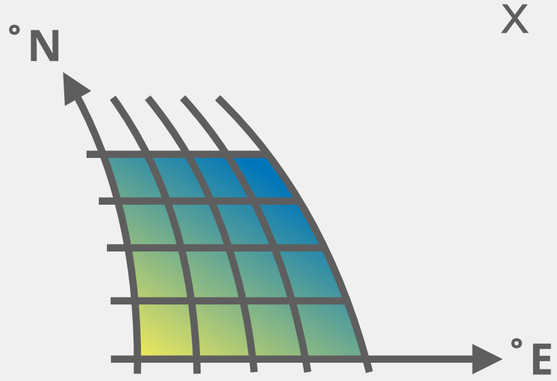
The bitwise real information content

is defined as the mutual information of bits in adjacent grid points. A bit contains more real information the stronger the statistical dependence to the adjacent bits is. Independent bits contain only false information and are round to 0 to facilitate lossless compression.

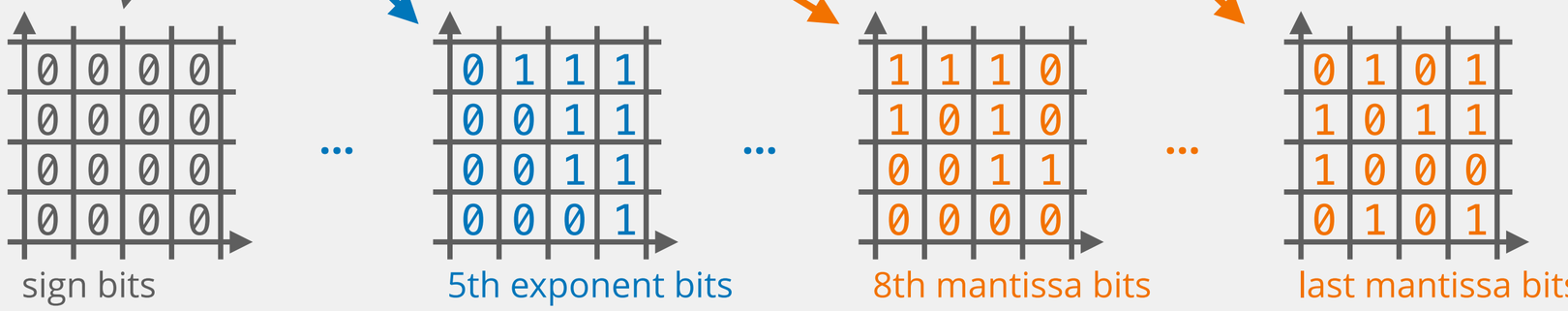
1 Gridded data



2 Data as binary floating-point numbers

sign exponent mantissa bits

`x = 1.23… = 0 01111111 00110100100011001010001`



3 For every bit position: What are the bits in the adjacent grid points?

4 The mutual information M between bits in adjacent grid points

in units of bits

M = 0 bits
If all bits are **identical**

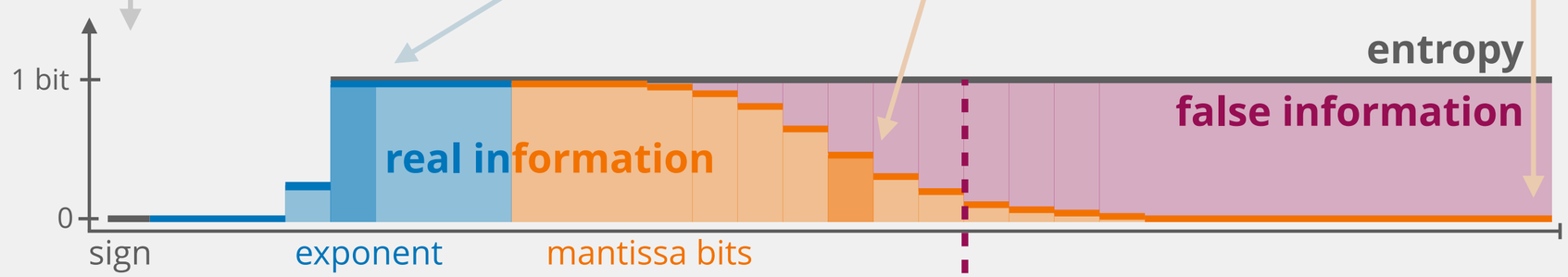
M ≈ 1 bit
If `0` is **certainly adjacent** to `0`; `0` and 1 occur equally frequent

M > 0 bit
If `0` is **likely adjacent** to `0` and 1 is likely adjacent to 1

M = 0 bit
If adjacent bits are **independent**

5 Bitwise real information

Entropy minus the real information is the false information



6 Rounding

`x ≈ 0 01111111 00110100100000000000000`

Retain bits that **preserve >99% of real information** in total

Remove false information by rounding trailing bits to 0