Audio Processing and Indexing

E.M. Bakker

Overview

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29-11	**Final Project Presentations Demo**
12-12	Project Deliverables:
	- Final Technical Project
	- Paper (4-8 pages), code, and
	- Web Site (or github)

Grading (6 ECTS):
Presentations and Project (60% of grade).
Class discussions,
attendance, and workshops (40% of grade).

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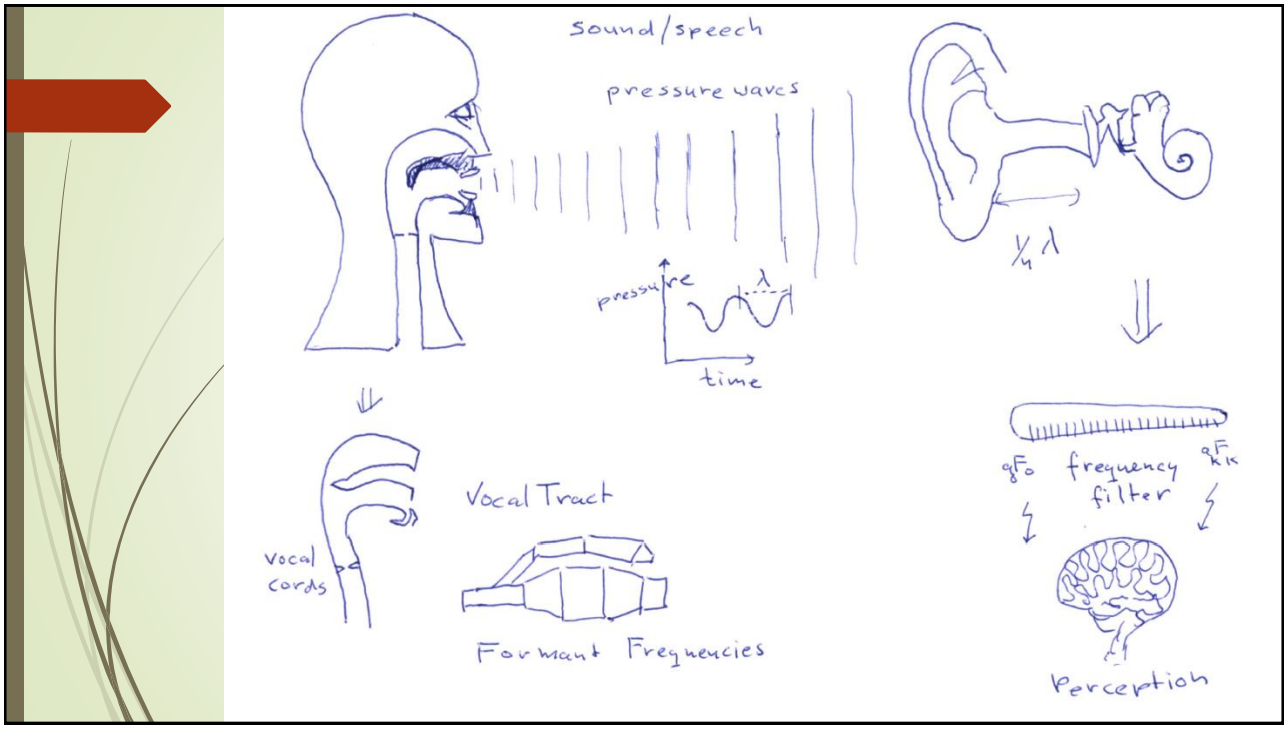
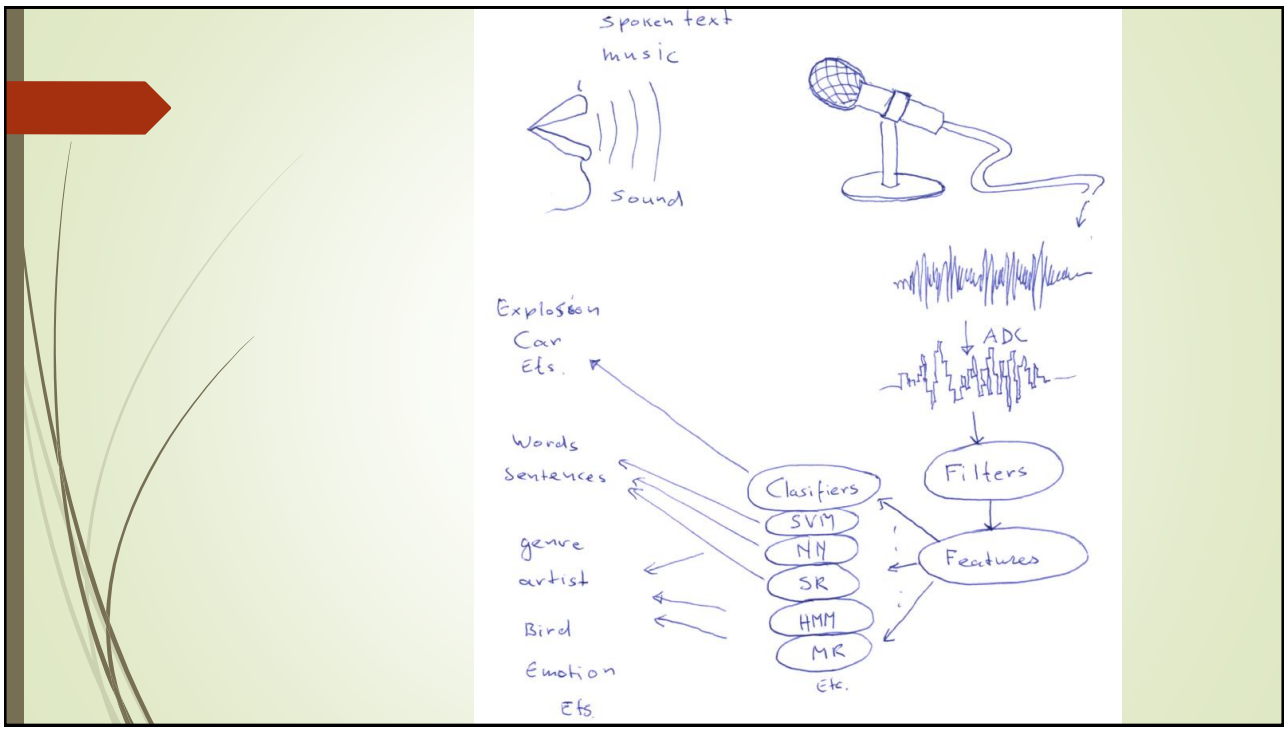
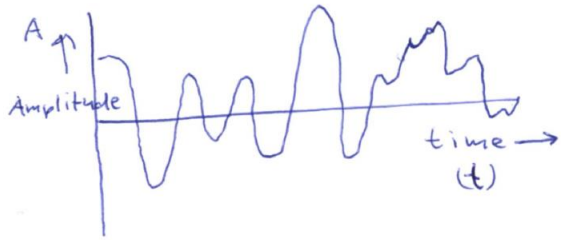

