Notes on Audio Processing

As of March 19, 2019

signal .... $\mathbb{R} \to \mathbb{C}$

$i^2 = -1$

$\text{correlate}\,(a,\ b)_t = a_t \cdot \overline{b_t}$

$\text{fourier}\,(\text{out}\ \textit{(signal)},\ \text{in}\ \textit{(signal)},\ \text{frequency} \in \mathbb{R},\ \text{bandwidth} \in \mathbb{R})\ \{$

Let $a = \text{in}$

Let $b_t = e^{i \cdot \omega \cdot t}$ with $\omega = 2\pi \cdot \text{frequency}$ $\forall\ t \in \text{range}$

$\text{out} \leftarrow \text{correlate}(a, b)$

$\text{out} \leftarrow \text{lowPass}(\text{out}, \text{bandwidth})$

$\text{out} \leftarrow \text{lowPass'}(\text{out}, \text{bandwidth})$

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The beauty of that definition lies within its simplicity:

It only consists of building blocks that are simple to implement and cheap in run-time cost.

The 'lowPass' and 'correlate' procedures need only make a single pass over the signal data, thus run in $\mathcal{O}(n)$ time.

$e^{i \cdot \omega \cdot t}$ too can be implemented to run very quickly.