MENURA

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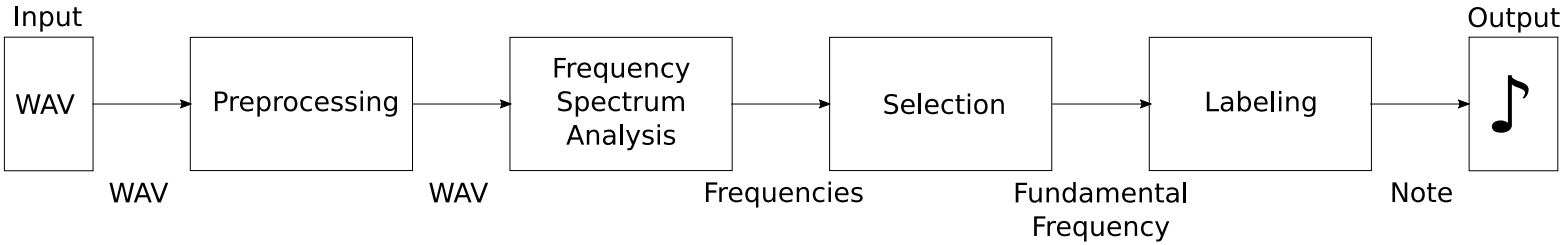
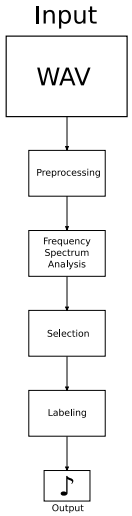
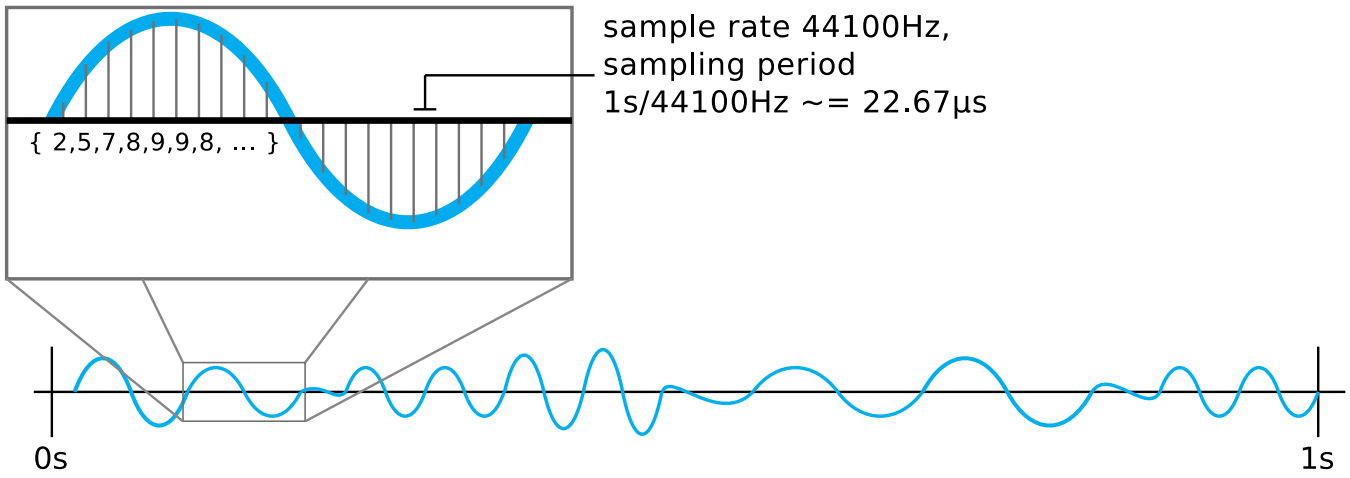
Praktikum Advanced Software Development with Modern C++ - Sommersemester 2018

