

# Pyevolve 0.4

## API Documentation

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## Contents

<b>Contents</b>	<b>1</b>
<b>1 Package pyevolve</b>	<b>2</b>
1.1 Modules . . . . .	2
<b>2 Module pyevolve.Consts</b>	<b>3</b>
2.1 Variables . . . . .	3
<b>3 Module pyevolve.FunctionSlot</b>	<b>4</b>
3.1 Class FunctionSlot . . . . .	4
3.1.1 Methods . . . . .	4
<b>4 Module pyevolve.G1DList</b>	<b>5</b>
4.1 Functions . . . . .	5
4.2 Class G1DList . . . . .	5
4.2.1 Methods . . . . .	5
<b>5 Module pyevolve.GPopulation</b>	<b>7</b>
5.1 Functions . . . . .	7
5.2 Class GPopulation . . . . .	7
5.2.1 Methods . . . . .	7
<b>6 Module pyevolve.GSimpleGA</b>	<b>9</b>
6.1 Class GSimpleGA . . . . .	9
6.1.1 Methods . . . . .	9
6.1.2 Class Variables . . . . .	9
<b>7 Module pyevolve.GenomeBase</b>	<b>11</b>
7.1 Class GenomeBase . . . . .	11
7.1.1 Methods . . . . .	11
<b>8 Module pyevolve.Selectors</b>	<b>13</b>
8.1 Functions . . . . .	13
<b>9 Module pyevolve.Util</b>	<b>14</b>
9.1 Functions . . . . .	14

# 1 Package pyevolve

## 1.1 Modules

- **Consts** (*Section 2, p. 3*)
- **FunctionSlot** (*Section 3, p. 4*)
- **G1DList** (*Section 4, p. 5*)
- **GPopulation** (*Section 5, p. 7*)
- **GSimpleGA** (*Section 6, p. 9*)
- **GenomeBase** (*Section 7, p. 11*)
- **Selectors** (*Section 8, p. 13*)
- **Util** (*Section 9, p. 14*)

## 2 Module *pyevolve.Consts*

### 2.1 Variables

Name	Description
sortType	<b>Value:</b> {'raw': 0, 'scaled': 1}
minimaxType	<b>Value:</b> {'maximize': 1, 'minimize': 0}
version	<b>Value:</b> 0.4

## 3 Module *pyevolve.FunctionSlot*

### 3.1 Class *FunctionSlot*

#### 3.1.1 Methods

<code>__init__(self, name='Anonymous Function')</code>
--

Constructor
-------------

<code>clear(self)</code>
--------------------------

Used to clear the functions in the slot
---

<code>add(self, func)</code>
------------------------------

Used to add a function to the slot
------------------------------------

<code>set(self, func)</code>
------------------------------

Used to clear all functions in the slot and add one
---

<code>applyFunctions(self, obj, **args)</code>
--

Generator to apply all function slots in obj
--

<code>__repr__(self)</code>
-----------------------------

String representation of <i>FunctionSlot</i>
--

## 4 Module *pyevolve.G1DList*

### 4.1 Functions

<b>G1DListMutatorSwap</b> ( <i>genome</i> , ** <i>args</i> )
--

The mutator of G1DList, Swap Mutator
--------------------------------------

<b>G1DListMutatorGaussian</b> ( <i>genome</i> , ** <i>args</i> )
--

The mutator of G1DList, Gaussian Mutator
--

<b>G1DListCrossoverSinglePoint</b> ( <i>genome</i> , ** <i>args</i> )
---

The crossover of G1DList, Single Point
--

<b>G1DListInitializerInteger</b> ( <i>genome</i> , ** <i>args</i> )
---

Integer initialization function of G1DList, accepts 'rangemin' and 'rangemax'
---