Sound/speech
pressure waves
pressure
time
λ
¼ λ
Vocal Tract
vocal cords
Formant Frequencies
frequency filter
Perception

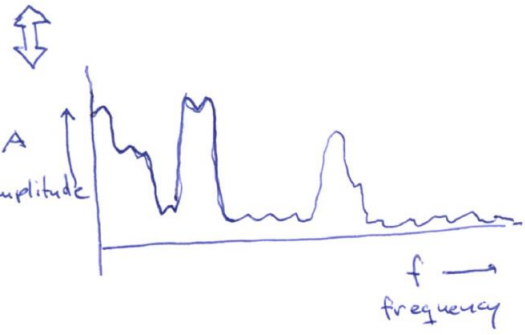

spoken text
music
sound
ADC
Explosion
Car
Etc.
Words
Sentences
genre
artist
Bird
Emotion
Etc
Clasifiers
SVM
NN
SR
HMM
MR
Etc.
Filters
Features

Digitizing Sound

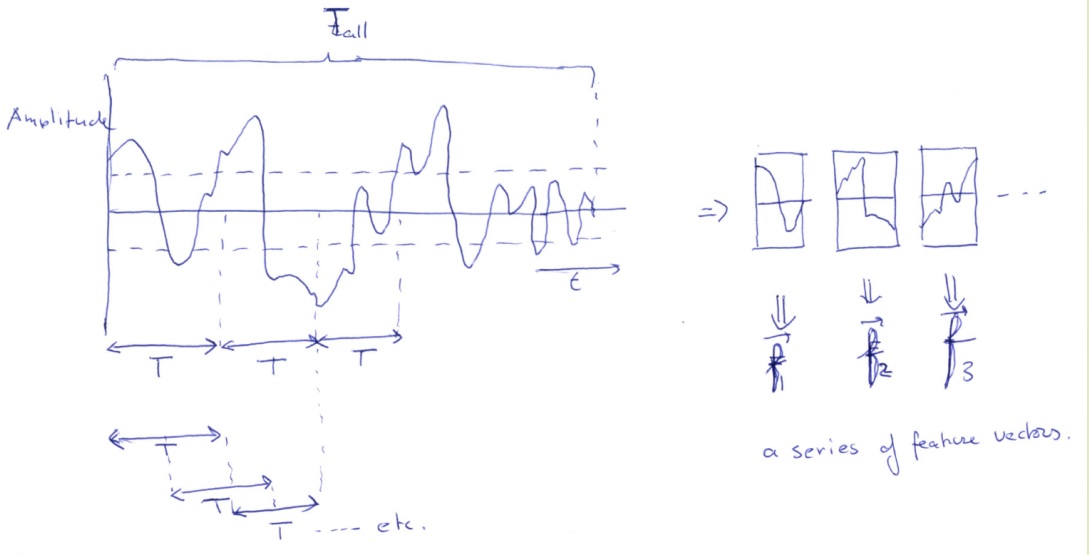
Time Domain

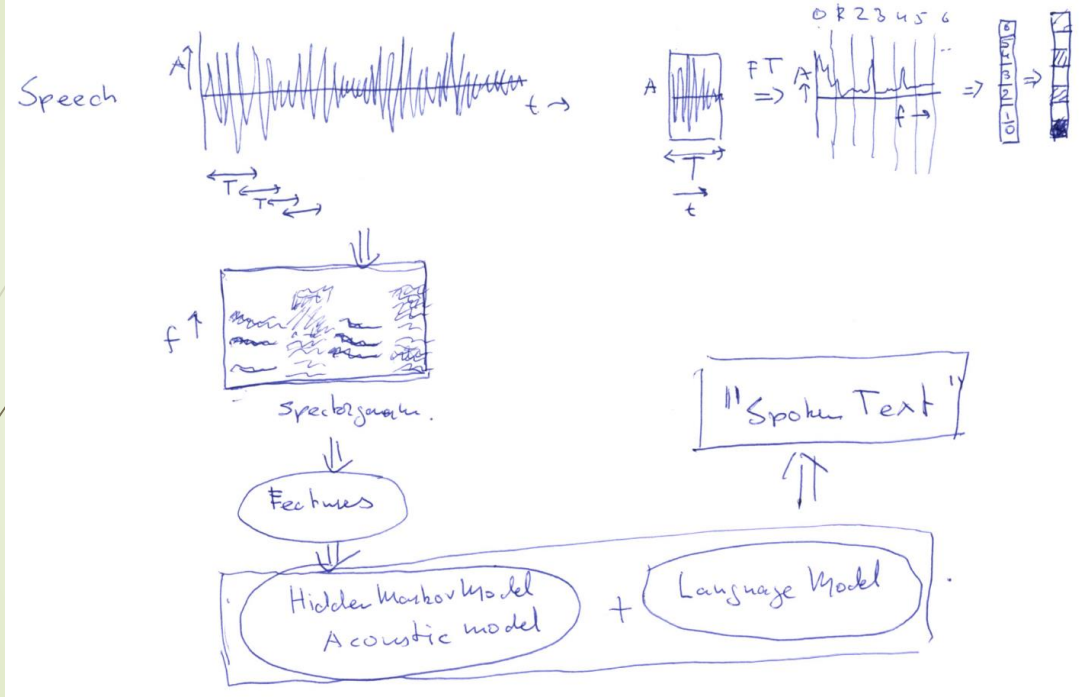


Fourier Transform



Frequency Domain





Applications

- ASR
- TTS
- Music Recognition
- Genre Recognition
- Sound Recognition
- Bird Recognition
- Sound location
- Language Recognition
- Timing
- Speaker Recognition
- Voice Cloning
- Singing
- Emotion Recognition
- Chord Recognition
- Music Transcription
- Cover Song Detection
- Drum Transcription
- Neural Audio Synthesis
- User Interfaces for Music Discovery
- Style Transfer
- Etc. Etc.

https://dblp.org/db/conf/index.html

- ISMIR https://dblp.org/db/conf/ismir/index.html
- Interspeech https://dblp.org/search?q=interspeech
- Eurasip https://dblp.org/db/journals/ejasmp/index.html

Previous Projects I

- Second Voice Generation
- Robustness of Musical Genre Identification
- Improved Mobile Song Recognition
- An iOS App using Bliss for Improved Communication through Text-To-Speech
- ScoreAid
- Emotion Recognition
- Instrument Detection
- Musical Instrument Recognizer (Annotation)
- **Audio Feature Extraction with Deep Belief Networks**
- Audio Morphing
- Audio Indexing the 1.000.000 song data set
- Chord Recognition
- Audio Phantom Materialization
- Harmonic Model Based Audio Transformations
- Content-Based Music Similarity, Visualization and Automatic Play-List Generation.
- Indexing and Predicting Bands from Unknown Songs
- Interpolation between Different Instruments
- Modular Synthesizer
- Hit Predictor
- **Pitch Perfector**
- Inter-Voice Morphing

Previous Projects II

- A SteglbIza implementation using traditional digital signal processing techniques: Steganography in music through tempo modulation
