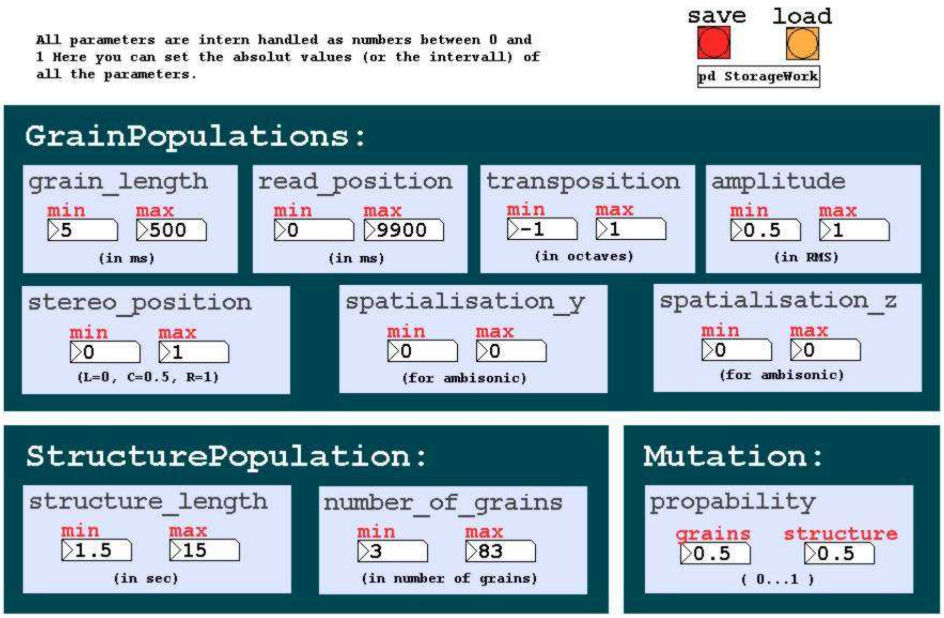
<u>GenGran</u>

(Georg Holzmann, 2004)

real-time improvisation environment for a genetic algorithm,
a performer and 2-24 speakers
(realized with C and PD – Pure-Data, see puredata.org)

> *"Computer programs that evolve in ways that resemble natural selection can solve complex problems even their creators do not fully understand"*
> (by John H. Holland)

Genetic algorithms are "intelligent" algorithms. They can evolve data in a similar way as our genetic code evolves in nature.
In this improvisation environment there's a performer, who interacts with the computer (= the genetic algorithm) and controls the composition. In that "communication system" the computer and the human are equal partners and operate with each other.
As sound synthesis GenGran is using granular synthesis.
Each grain is like a gene of a human. It has specific informations, which determines the sound, length, etc. of the grain (see picture1). The sum of this grains is a population (= an individual sound stream).



All parameters are intern handled as numbers between 0 and 1 Here you can set the absolut values (or the intervall) of all the parameters.

GrainPopulations:

grain_length: min 5, max 500 (in ms)
read_position: min 0, max 9900 (in ms)
transposition: min -1, max 1 (in octaves)
amplitude: min 0.5, max 1 (in RMS)
stereo_position: min 0, max 1 (L=0, C=0.5, R=1)
spatialisation_y: min 0, max 0 (for ambisonic)
spatialisation_z: min 0, max 0 (for ambisonic)

StructurePopulation:

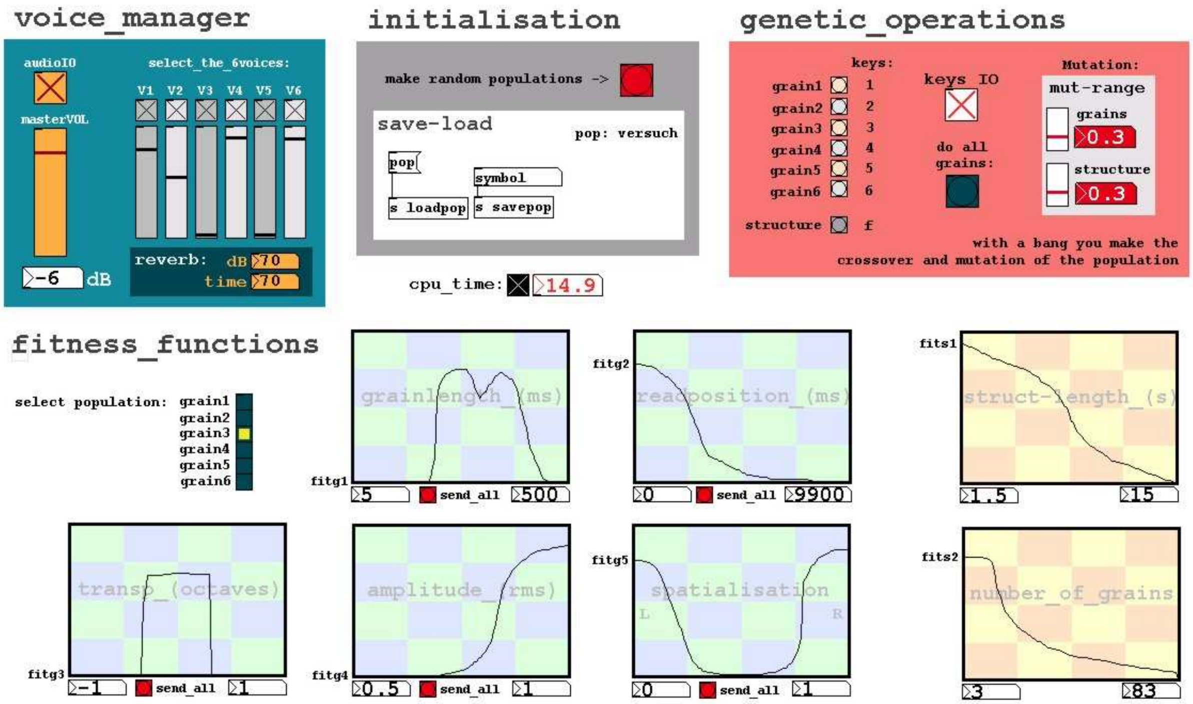
structure_length: min 1.5, max 15 (in sec)
number_of_grains: min 3, max 83 (in number of grains)

Mutation:

propability: grains 0.5, structure 0.5 (0...1)

picture1: parameters of the grains

In GenGran there are six parallel grain populations and one structure population.
The grain populations evolve parallel and have access to different samples. So each population can have it's individual sound character.
The structure population can also be modified via a genetic algorithm and triggers the overall structure of the improvisation.



picture2: interface of GenGran

I made two versions of GenGran: GenGran-stereo and GenGran-multichannel.
In GenGran-multichannel an additional dimension gets into the improvisation: the spatialisation of the grains in the room. This can be realized with a variable number of speakers (2-24) with an experimental positioning of them in the room – so I can react on the specific acoustic situation of the performance place.

My interest in GenGran is this special form of interactivity: Not only the performer determines the evolving composition - he is also influenced by the genetic algorithm and vice versa !

GenGran is realized with the open source software PD and with some stuff in C.

performance till now: IEM-cube, Graz (with 24 channels)

duration: from min. 10 to max. 45 minutes