Music GenAI Valerio #1 - Intro

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Course Goals

- Outline generative music **use cases**
- Review notable **symbolic- and audio**-based generative systems
- Use existing systems to **create music**
- **Develop** your own!
- Evaluatie **limitations** of current systems
- **Analyse new approachs** to gen music
- Discuss **ethical**, regulatory aspects

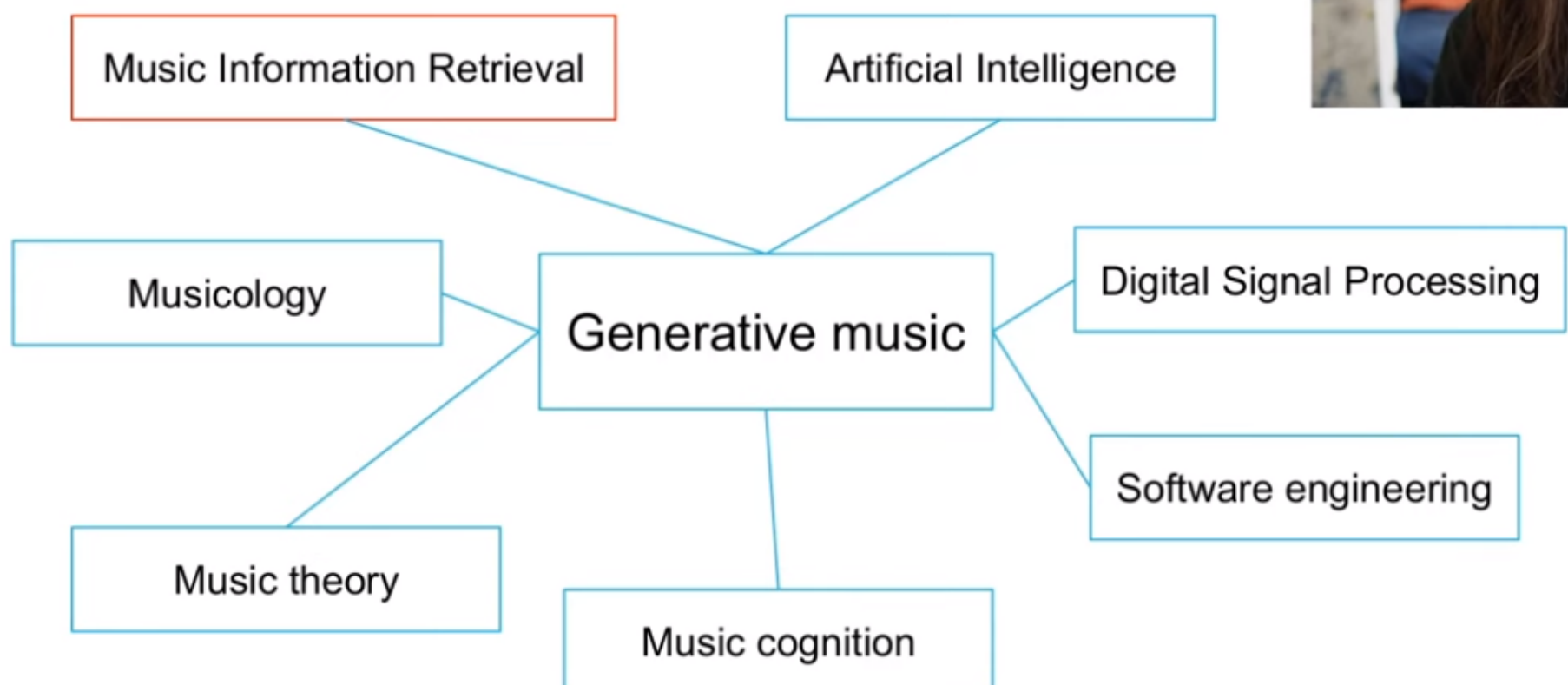Sign up to The Sound of AI **Slack** Community to join the discussion:

https://valeriovelardo.com/the-sound-...

Get the lecture **slides**:

https://github.com/musikalkemist/gene...

What's Generative Music?

The **art and science** of developing computer programmes that create music with a **varying degree of autonomy.**

GM Challanges

How can we represent music?

- **Formalizing the problem of music composition** is impossible due to its complexity and the multitude of factors and variables involved, ranging from the physics of sound to music perception and theory.