SYSTEM DIAGRAM

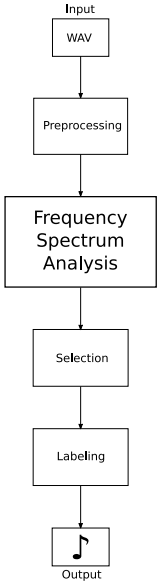


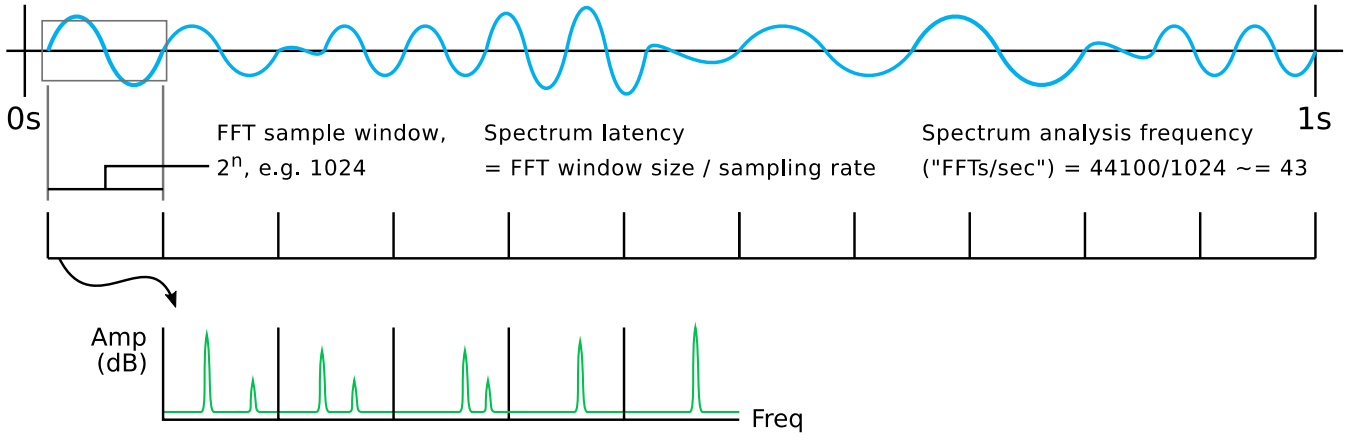
AUDIO SAMPLING



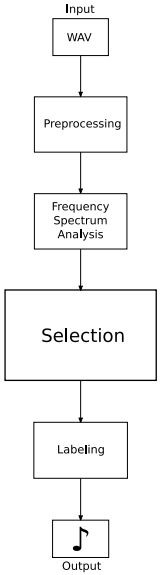


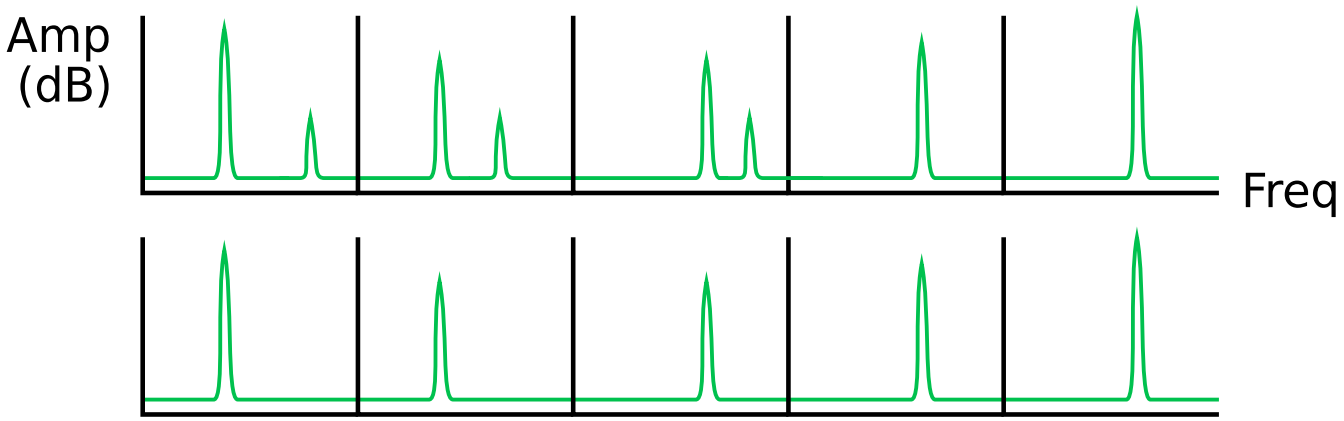
FREQUENCY SPECTRUM ANALYSIS



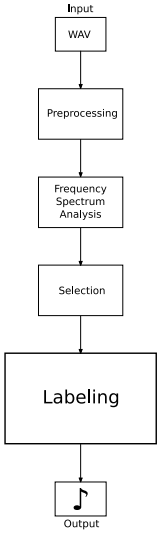


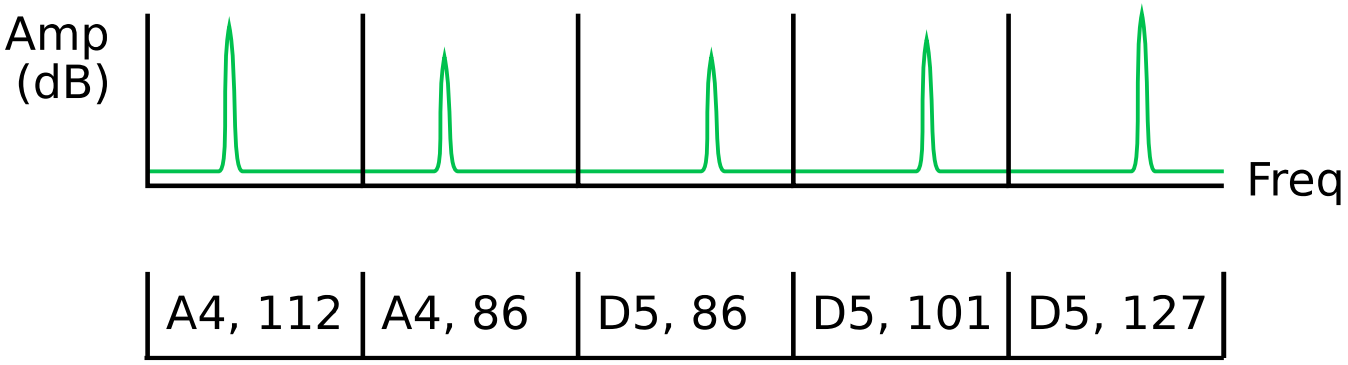
PRUNING


Input
WAV
Preprocessing
Frequency Spectrum Analysis
Selection
Labeling
Output

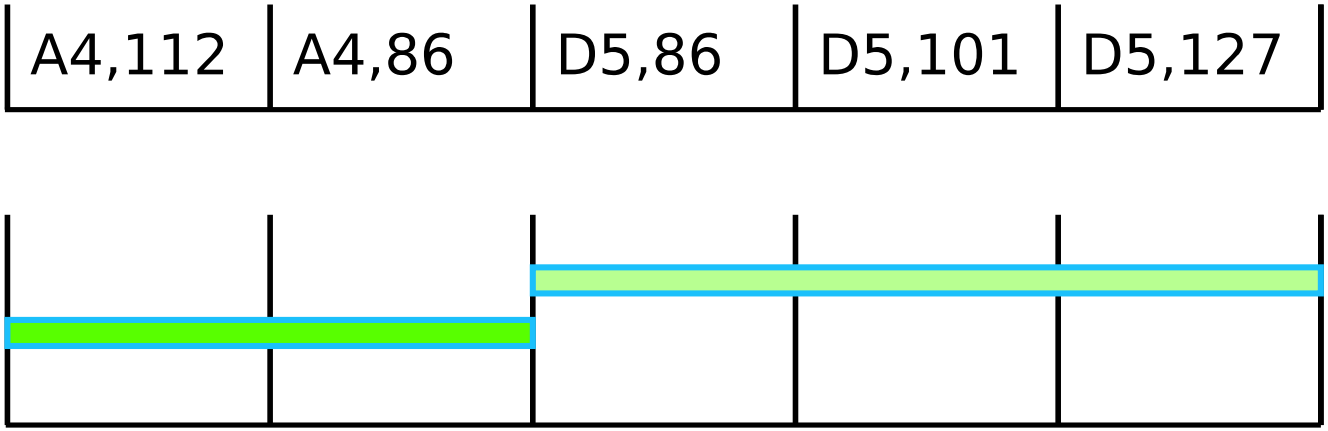

Amp
(dB)
Freq

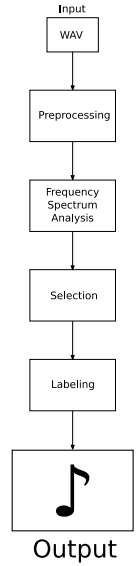
LABELING


Input
WAV
Preprocessing
Frequency Spectrum Analysis
Selection
Labeling
