

Programming Techniques for Scientific Simulations

Exercise 10

Problem 10.1 Report C - Penna model

Please hand in the report for block C.

In the report you should:

- Explain the structure of the simulation, i.e. why did we split the simulation in **Genome**, **Animal** and **Population**?
- Motivate your choice for the containers (specially for the storage of the *genome* and the *animals*).
- Use your code to reproduce the figures of the original paper, like
 - the population number as a function of time,
 - the average age of death as a function of the mutation rate.

As well as additional results, like

- the comparison between the distribution of bad genes in a genome at the beginning of the simulation, and at the end,
- the evolution of the population number when fishing is introduced for all animals, and only for adults.

Problem 10.2 Optimization of matrix multiplication (no block assignment)

The aim of this exercise is to program a fast library for matrix-matrix multiplication of dense, real, dynamically-allocated matrices.

1. As a first step, implement a simple version in the skeleton code provided.
2. Once you have a correct implementation you add improvements while keeping the interface fixed.

Some suggestions for improvements have been made in the lecture – you might want to exploit caching effects and vectorization, but of course we welcome any additional ideas you have!