- Rules, spectograms (audio), statistics, symbolic, embeddings - **good rep** is half the system - very "open" field

How can we evaluate the output of GM systems?

- **Intelligent tasks** can be reproduced with machines using various artificial intelligence techniques, but **creative tasks** are much more difficult to replicate due to the lack of a clear success metric and their ill-defined nature.

- Application specific

Who should evaluate GM systems?

- Not clear

History in 5 Eras with Notable Examples

Pre-computer era (1700 - 1956)

- Manual algorithms
- Composers lead the charge
- Randomness
- Re-combination
- Algorithms derive various musical parameters

Academic era (1957 - 2009)

- Research activity
  - Lots of experimentation
  - Incremental advancements
  - Scattered community
- Musical output
  - Full-piece generation is rare
  - No focus on audio production quality
  - Score generation (symbolic)
  - Classical music

Mozart Dice Game (1787)
• Random recombination
• 176 pre-composed bars
• Roll dice to select bars

Mode de valeurs et d'intensités (Messiaen, 1949)
• Parametrization of dynamics, articulation,
pitch, duration
• Algorithm to select musical elements

Illiac Suite (Hiller & Isaacson, 1957)

• First computer-generated piece
• String quartet
• Four movements (different techniques → gen Grammers and/or markov chains)
• Different generative techniques

Experiments in Musical Intelligence (Cope, 1981)

• Invented because of composer's block

• Generate full piece

• Recombination approach

a. Analyse corpus

b. Extract signatures

c. Re-combine

First startup wave (2010 - 2016)

- Product focus

- Full-piece generation

- High-quality music datasets

- Machine learning

melodrive
adaptive music generation

Jukedeck

AMPER MUSIC

Endel

Aiva

Mubert®

Brain.fm

Melodrive (2016)

• Real-time video game music generation

• Music adapts to emotional context

• Unity SDK for indie game devs

Big tech experiments (2016 - 2022)

- Deep learning focus

- Massive datasets

- Massive computational power

- No commercial end goal

magenta

OpenAI

amazon

IBM Watson

AWS DeepComposer (Amazon, 2019)

Jukebox (OpenAI, 2020)

- Raw-audio generation

- Advanced Deep Learning

- Full piece + lead vocals

- Performance details

Music AI hype (2023 - ?)

- Music industry is on fire
- Big tech explores commercial opportunity
- Scalable technology
- Really massive music datasets
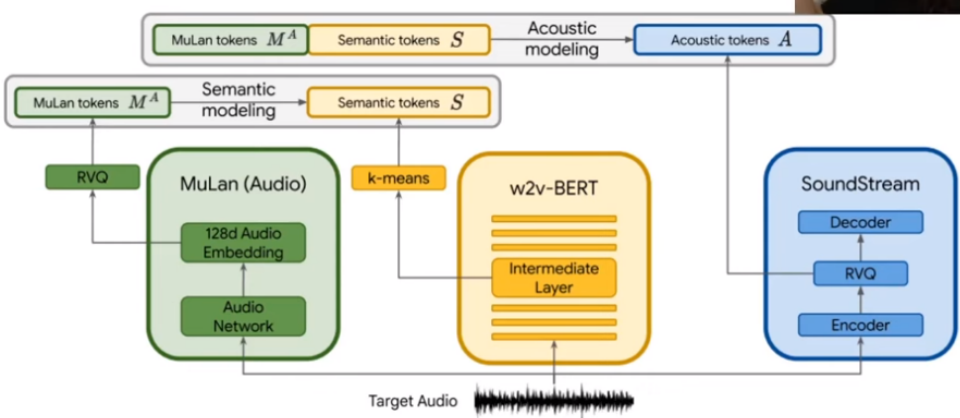- New startup wave

Text-to-music generation
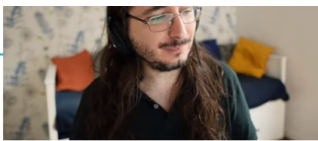
A fusion of reggaeton and electronic dance music, with a spacey, otherworldly sound. → Music model →
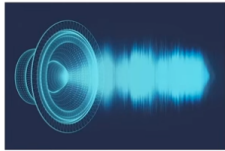
MusicLM (Google, 2023)

MusicGen (Meta, 2023)

Generative audio models launched in Jan '23

- Mousai
- AudioLDM
- SingSong
- RAVE 2
- Riffusion (Dec '22)
- …

Second startup wave