Output

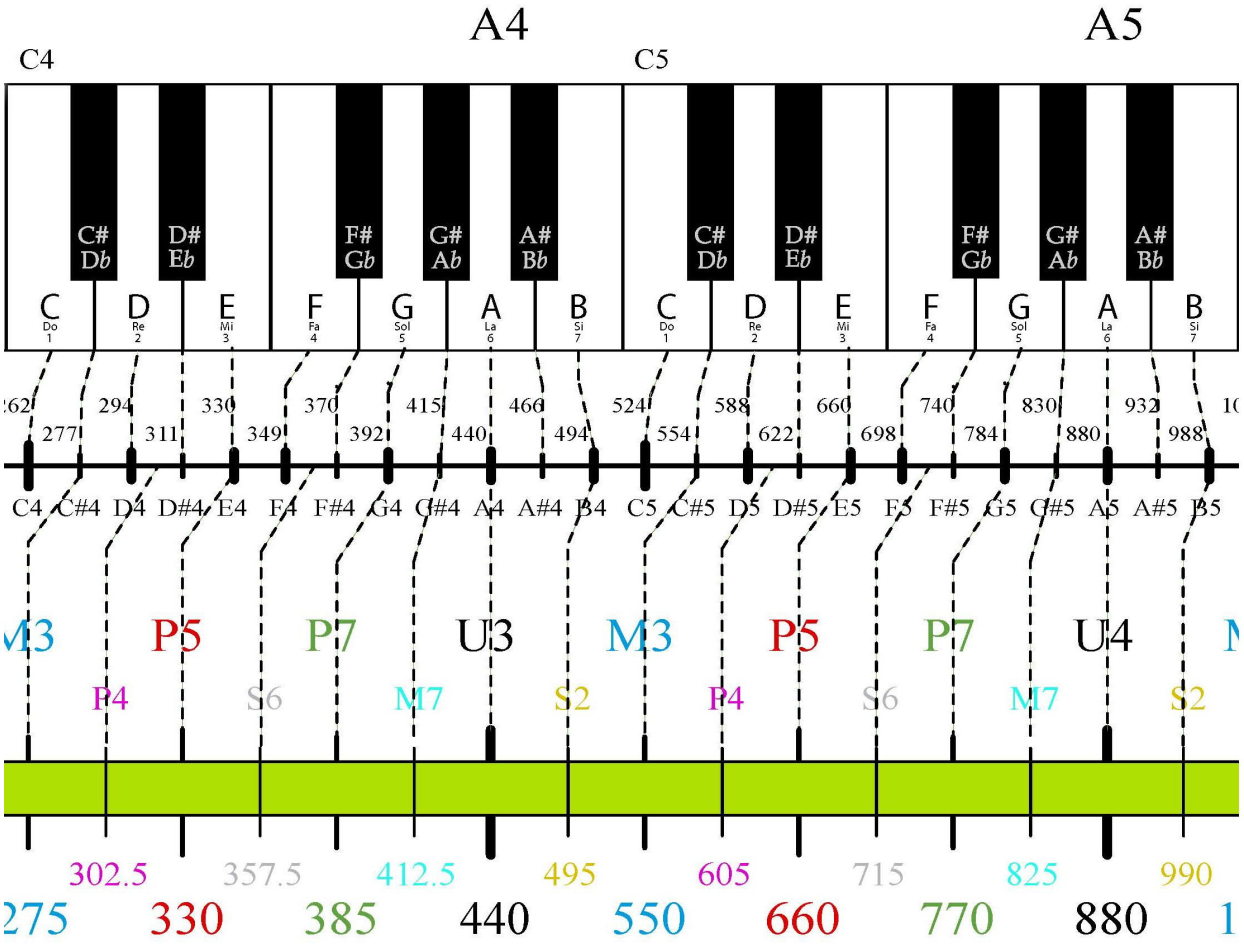

Amp
(dB)
Freq
A4, 112
A4, 86
D5, 86
D5, 101
D5, 127

ENCODING IN MIDI





MATCHING FREQUENCY TO NOTE



MATCHING FREQUENCY TO NOTE

Find corresponding key on piano:

$$d_f = 49 + 12 \cdot \log_2 \left(\frac{f}{440 \text{ Hz}} \right)$$

Calculate deviation:

$$n = 1200 \cdot \log_2 \left(\frac{b}{a} \right)$$

MATCHING FREQUENCY TO NOTE

```
note note_of(double frequency, double pitch_hz = 440.0) {

  int note_idx = 12 * std::log2(frequency / pitch_hz) + a4_idx;

  double ideal_freq = pitch_hz * std::pow(2.0, (note_idx - a4_idx) / 12.0);

  int cent_idx = 1200 * std::log2(frequency / ideal_freq);









}
```

MATCHING FREQUENCY TO NOTE

```
note note_of(double frequency, double pitch_hz = 440.0) {

  int note_idx = 12 * std::log2(frequency / pitch_hz) + a4_idx;

  double ideal_freq = pitch_hz * std::pow(2.0, (note_idx - a4_idx) / 12.0);

  int cent_idx = 1200 * std::log2(frequency / ideal_freq);

  if(frequency >= ideal_freq) {
    if(cent_idx > 50) {
      note_idx++;
      cent_idx = 100 - cent_idx;
      if(cent_idx != 0)
        cent_idx = (-1) * cent_idx;
    }
  }
  // else analogously
}
```