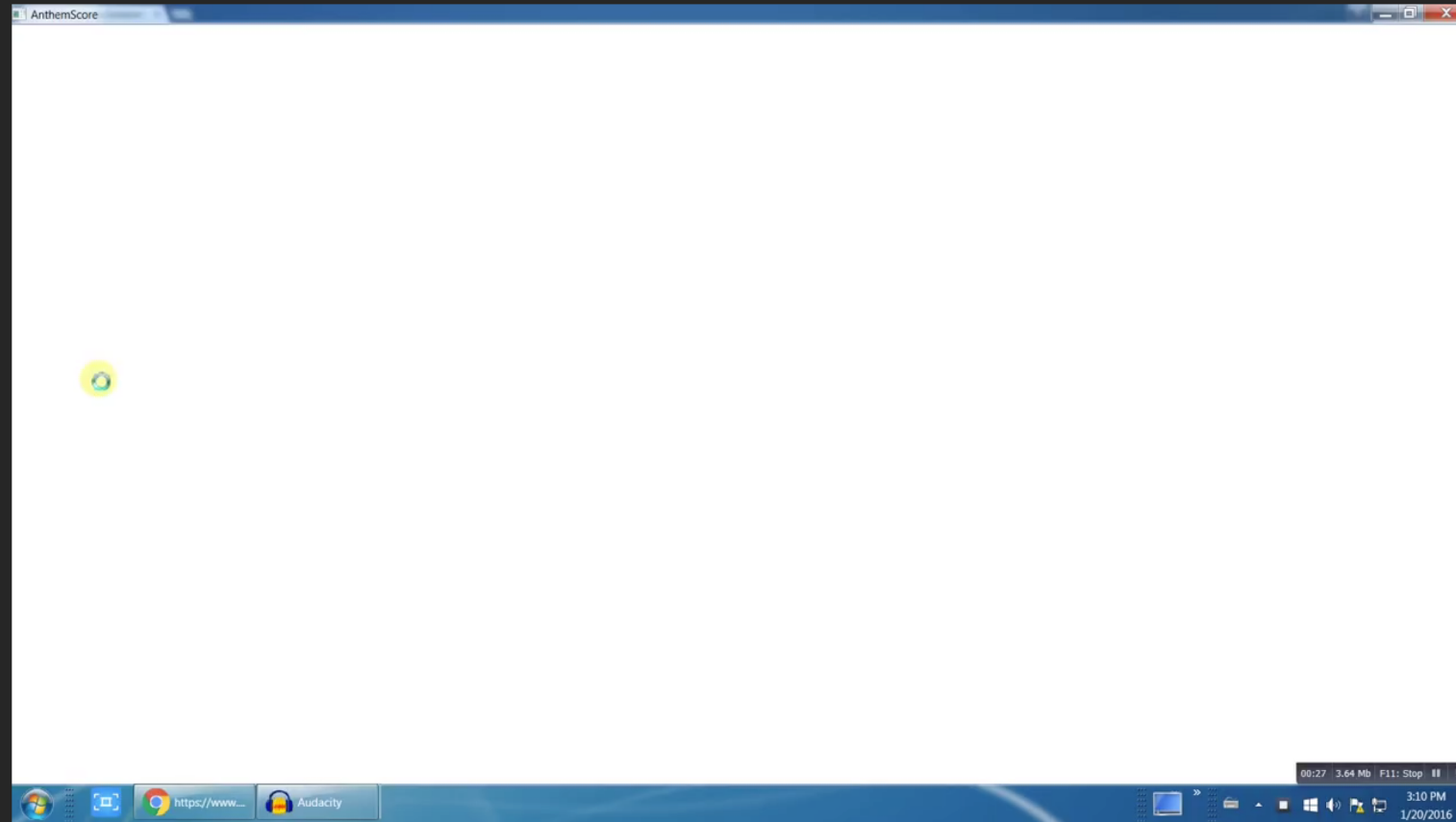


<https://www.soundhound.com/soundhound>

Music Transcription

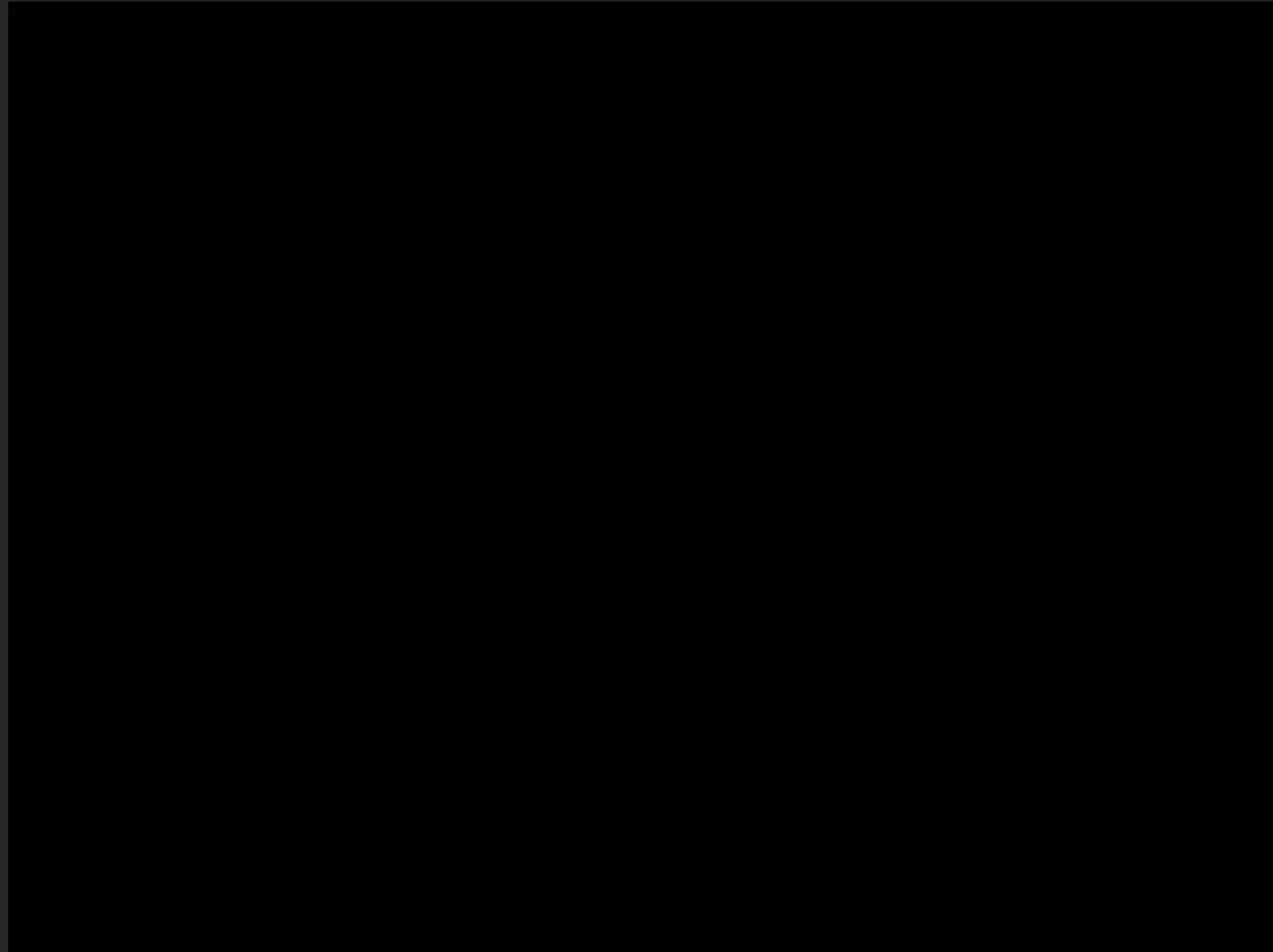


AnthemScore



<https://www.youtube.com/watch?v=f8KpE0hyFI0&t=39s>

Automatic Music Improvisation



<https://www.youtube.com/watch?v=bB8kGVXdlg4>



Automatic Music Accompaniment

MySong

MySong: Automatic Accompaniment for Vocal Melodies

Ian Simon (University of Washington)
Dan Morris (Microsoft Research)
Sumit Basu (Microsoft Research)

ACM CHI 2008

<http://research.microsoft.com/~dan/mysong>

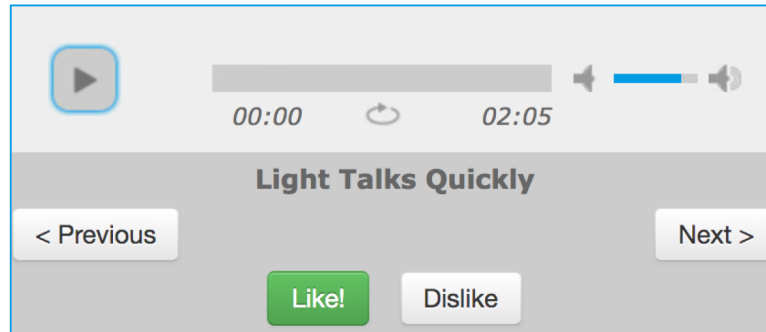
<https://www.youtube.com/watch?v=DCG3qhz6sIE>

Automatic Music Generation

Computoser

Listen to unique, computer-generated music...

