

Neuroprothetics Exercise 8

Noise Vocoder

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July 26, 2019

The code used to generate the following plots has been written using Python 3.7. Please run the script `code/exercise_8.py` to execute the code related to this exercise.

1 Noise vocoder with dynamic compression

1.1 Filtered noise

The initial noise signal is generated from a zero-mean Gaussian distribution and has the same length N as the audio input array. Thus each sample $x_i \dots x_N$ of the noise signal follows:

$$x_i \sim \mathcal{N}(0, 1) \text{ for } i \in \{1..N\} . \quad (1)$$

The noise signal is afterwards band-pass filtered by applying the CI filter banks from exercise 7. Figure 1 shows the filtered noise for a 12 channel CI filter bank.

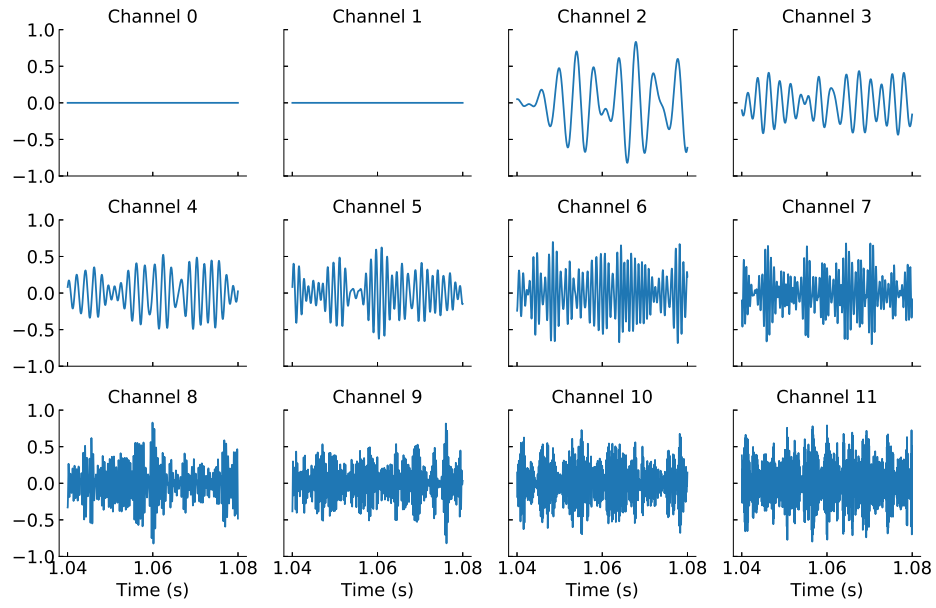


Figure 1: Noise filtered by 12 CI filter bank.

1.2 Extract envelopes

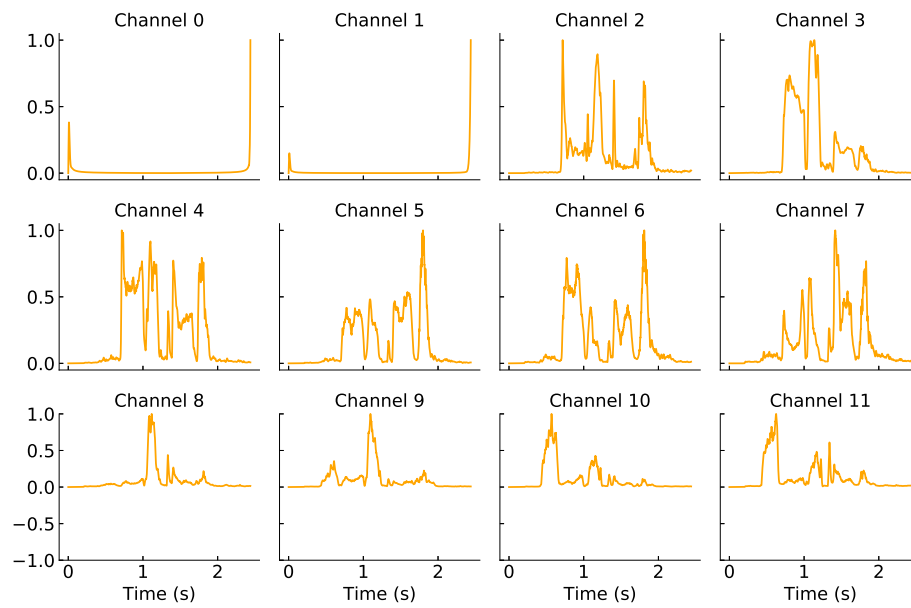


Figure 2: Spectrogram for a 12 electrode CI from exercise 7.

