Introduction to **Audio Content Analysis**

module 0.0: course introduction

alexander lerch

introduction
about alexander lerch

- **education**
  - Electrical Engineering (Technical University Berlin)
  - Tonmeister (University of Arts Berlin)

- **professional**
  - Associate Professor at the Georgia Tech
  - previous: CEO at zplane.development

- **research focus**
  - Music Information Retrieval (MIR)
  - Audio Content Analysis
  - Audio Signal Processing
  - Music Performance Analysis
  - Music Generation

links to optional resources will appear here → Lerch's online profile

introduction
course introduction

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Audio Content Analysis and Music Information Retrieval (MIR):

- extract and infer descriptors from music signals
- answers questions and tasks such as
  - "What is the tempo/key/mood of this song?"
  - "Transcribe this signal into a musical score."
  - . . .

- MIR is commercially interesting for, e.g.,
  - music recommendation
  - music identification
  - intelligent music production
  - automatic music generation

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course goals

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after successful completion of this course, you will

1. have a good **overview of typical tasks** in MIR
2. **understand algorithmic approaches** in a large variety of basic MIR systems
3. be able to **implement MIR systems** in Matlab/Python
4. be able to **formally evaluate** systems with common datasets and metrics

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course overview

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1. Introduction to ACA and MIR
2. Fundamentals
   - Signals & Pre-Processing
   - Input Representations
   - Inference
   - Data & Evaluation
3. Music Transcription
   - Tonal Analysis (Pitch, Key, ...)
   - Analysis of Intensity
   - Temporal Analysis (Onset, Beats, Structure, ...)
   - Alignment
4. Music Identification & Classification
   - Audio Fingerprinting
   - Classification: Genre, Similarity, Mood, Instrument
   - Music Performance Assessment

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prerequisites

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- basic knowledge in **DSP**
  - signals & systems, block diagrams, linear algebra, . . .

- familiarity with **Matlab and Python**
  - scripting and functions, file I/O, . . .

- helpful: knowledge of **machine learning** concepts
  - classification & regression, training and testing, evaluation metrics

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course materials & resources

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- **text book**: "An Introduction to Audio Content Analysis":
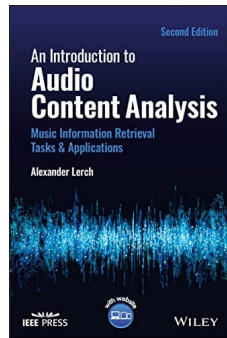 - 2nd edition
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- **optional reading**
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- **online resources** @AudioContentAnalysis.org:
  - slides & videos of previous classes
  - datasets
  - code (matlab, python, C++)

- **needed software**: Python 3, (Matlab)

www.AudioContentAnalysis.org

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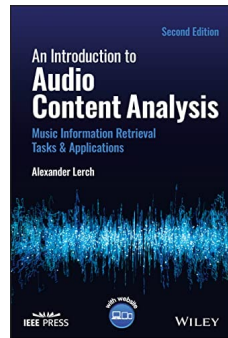 - 2nd edition
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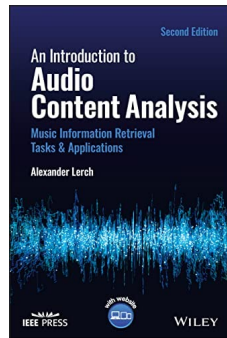
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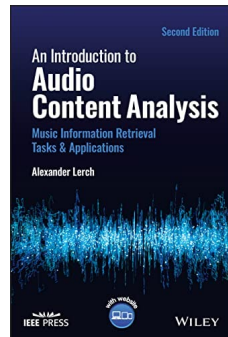 - 2nd edition
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grading

- **grades**

exercises & assignments	45%
exercises & participation	10%
project	45%
presentation (proposal)	5%
presentation (midterm)	5%
presentation (final)	5%
paper	10%
algorithmic design and implementation	20%

- **bonus points** for finding errors in the book or in the slides added to the assignment grade of your choice
  - typos: 0.5 points
  - language: 1 point
  - misleading or incomplete statements: 2 points
  - wrong statements and errors in equations: 3 points

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