Intro Lecture Notes

Zach Neveu

September 5, 2019

1 Course Intro

- Using DTU Learn instead of DTU Inside
- Goal: learn fundamental sp methods, and code in Matlab/Python
- Should be able to create a modern signal processing system with ML by the end
- 4 hours of hw/week
- each class 1 hour of lecture, 3 hours of exercises
- Exercises as live scripts/Jupyter notebooks

2 Course Plan

- 3 parts
- Conventional DSP
- Linear Methods
- Non-linear methods - hmms neural nets

3 Technical Lecture

- Traditional SP - doesn't care much about input content
- Traditional ML - not particularly friendly for time series of signals
- MLSP - combines the two
- Example Areas
  - sparsity-aware learning - compression
  - Information-theoretic learning
  - Adaptive filtering
  - Sound processing
  - Images/Videos
  - Telecommunications

- Sensors

4 Connection

- Simplest connection - $h(t)$ can be a classifier etc. ML is just a specific kind of of non-linear processing.
- Another idea: signal processing is how to get a small amount of features from a large amount of data