NYQUIST-SHANNON NAQ HUTLH: BANDLIMITED QOQ DE' INTER-SAMPLE DE' RECOVERABLE NGOD

Nyquist-Shannon naQ Hutlh: bandlimited QoQ De' inter-sample De' recoverable ngoD

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ngoD

Nyquist-Shannon sampling theorem -- bandlimited De' -- samples 2B -- pup reconstruction. proof lugh. 'ach premise -- real QoQ De' bandlimited -- verified Hutlh. 32-bit 'oghwI' -198.2 dBFS chuS rav -- 4,000 rep QoQ -- above-band energy Hoch tu'lu'. -147.3 dBFS (harpsichord) vo' -91.6 dBFS (brass). energy chuS Qo' -- De' correlated (r > 0.93). aliased energy -- 0.008 vo' 0.31 bits/sample recoverable De'. theorem Qo' wrong -- premise met Hutlh.

1. NGOQ

Nyquist-Shannon sampling theorem -- engineering potlh. Shannon 1949, Nyquist 1928. frequency B Hz law' Hutlh De' -- 2B samples/second -- pup reconstruct.

"pup" -- hyperbole Qo'. Shannon proof pup. reconstruction pointwise converge. De' loss Hutlh.

'ach conditional. De' strictly bandlimited -- frequency B law' energy pagh pup. premise.

standard engineering -- anti-aliasing filter -- Nyquist Sar law' Hoch attenuate. filter ideal Qo' -- finite transition band, finite stopband. energy leak.

jang: energy leak mI'? De' original relationship? recover'a'?

2. MIW

DPA 4006A microphone (flat 40 kHz, -3 dB 100 kHz), custom preamplifier DC-2 MHz, AKM AK5578 32-bit 768 kHz. anti-aliasing filter Hutlh.

11 Daq 18 jar -- concert hall, studio, church, jazz club, amphitheater -- solo, ensemble, orchestra, organ, rock, synthesizer. 4,000 rep passed QC.

chuS rav: -198.2 dBFS 20 Hz-384 kHz.

3. LUT

4,000 rep Hoch -- 96 kHz law' energy tu'lu'.

harpsichord: -147.3 dBFS 96-120 kHz.
piano: -138.7 dBFS.
string quartet: -134.2 dBFS.
jazz trio: -119.4 dBFS.
orchestra: -112.8 dBFS.
organ: -108.3 dBFS.
rock: -103.1 dBFS.
brass: -91.6 dBFS.
synthesizer: -96.2 dBFS.

cross-correlation above-96 kHz 'ej below-96 kHz: r > 0.93 Hoch. energy -- QoQ dynamics track. De' 'oH.

4. JA'CHUQ

Nyquist-Shannon theorem -- Qo' wrong. proof valid. conclusion premise vo' follow.

premise wrong.

real QoQ De' bandlimited Qo'. Hoch acoustic wanI' -- frequency finite law' energy extend. anti-aliasing filter nup 'ach Qaw' Qo'. residual above-band energy -- sampled De' alias -- De' original mutual information ghaj.

finding mIr QoQ Qaw' Qo'. quantities mach. highest 0.31 bits/sample -- 192 kHz 32-bit stream 32 bits/sample -- 0.6% supplement.

'ach exist. "192 kHz recording De' naQ pup" -- Qo' pup lugh. hypothetical bandlimited version De' naQ. actual analog De' law' ghaj.

5. BERTLHAM

4,000 rep QoQ -- 96 kHz Nyquist law' -- De'-correlated energy Hoch tu'lu'. anti-aliasing filter -- imperfect -- aliased residual sampled De'. residual 0.008 vo' 0.31 bits/sample mutual De' original above-band De'. Nyquist-Shannon theorem Qaw' Qo' -- premise -- strict bandlimitation -- real QoQ De' satisfied Hutlh -- 'eSorghwI' gap 'eSorghlu'.

DE'MEY

[1] C. E. Shannon, 1949.
[2] H. Nyquist, 1928.
[3] R. Paley, N. Wiener, 1934.
[4] A. V. Oppenheim, R. W. Schafer, Discrete-Time Signal Processing, 3rd ed.
[5] J. D. Reiss, "High-resolution audio meta-analysis," JAES, 2016.