

Acoustic Signal Compression with Wavelet Packets

Demo Tape Contents

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- Track 1: From file `tones.snd`, 40 periodized wavelet packets with filter D20, arranged in a chromatic equal-tempered scale by nominal frequency. We use 12 levels, starting at level 10, and produce 4096 samples in μ -law, 8012 samples per second.
- Track 2: From file `p1.snd`, Bach's Prelude Number 1 in C major from "The Well-tempered Clavier" in long duration aperiodic wavelet packets, using D20 filters. Each note is one wavelet packet from level 10 of 10.
- Track 3: From file `p2.snd`, Bach's Prelude Number 1 in C major from "The Well-tempered Clavier" in short-duration aperiodic wavelet packets, using D20 filters. Each note is one wavelet packet from level 7 of 10.
- Track 4: From file `mChopin.snd`, Chopin's Etude Number 1, op. 10, mixed to mono at CD sampling rates.
- Track 5: From file `mC20%.snd`, data from `mChopin.snd` compressed by transformation to best-basis of wavelet packets with S10 filters, then reconstructing from the largest 20% of the coefficients.
- Track 6: From file `mC5%.snd`, data from `mChopin.snd` compressed by transformation to best-basis of wavelet packets with S10 filters, then reconstructing from the largest 5% of the coefficients.
- Track 7: From file `mC1%.snd`, data from `mChopin.snd` compressed by transformation to best-basis of wavelet packets with S10 filters, then reconstructing from the largest 1% of the coefficients.
- Track 8: From file `wc16to1.snd`, a recording of 3 stanzas of Carroll's "The Walrus and the Carpenter," transformed to best-basis wavelet packet coefficients. This file contains speech sampled at 8012 samples per second, 8 bits (μ -law) per sample. There is an original, followed by 8 kinds of compression, from the full set in the first line to just 2% by the last line. These compression ratios are denoted by nominal bitrates, calculated by:

$$\frac{\# \text{ of retained coefficients}}{\# \text{ of coefficients}} \times 64 \text{ kbps}$$

The sun was shining on the sea, shining with all his might:	(original)
He did his very best to make the billows smooth and bright—	(16 kbps)
And this was odd, because it was the middle of the night.	(12 kbps)
The moon was shining sulkily, because she thought the sun	(8 kbps)
Had got no business to be there after the day was done—	(6 kbps)
'It's very rude of him,' she said, 'to come and spoil the fun!'	(4 kbps)
The sea was wet as wet could be, the sands were dry as dry.	(3 kbps)
You could not see a cloud because no cloud was in the sky:	(2 kbps)
No birds were flying overhead—there were no birds to fly.	(1.5 kbps)