Computoser is an "artificial intelligence" algorithm that turns the computer into a music composer. Each track you hear is algorithmically generated.



Download: [Original .midi](#) | [.mp3](#) | [MusicXML](#) (licensed under Creative Commons)

Permanent link to this track. Share this track to: [\[twitter\]](#) [\[facebook\]](#)

<http://computoser.com/>

Automatic Music Generation

Jukedeck

The logo for Jukedeck.com features the text "jukedeck.com" in a white, lowercase, sans-serif font. The text is centered within a dark teal rectangular background that has a subtle, wavy, water-like texture. The overall aesthetic is clean and modern.

jukedeck.com

<https://www.jukedeck.com/>

Automatic Lyrics Generation

Song Lyrics Generator

Write your own song lyrics in less than a minute!



Genres



Freestyle Song



Line By Line



Rap



Metal



Love Song



Rhyming Song



Summer Song



Country



X Factor Song



Ballad

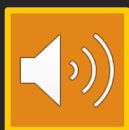
Song Lyrics
Generator

<https://www.song-lyrics-generator.org.uk/>

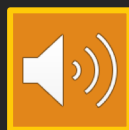


Audio Similarity – Classification

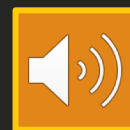
- Κατηγοριοποιήστε τους παρακάτω ήχους



A



