european voice teachers association

Education and Culture

Voice and Music in the computer

Recording, analysing, processing

Dr. Michael Büttner, Potsdam

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How does the voice come into the computer?

- Step 1: Microphone
- Step 2: Sound card

Step 1: Microphone

- The microphone works like a technical ear
  - different types with special characteristics
  - dynamic vs. condenser microphon
  - on stage: dynamic mics
  - for recording and analysing purposes: condenser mics
  - sound waves converted into electrical signals

Step 2 – Sound card

- Works as an analog-digital (A/D-Converter)
  - Electrical signals made by the mics converted into digital (numeric) signals
- D/A-Converter for output purposes
- Colours:

Pink	Analog microphone audio input.
blue	Line in for stereo aux
Green	Line-out for head phones
Black	Output for rear speakers
orange	Output for subwoofer

File formats

- Different types of audio files
  - mp3
  - wav
  - ogg
  - flac
  - Ram
  - Aiff
  - wma

mp3

- Standard file format for music in the internet
- Signal highly compressed è low size
- Tolerable quality lost
- Bit rates: 96 kb/s; 128 kb/s; 160 kb/s, 192 kb/s
- The higher the bitrate, the higher the quality
- (cd quality from 128 kb/s)
- Sampling rate (Hz) eg. 44100 Hz

Wave-format

- best quality
- memory intensive
- standard format for windows
- wave-file ten times bigger than mp3-file
- on CDs: cda file format
- extension name: .wav

ogg

- free, open standard container format
- designed to provide for efficient streaming
- higher quality than mp3
- extension names: .ogg; .oga; ogv; .ogx

flac

- free lossless audio codec
- losless data compression algorithm
- high quality
- digital audio recording compressed by FLAC can be decompressed into an identical copy of the original audio data
- extension names: .flac

ram

- multimedia container format created by RealNetworks©
- low quality
- good streaming properties
- runs on realplayer©
- extension names: .ram or .rm

aiff

- Audio Interchange File Format
- apple file format
- standard audio file format on Macintosh©Computers
- AIFF file is uncompressed pulse-code modulation
- high need of memory space
- extension names: .aiff or .aif

wma

- Windows Media Audio
- audio data compression technology developed by Microsoft
- runs with WindowsMediaPlayer©
- based on the same compression algorithm like mp3
- special format: Windows Media Audio Voice

MIDI

- industry-standard protocol
- defined in 1982
- musical instrument digital interface
- enables electronic musical instruments to communicate and synchronize with each other
- does not transmit any audio signals
- sends event messages like
  - pitch and intensity

MIDI 2nd

- control signals for parameters such as volume, vibrato and panning (mono, stereo)
- clock signals to set the tempo
- extension name: .mid or .smf

Software for converting MIDI to Audio formats

- MIDI to wav-format:
- Winamp 5.6
- Notation Musician

- reconverting wav-files to midi-files:
- NOT possible!

Converting Audio Formats

- e.g. wav to mp3:
  - Free Audio Converter
- CD to mp3
  - Free Audio Cd to mp3 Converter
- Youtube videos to mp3
  - Free youtube to mp3 converter

Playing Audio Files

- Real Player
- Windows Media Player
- iTunes
- Quicktime
- Winamp Media Player

Recording (Sampling)

- converts analog signals into digital signals
- sound waves è analog-digital-converter è digital signals
- quality depends on channels, sampling rate and resolution
  - channels: mono (1); stereo (2 or more)
  - sampling rate: (11 KHz telephone; 44,1 kHz CD-quality
  - resolution: 16 bit CD Quality; 8 bit speech

Recording

- necessary: Sound card of the computer
- recording software: Audacity

Audio Editing

- Audacity

  working like a text document:

  cut, copy, paste
- Adobe Audition

Voice analysis

- provides spectral analysis of music or voice
- Fast Fourier Analysis
- most popular software:
- **VOCE VISTA ©**
- developed by Donald G. Miller
- easy to use software
- to combine with EGG-measurement tool

Aternative analysing tool

- in Germany increasingly popular:

- Overtone analyser by SYGYT sygyt.de
- developed by Bodo Maas, Berlin

Pro and Con‘s of both software

- advantages
  - easy to use
  - runs on almost every PC or notebook
  - images easy to read, voice recording possible
  - images storable to compare different voice files

- drawbacks
  - Microphone not to calibrate
  - results depend on microphone quality and
  - Mouth-Microphone-distance and
  - room acoustics
  - è results are NOT comparable

Solution of the problem

- use of software and microphones which can be calibrated
- DIVAS© by XION
- drawback: very expensive