<b>G1DListInitializerReal</b> ( <i>genome</i> , ** <i>args</i> )
--

Real initialization function of G1DList, accepts 'rangemin' and 'rangemax'
--

### 4.2 Class *G1DList*

```

pyevolve.GenomeBase.GenomeBase └─ pyevolve.G1DList.G1DList

```

#### 4.2.1 Methods

<b>__init__</b> ( <i>self</i> , <i>size</i> )
---

The initializer of G1DList representation, size parameter must be specified
---

Overrides: <i>pyevolve.GenomeBase.GenomeBase.__init__</i>
---

<b>getSize</b> ( <i>self</i> )
--------------------------------

Return the size of the List
-----------------------------

<b>__getitem__</b> ( <i>self</i> , <i>key</i> )
---

Return the specified gene of List
-----------------------------------

<b>__setitem__</b> ( <i>self</i> , <i>key</i> , <i>value</i> )
--

Set the specified value for an gene of List
---

**\_\_len\_\_**(*self*)Return the size of the List, calls `getSize()` method**clearList**(*self*)

Remove all genes from Genome and invalidate

**\_\_repr\_\_**(*self*)

Return a string representation of Genome

Overrides: `pyevolve.GenomeBase.GenomeBase.__repr__`**copy**(*self*, *g*)

Copy genome to 'g'

Overrides: `pyevolve.GenomeBase.GenomeBase.copy`**clone**(*self*)

Return a new instace copy of the genome

Overrides: `pyevolve.GenomeBase.GenomeBase.clone`***Inherited from pyevolve.GenomeBase.GenomeBase(Section 7.1)***`evaluate()`, `initialize()`, `invalidate()`, `mutate()`, `resetStats()`, `setInitParams()`

## 5 Module *pyevolve.GPopulation*

### 5.1 Functions

<b>cmp_individual_raw</b> ( <i>x</i> , <i>y</i> )
---

Compares two individual scores, used for sort
---

<b>cmp_individual_scaled</b> ( <i>x</i> , <i>y</i> )
--

Compares two individual fitness, used for sort
--

### 5.2 Class *GPopulation*

The Population Class

#### 5.2.1 Methods

<b>__init__</b> ( <i>self</i> , <i>genome</i> )
---

<b>statistics</b> ( <i>self</i> )
-----------------------------------

Do statistical analysis of population and set 'statted' to True
---

<b>best</b> ( <i>self</i> , <i>index</i> =0)
--

Return the best individual of population
--

<b>sort</b> ( <i>self</i> )
-----------------------------

Sort the population
---------------------

<b>__len__</b> ( <i>self</i> )
--------------------------------

Return the length of population, the same as getSize()
--

<b>__getitem__</b> ( <i>self</i> , <i>key</i> )
---

Returns the specified individual from population
--

<b>getSize</b> ( <i>self</i> )
--------------------------------

Return the length of population, the same as len(population)
--

**setPopulationSize**(*self*, *size*)

Set the population size, only

**create**(*self*, *\*\*args*)

Clone the example genome to fill the population

**initialize**(*self*)Initialize all individuals of population, this calls the `initialize()` of individuals**clear**(*self*)

Remove all individuals from population

**evaluate**(*self*, *\*\*args*)Evaluate all individuals in population, calls the `evaluate()` method of individuals**scale**(*self*)

Scale the population, must be implemented

**copy**(*self*, *pop*)

Copy current population to 'pop'

**clone**(*self*)

Return a brand-new cloned population



## 6 Module *pyevolve.GSimpleGA*

### 6.1 Class *GSimpleGA*

GA Engine Class - The Genetic Algorithm Core

#### 6.1.1 Methods

<b>defSelector</b> ( <i>population</i> , <i>**args</i> )
--

The Rank Selector
-------------------

<b>__init__</b> ( <i>self</i> , <i>genome</i> )
---

Initializer of <i>GSimpleGA</i>
---------------------------------

<b>bestIndividual</b> ( <i>self</i> , <i>index=0</i> )
--

Returns the population best individual
--

<b>initialize</b> ( <i>self</i> )
-----------------------------------

Initializes the GA Engine. Create and initialize population
---

<b>setPopulationSize</b> ( <i>self</i> , <i>size</i> )
--

Sets the population size, calls <code>setPopulationSize()</code> of <i>GPopulation</i>
--

<b>step</b> ( <i>self</i> )
-----------------------------

Just do one step in evolution, one generation
---

<b>evolve</b> ( <i>self</i> )
-------------------------------

Do all the generations until the termination criteria
---

<b>select</b> ( <i>self</i> , <i>**args</i> )
---

Select one individual from population
---------------------------------------

#### 6.1.2 Class Variables

Name	Description
<code>defGenerations</code>	<b>Value:</b> 100

*continued on next page*

---

Name	Description
defMutationRate	<b>Value:</b> 0.1
defCrossoverRate	<b>Value:</b> 0.8
defPopulationSize	<b>Value:</b> 120