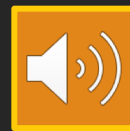
B



C



D

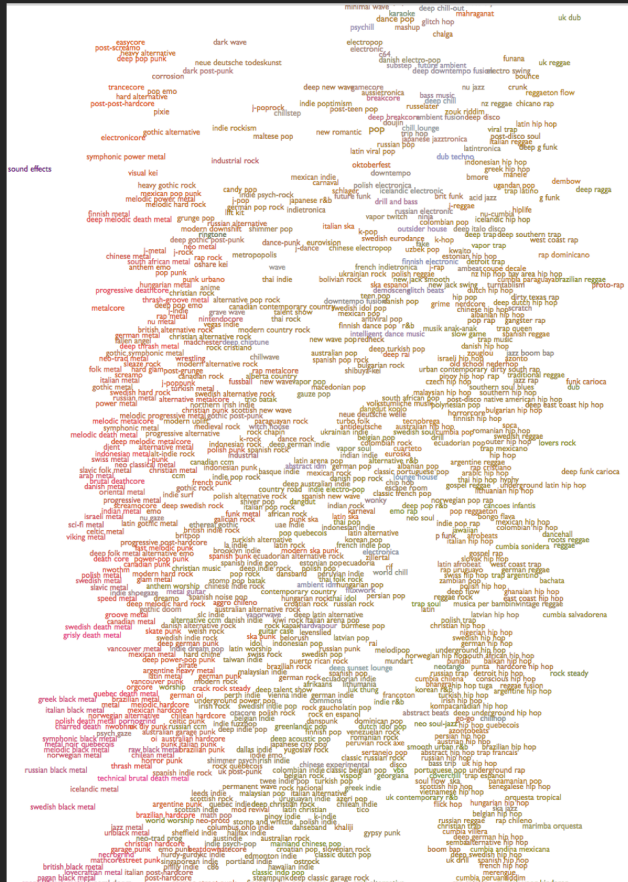


E

Audio Similarity – Music Genre Classification



Every Noise at once
Music Genre Map

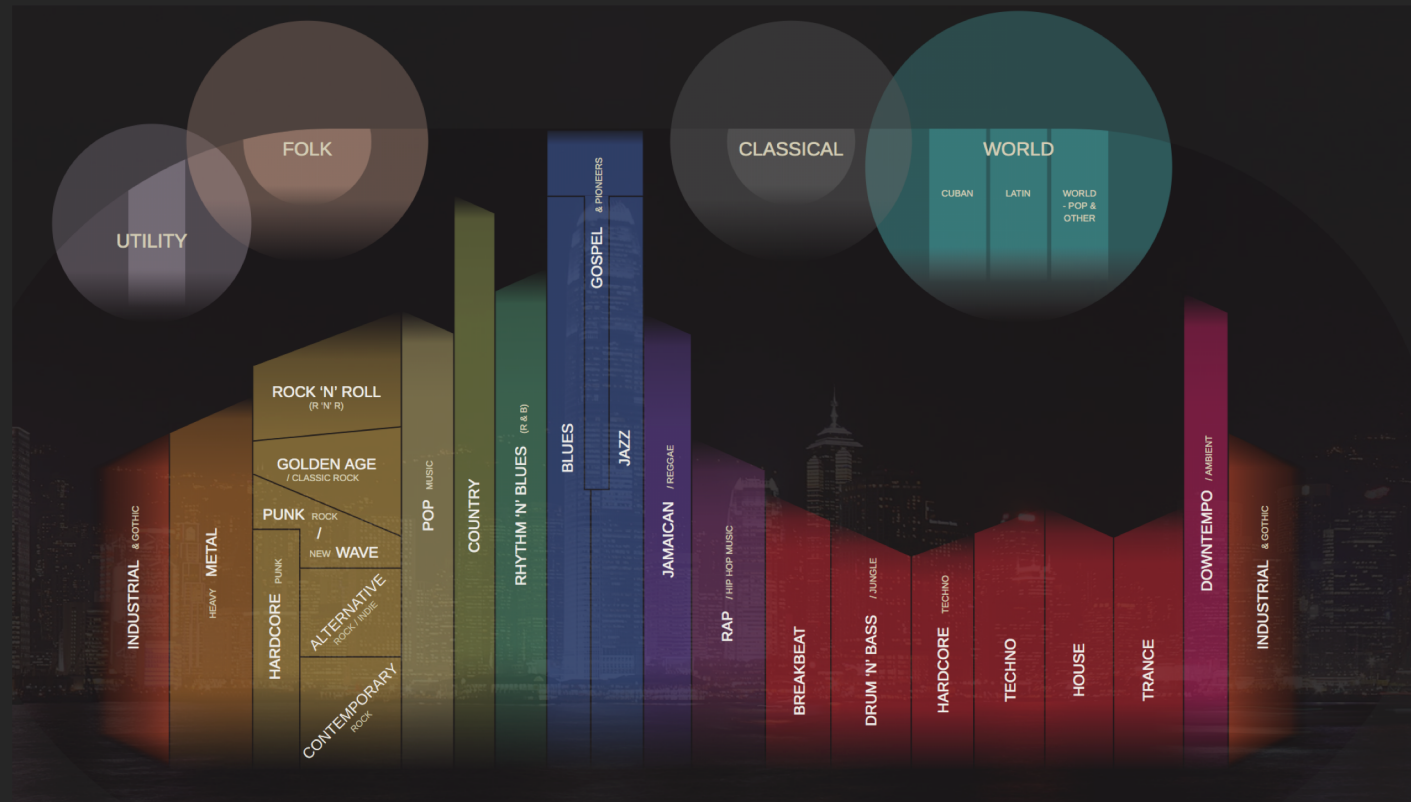


<http://everynoise.com/engnremap.html>

Audio Similarity – Music Genre Classification

Musicmap

The Genealogy and History of Popular Music Genres from Origin till Present (1870-2016)



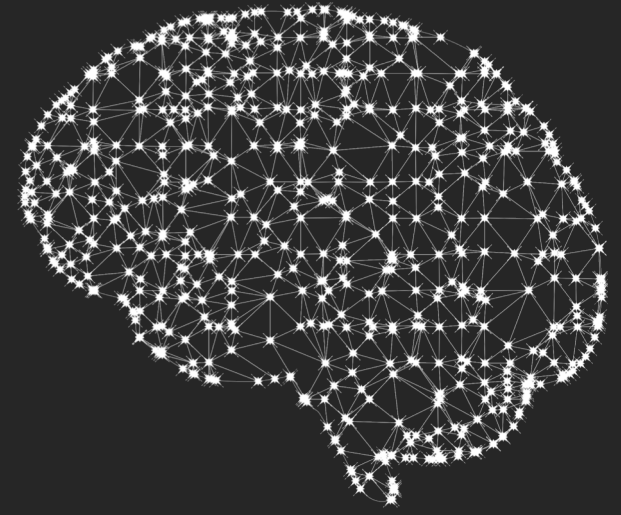
<https://musicmap.info/#>

Audio Similarity – Music Recommendation



The screenshot displays the Spotify web interface. At the top, there is a search bar and a user profile for 'areti500'. A large blue banner promotes Spotify Premium with the text: "Νιώσε την ελευθερία. Απόκτησε το Premium. Άκου μουσική εκτός σύνδεσης. Χωρίς διαφημίσεις. On-demand. 30 ημέρες δωρεάν." Below the banner are navigation tabs: OVERVIEW, PODCASTS, CHARTS, GENRES & MOODS, NEW RELEASES, DISCOVER, and CONCERTS. A section titled "When the lights go out" features four album covers: "Your Discover Weekly", "Piano in the Background", "Bedroom Jams", and "Late Night Jazz". At the bottom, a music player is active, showing "Etude No. 2" by Philip Glass with a progress bar from 0:56 to 4:56.

Spotify



Τέλος