github.com/alexanderlerch/2025-Music-AI-T

Music AI: Threats and Opportunities

overview

alexander lerch

Georgia Tech Center for Music Technology
College of Design

about

about me

Georgia Tech Center for Music Technology
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- **education**
  - Electrical Engineering (Technical University Berlin)
  - Tonmeister (music production, University of Arts Berlin)

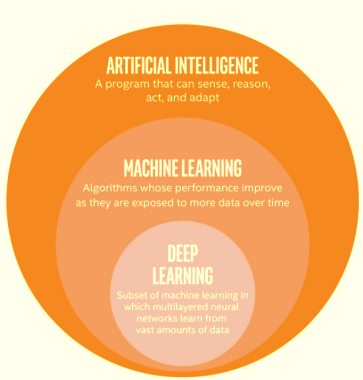
- **professional**
  - Associate Dean for Research & Creative Practice, College of Design, Georgia Tech
  - Associate Professor, School of Music, Georgia Tech
  - prev: 2000-2013: CEO at zplane.development

- **background**
  - machine learning for audio and music (20+ years)
  - audio algorithm design (20+ years)
  - commercial music software development (10+ years)
  - entrepreneurship (10+ years)

www.linkedin.com/in/lerch

introduction
artificial intelligence

- **artificial intelligence**
  - unclear definition: everything that is perceived to act intelligently
  - changes over time
- **machine learning**
  - data-driven: algorithm is more agnostic to task and is parametrized through training with data
- **deep learning**
  - deep neural networks are the ML approach used
- **generative AI**
  - deep neural networks *generating content*



machine learning
importance of data

machine learning: generic algorithm mapping an input to an output

- mapping function is learned from patterns and characteristics **from data**

⇒ model **success largely depends on training data**

- **technical challenges** concerning data
  - *imbalance & bias* (distribution is skewed, biased)
  - *diversity & representativeness*
  - *subjectivity* of annotations
  - *noisiness* (bad quality, bad annotations, . . .)
  - *amount*

https://imgs.xkcd.com/comics/machine_learning.png

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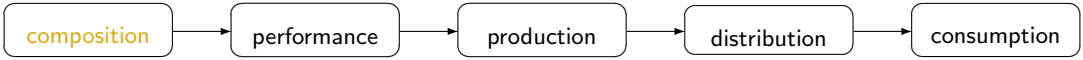
musical communication

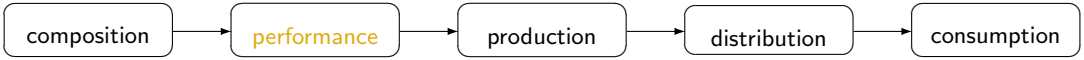
chain of musical communication



- **creation of musical ideas** ("score")
  - defines style and idea
- **realization of musical ideas** into acoustical rendition
  - interpretation, modification, addition, and dismissal of score information
  - unique acoustic representation of score
- **recording, mixing, and editing** (in case of record media)
  - editing and splicing of recorded data; timbre, equalization choices
  - not separable from performance in a recording
- **distribution & listening**
  - music recommendation and discovery

musical communication

chain of musical communication



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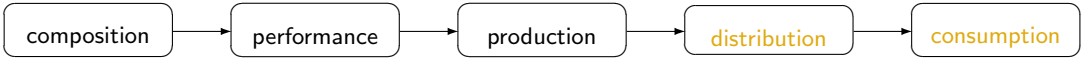

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musical communication
paradigm shift

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- historical technological shifts in music:
  - recording devices (tape, grammophone)
  - digitization/softwarization of recording studio
- historical technological shifts in general:
  - internet
  - introduction of photography

musical communication
paradigm shift

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blues funk metal chanson[a]

systematic evaluation

evaluation targets

- **system output**
  - originality
    - plagiarism
    - diversity
    - creativity
  - audio quality
  - musical & aesthetic qualities
- **user experience**
- **other criteria**
  - explainability
  - bias
  - ethical use of data & data curation practices
  - resource use & environmental impact

systematic evaluation
methods

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- **subjective** testing
  - preference test
  - Turing test
  - rating of properties
- **objective** testing
  - *reference-independent*
  - *comparison of distributions*

systematic evaluation
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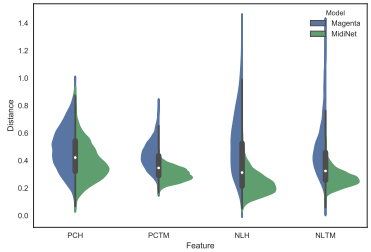

music ai
opportunities & threats

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opportunities

- content creation:
  - speed-up, increased efficiency
  - creative possibilities (morphing, etc.)
  - co-creative idea givers
  - democratization
- consumption:
  - personalization
  - effective discovery and accessibility
  - (inter)active listening experiences

- content creation:
  - ethical use of data
  - growth in plagiarism
  - liability for harmful content
  - livelihood of creators
  - value perception of artistic content
- consumption:
  - consumer distrust through
    - inflationary ai-generated content
    - inexplainable black-box systems
- both:
  - 'mainstreamification'
  - bias (data curation, for-profit system control)

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thank you!

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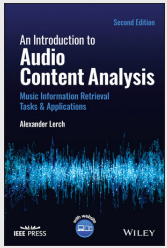
links

alexander lerch: www.linkedin.com/in/lerch

mail: alexander.lerch@gatech.edu

book: www.AudioContentAnalysis.org

music informatics group: musicinformatics.gatech.edu



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