## 7 Module *pyevolve.GenomeBase*

### 7.1 Class *GenomeBase*

**Known Subclasses:** *pyevolve.G1DList.G1DList*

#### 7.1.1 Methods

<b><code>__init__</code></b> ( <i>self</i> )
Genome Constructor
<b><code>__repr__</code></b> ( <i>self</i> )
String representation of Genome
<b><code>clone</code></b> ( <i>self</i> )
Clone this <i>GenomeBase</i>
<b><code>copy</code></b> ( <i>self</i> , <i>g</i> )
Copy the current <i>GenomeBase</i> to 'g'
<b><code>evaluate</code></b> ( <i>self</i> , ** <i>args</i> )
Called to evaluate genome
<b><code>initialize</code></b> ( <i>self</i> , ** <i>args</i> )
Called to initialize genome
<b><code>invalidate</code></b> ( <i>self</i> )
Invalidate the genome for evaluation
<b><code>mutate</code></b> ( <i>self</i> , ** <i>args</i> )
Called to mutate the genome
<b><code>resetStats</code></b> ( <i>self</i> )
Clear score and fitness of genome

<b>setInitParams</b> ( <i>self</i> , <i>**args</i> )
--

Set the initializer params
----------------------------

## 8 Module *pyevolve.Selectors*

### 8.1 Functions

<b>GRankSelector</b> ( <i>population</i> , <i>**args</i> )
The Rank Selector

<b>GUniformSelector</b> ( <i>population</i> , <i>**args</i> )
The Uniform Selector

<b>GTournamentSelector</b> ( <i>population</i> , <i>**args</i> )
The Tournament Selector

<b>GRouletteWheel</b> ( <i>population</i> , <i>**args</i> )
The Roulette Wheel selector

<b>GRouletteWheel_PrepereWheel</b> ( <i>population</i> )
A preparation for Roulette Wheel selection

## 9 Module `pyevolve.Util`

### 9.1 Functions

<b><code>nvl</code></b> <i>(value, text)</i>
If 'value==None', returns 'text', otherwise, returns 'value'

<b><code>randomFlipCoin</code></b> <i>(p)</i>
Returns True or False with the 'p' probability, flips a coin

<b><code>listSwapElement</code></b> <i>(list, indexa, indexb)</i>
Swap elements of a list

## Index

- pyevolve (*package*), 2
  - pyevolve.Consts (*module*), 3
  - pyevolve.FunctionSlot (*module*), 4
    - pyevolve.FunctionSlot.FunctionSlot (*class*), 4
  - pyevolve.G1DList (*module*), 5–6
    - pyevolve.G1DList.G1DList (*class*), 5–6
    - pyevolve.G1DList.G1DListCrossoverSinglePoint (*function*), 5
    - pyevolve.G1DList.G1DListInitializerInteger (*function*), 5
    - pyevolve.G1DList.G1DListInitializerReal (*function*), 5
    - pyevolve.G1DList.G1DListMutatorGaussian (*function*), 5
    - pyevolve.G1DList.G1DListMutatorSwap (*function*), 5
  - pyevolve.GenomeBase (*module*), 11–12
    - pyevolve.GenomeBase.GenomeBase (*class*), 11–12
  - pyevolve.GPopulation (*module*), 7–8
    - pyevolve.GPopulation.cmp\_individual\_raw (*function*), 7
    - pyevolve.GPopulation.cmp\_individual\_scaled (*function*), 7
    - pyevolve.GPopulation.GPopulation (*class*), 7–8
  - pyevolve.GSimpleGA (*module*), 9–10
    - pyevolve.GSimpleGA.GSimpleGA (*class*), 9–10
  - pyevolve.Selectors (*module*), 13
    - pyevolve.Selectors.GRankSelector (*function*), 9, 13
    - pyevolve.Selectors.GRouletteWheel (*function*), 13
    - pyevolve.Selectors.GRouletteWheel\_PrepereWheel (*function*), 13
    - pyevolve.Selectors.GTournamentSelector (*function*), 13
    - pyevolve.Selectors.GUniformSelector (*function*), 13
  - pyevolve.Util (*module*), 14
    - pyevolve.Util.listSwapElement (*function*), 14
    - pyevolve.Util.nvl (*function*), 14
    - pyevolve.Util.randomFlipCoin (*function*), 14