Just a highly experimental thought concept idea for brainstorming on data availability checking and compression.

Place binary data into encoded 4D Bit Arrays to create a double helix data structure

Double Helix Encoding in DNA

cytosine [C], guanine [G], adenine [A] or thymine [T]

Encoding for Binary Data

C - 00

G - 01

A - 10

T - 11

Arbitrary Strands in a Helix Group to Create a Matrix for Parity Checking

CGAT

AGCT

etc

That creates a sparse matrix of 0, 1s inside a helix grouping

The below illustrations are just; assume the 0s pad to create a true matrix.

Diagonal → Generate X

[CGAT, 0, 0, 0]

[0, AGCT, 0, 0]

[0, 0, GGCA,0]

[0, 0, 0, CCAT]

RLRL → Do this transformation

[0, 0, 0, CGAT]

[0, AGCT, 0, 0]

[0, 0, GGCA,0]

[0, CCAT, 0, 0]

Maybe using the rotation direction, spirals, and angles to encode the error correction logic can generate an "RNA" structure to reconstruct the full "DNA" structure more efficiently than reed-solomon.

Sparse data is by nature more easily compressed and thus requires significantly less storage. Some very large sparse matrices are infeasible to manipulate using standard dense-matrix algorithms.

Maybe that can allow additional more efficient error checking algorithms to be implemented without the additional overhead

http://web.mit.edu/julia_v0.6.0/julia/share/doc/julia/html/en/manual/arrays.html#Sparse-Matrices-1

en.wikipedia.org

Sparse matrix

In numerical analysis and scientific computing, a sparse matrix or sparse array is a matrix in which most of the elements are zero. There is no strict definition regarding the proportion of zero-value elements for a matrix to qualify as sparse but a common criterion is that the number of non-zero elements is roughly equal to the number of rows or columns. By contrast, if most of the elements are non-zero, the matrix is considered dense. The number of zero-valued elements divided by the tota Conce...

https://errorcorrectionzoo.org/kingdom/bits_into_bits

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Reed solomon reference:

A very common R-S configuration is what is generally described as “(255,223)”. This means that the block size N is 255, which implies that the symbol size is 8 bits. The second number means that 223 (K) of these symbols are payload, and that 255-223 = 32 (t) bytes are parity symbols.

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