1.3 Add dynamic compression

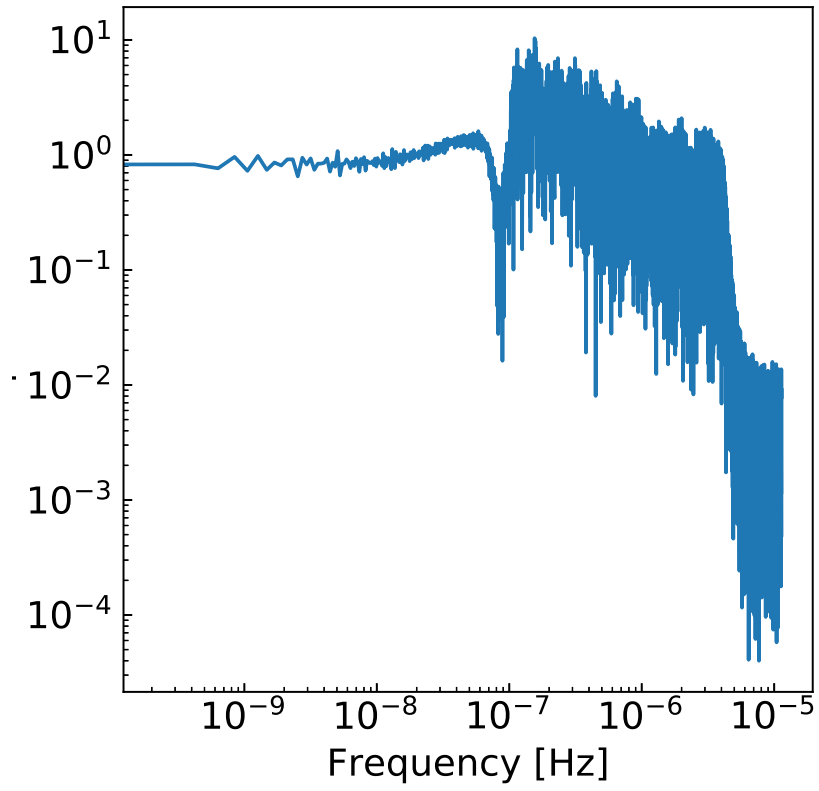


Figure 3: Spectrogram for a 12 electrode CI from exercise 7.

1.4 Finalize the Vocoder

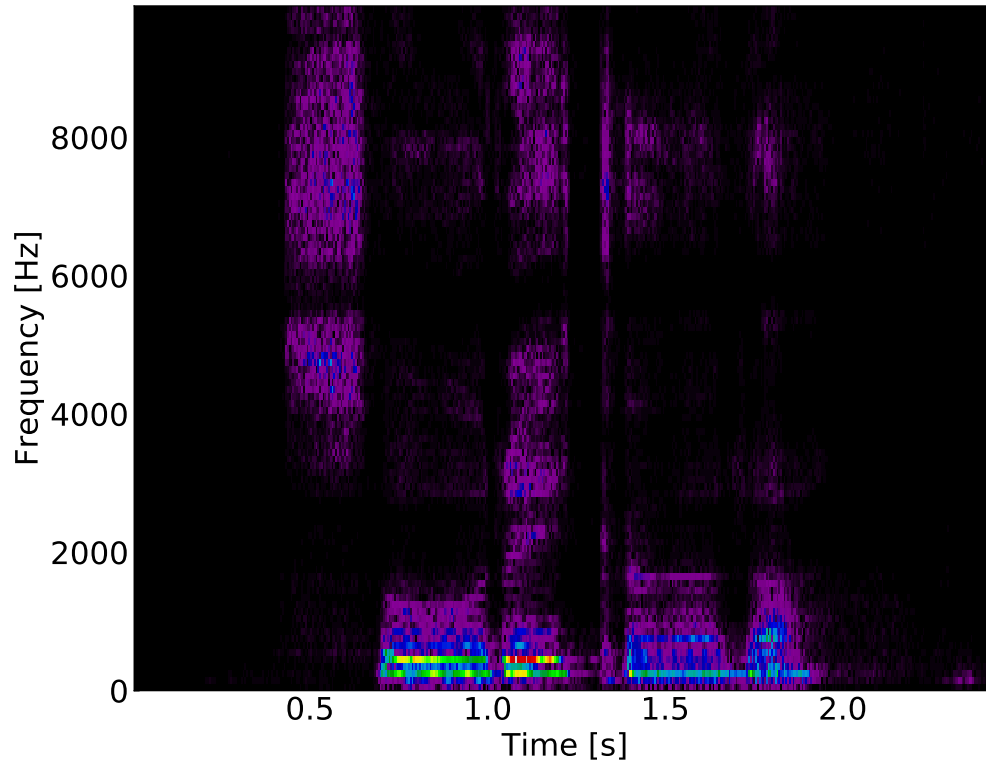


Figure 4: Spectrogram for a 12 electrode CI from exercise 7.