- Transfer Learning limited edition sounds (VGG16)
- **Tempo Extraction From Electroencephalography Using a Single EEG Channel**
- Monophonic Music Generation with LSTM Recurrent Neural Networks
- Blind speech signal separation from stereo sound input
- Gaussian Process Audio Model For **Audio Textures Modelling And Synthesis**

Previous Projects III

- A Deep Learning Approach to Instrument Detection and Chord Estimation via Frequency-based Feature Extraction
- **Open-Air Acoustic Delay-line Memory using a Micro-controller**
- Midioke
- Towards Real Time Audio Mosaicing
- Artist Recognition with Convolutional Recurrent Neural Networks
- **Automatically Identifying and Fixing Single Channel Audio Defects in Stereo Audio**
- **Information transmission by multilevel pitched audio**
- Event Detection using Wavelet Packets.
- Dynamic Play-list Generation.
- Automatic Song Remixer.
- **Isolating Voices in Sacred Harp Singing.**
- Voicecrack: A geolocation- and voice authentication-based password recovery mechanism.
- Song year prediction based on dynamic range values.
- Quotes to Characters.
- Arduino Peripheral Sound Imitation System.

API 2022 Projects

- **Music Analyzer - Information Extraction and Visualization**
  - https://github.com/arvindeva/API-final-project
  - https://api-final-project.vercel.app/
- Exploring the Limits of DDSP
  - https://github.com/skylerf1/API_Final/
- Generative Adversarial Networks for Audio Generation: A Comparative Study
  - https://github.com/ernestvmo/API-project
- Mapping LPC predictor coefficients to reflection coefficients of an N-tube 2-Dimensional waveguide filter in real-time
  - https://tinyurl.com/3hebyhx8
- Music Genre Classification and Noise Separation
  - https://github.com/BingxuanW/api_project/tree/master
- Audio Processing and Indexing Musical Instrument Identification
  - https://github.com/thomasmaliappis/api
- **MUSICNN FOR DMX LIGHTING SOFTWARE AUTOMATION**
  - https://github.com/poldemort/Musicnn-for-DMX

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