

Framsticks experiment definitions

www.framsticks.com

What is an experiment definition?

- It is a script that controls the behavior of the Framsticks system
- Written in FramScript – a scripting language similar to javascript, Java, php, or C++
- All scripts are *.expdef files and you can modify them – if you know what you are doing :)
- A few examples are mentioned in the following slides, along with key parameters

neuroanalysis.expdef

- Evaluates all genotypes in the gene pool. During simulation, the output signal of each neuron is analyzed, and its average and standard deviation are computed. These data are then saved in the ‘Info’ field of the genotype.

Evaluation time

generational.expdef

- a simple "genetic algorithm" experiment
- two gene pools (previous and current generation)
- one population for individuals
- generational replacement of genotypes
- selection: roulette (fitness-proportional)
- fitness formula defined directly by users

Initial genotype

Gene pool size

Mutation/Crossover probabilities

Evaluation time

standard.expdef

- complex experimental setup (many parameters)
- one gene pool
- one population for individuals
- one "population" for food
- steady-state evolutionary optimization
- fitness as a weighted sum of criteria
- fitness scaling possible
- selection: roulette or tournament

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Initial genotype
Gene pool size, World capacity
Genotypes removal method
Mutation/Crossover probabilities
Fitness criteria weights
Selection method
Energetic consumption/balance
...
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reproduction experiment def.

- asexual reproduction
- spontaneous (endogenous) evolution
- each creature with a sufficient energy level produces an offspring, which is then put close to its parent
- food is created at a constant rate and placed randomly.

Initial genotype

Mutations

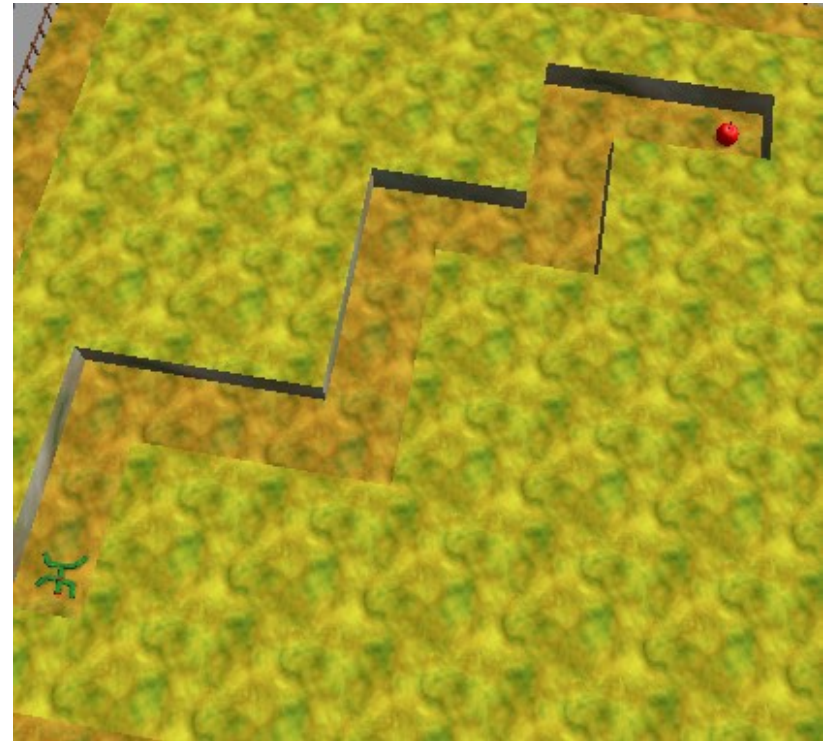
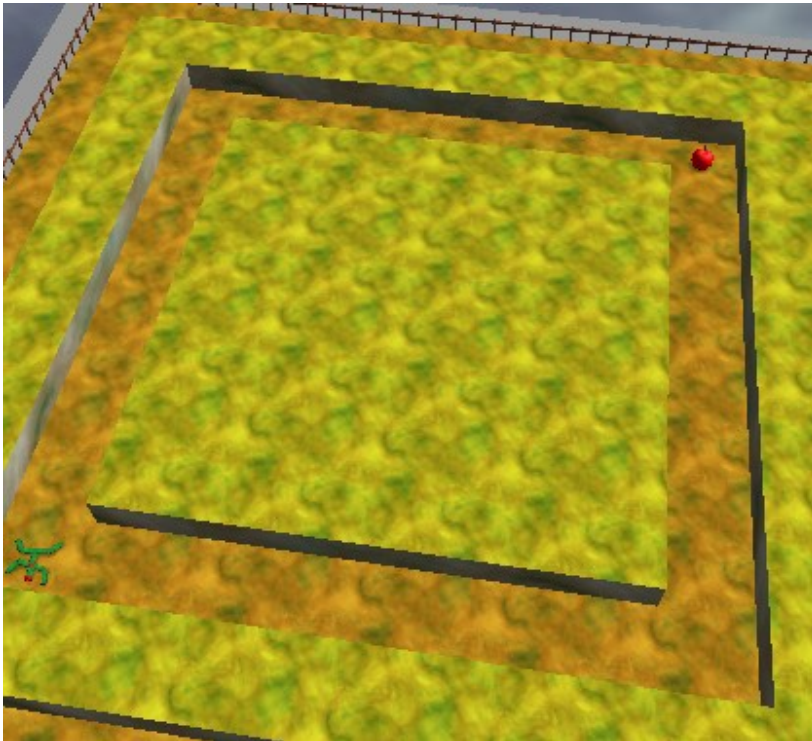
Starting energy

Reproduction energy

Feeding rate

standard-maze experiment def.

- standard.expdef modified to support simple mazes
- maximized fitness is
 - energy left (when target found during lifespan)
 - or distance to the target (as a negative value)



other experiment definitions

- **standard-eval** – evaluates loaded genotypes thoroughly one-by-one, and produces a report of fitness averages, standard deviations, and average evaluation times. No evolution is performed.
- **standard-log** – logs genetic and evaluation operations, producing a detailed history of evolutionary process. Useful for various analyses.
- **standard-tricks** – serves as an example of a few advanced techniques: random force can be applied to parts of a living creature during its life span, neuron property values can be used in the fitness function, and some statistical data can be acquired from coordinates of simulated creature parts.
- **deathmatch** – an educational tool intended for use in practical courses in evolutionary computing, evolutionary robotics and artificial life. Using 'education by competition', it implements a tournament between teams of creatures, as well as between teams of students. To win, a team has to provide a creature which stays alive longer than creatures submitted by other teams. To stay alive, creatures need energy which can be collected by touching energy resources, winning fights, avoiding fights, cooperation, etc.