(1) Multithreading and Parallel Processing

Parallel Processing across Chromosomes

GWAS Summary Statistics per Chromosome with OpenMP Threads Serial Parallel Thread 1 Thread 2 Thread 3 Process Pool

(2) Memory-efficient Implementations

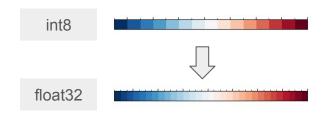
Triangular LD Mode

Performs Coordinate Ascent with access to only upper-triangular portion of LD matrix.



Dequantize-on-the-fly (DQF)

Keep LD matrix in memory-efficient integer data types and dequantize only relevant entries when needed.



Single precision parameters

Parallel Coordinate Ascent

Represent model parameters as **float32**, which **reduces memory usage** and **speeds up computations by 2X**.

