Machine Listening for Music and Sound Analysis

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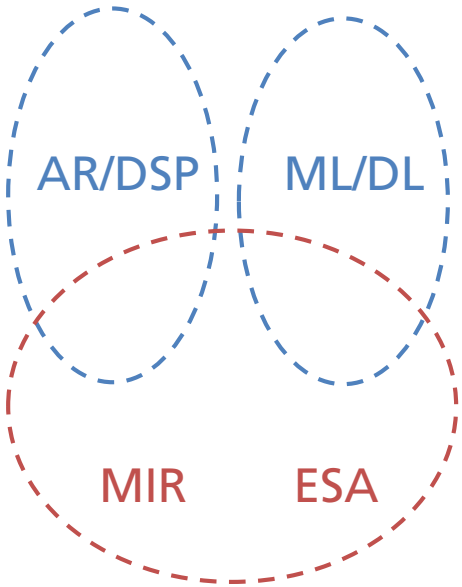
Overview

- Lecture Structure
  - Fundamentals
    - L1 - Audio Representations & DSP
    - L2 - Machine Learning & Deep Learning
  - Applications
    - L3 & L4 - Music Information Retrieval
    - L5 & L6 - Environmental Sound Analysis
- Additional Content
  - Insights into projects & current research @ Fraunhofer IDMT
  - Open student topics



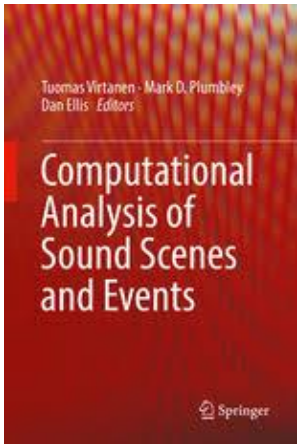
Overview

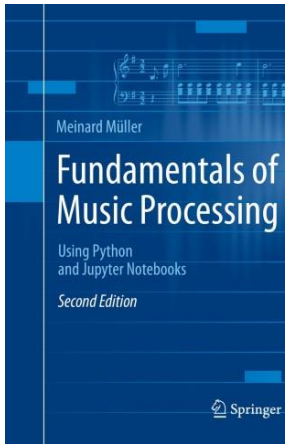
- Seminar Structure
  - S1 – Introduction to Python programming
  - S2 – Basics: Audio processing, machine learning, and deep learning
  - S3 – Music classification
  - S3 – Sound classification
- Notes
  - Programming in IPython notebooks / Google Colaboratory
  - Additional course material (audio samples, libraries)

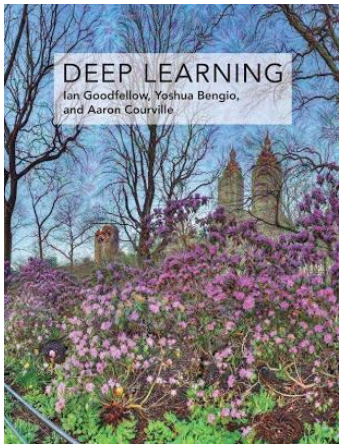
Course Website

https://machinelistening.github.io

Further Resources: Books







- Virtanen, T. et al.: Computational Analysis of Sound Scenes and Events, Springer, 2018.
- Müller, M.: Fundamentals of Music Processing – Using Python and Jupyter Notebooks, Springer, 2021.
- Goodfellow, I., et al.: Deep Learning, The MIT Press, 2016.

Further Resources: Webpages

- Deep Learning
  - https://www.deeplearningbook.org/
  - http://www.coursera.org (online courses)
  - http://www.udemy.com (online courses)
- Music Information Retrieval
  - https://www.audiolabs-erlangen.de/FMP (FMP notebooks)
  - https://musicinformationretrieval.com (iPython notebooks)
- Environmental Sound Recognition
  - http://dcase.community/ (DCASE challenges & workshop)

Further Resources: Programming Libraries

- General
  - numpy, scipy, scikit-learn, matplotlib
- Machine Learning / Deep Learning
  - scikit-learn, tensorflow 2.3 (keras), (pytorch)
- Audio Processing / MIR (Python)
  - pysox, soundfile (audio I/O & manipulation)
  - librosa, madmon, FMP notebooks (audio / music processing)
  - Music21, MeloSpyLib (symbolic music processing)
  - (MIR Toolbox – Matlab)

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