**python DEAP學習4（遺傳演算法）函數使用**

翻譯 2017年05月27日 15:32:20

* [python](http://so.csdn.net/so/search/s.do?q=python&t=blog) /
* [遺傳演算法](http://so.csdn.net/so/search/s.do?q=%E9%81%97%E4%BC%A0%E7%AE%97%E6%B3%95&t=blog) /

Evolutionary Tools

The [tools](http://deap.readthedocs.io/en/master/api/tools.html#module-deap.tools) module contains the operators for evolutionary algorithms. They are used to modify, select and move the individuals in their environment. The set of operators it contains are readily usable in the [Toolbox](http://deap.readthedocs.io/en/master/api/base.html#deap.base.Toolbox). In addition to the basic operators this module also contains utility tools to enhance the basic algorithms with [Statistics](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.Statistics), [HallOfFame](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.HallOfFame), and [History](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.History).

tools模組中toolbox裡面包含遺傳演算法的操作運算元，可以用來選擇個體、使個體發生變異或者直接刪除個體，另外還有一些基本操作在Statistics、HallOfFame和History裡面。

Operators

The operator set does the minimum job for transforming or selecting individuals. This means, for example, that providing two individuals to the crossover will transform those individuals in-place. The responsibility of making offspring(s) independent of their parent(s) and invalidating the fitness is left to the user and is generally fulfilled in the algorithms by calling toolbox.clone() on an individual to duplicate it and del on the values attribute of the individual’s fitness to invalidate it.

Here is a list of the implemented operators in DEAP,

下面是DEAP裡面內的操作運算元，看起來很強大...怎麼用還是慢慢摸索吧....

| **Initialization** | **Crossover** | | **Mutation** | **Selection** | **Migration** |
| --- | --- | --- | --- | --- | --- |
| [initRepeat()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.initRepeat) | [cxOnePoint()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxOnePoint) | | [mutGaussian()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.mutGaussian) | [selTournament()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selTournament) | [migRing()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.migRing) |
| [initIterate()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.initIterate) | [cxTwoPoint()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxTwoPoint) | | [mutShuffleIndexes()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.mutShuffleIndexes) | [selRoulette()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selRoulette) |  |
| [initCycle()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.initCycle) | [cxUniform()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxUniform) | | [mutFlipBit()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.mutFlipBit) | [selNSGA2()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selNSGA2) |  |
|  | [cxPartialyMatched()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxPartialyMatched) | | [mutPolynomialBounded()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.mutPolynomialBounded) | [selSPEA2()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selSPEA2) |  |
|  | [cxUniformPartialyMatched()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxUniformPartialyMatched) | | [mutUniformInt()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.mutUniformInt) | [selRandom()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selRandom) |  |
|  | [cxOrdered()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxOrdered) | | [mutESLogNormal()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.mutESLogNormal) | [selBest()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selBest) |  |
|  | [cxBlend()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxBlend) | |  | [selWorst()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selWorst) |  |
|  | [cxESBlend()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxESBlend) | |  | [selTournamentDCD()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selTournamentDCD) |  |
|  | [cxESTwoPoint()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxESTwoPoint) | |  | [selDoubleTournament()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selDoubleTournament) |  |
|  | [cxSimulatedBinary()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxSimulatedBinary) | |  | [selStochasticUniversalSampling()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selStochasticUniversalSampling) |  |
|  | [cxSimulatedBinaryBounded()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxSimulatedBinaryBounded) | |  | [selLexicase()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selLexicase) |  |
|  | [cxMessyOnePoint()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.cxMessyOnePoint) | |  | [selEpsilonLexicase()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selEpsilonLexicase) |  |
|  |  | |  | [selAutomaticEpsilonLexicase()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selAutomaticEpsilonLexicase) |  |
|  |  | |  |  |  |
| and genetic programming specific operators. **Initialization** | | **Crossover** | **Mutation** | **Bloat control** | |
| [genFull()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.genFull) | | [cxOnePoint()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.cxOnePoint) | [mutShrink()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.mutShrink) | [staticLimit()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.staticLimit) | |
| [genGrow()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.genGrow) | | [cxOnePointLeafBiased()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.cxOnePointLeafBiased) | [mutUniform()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.mutUniform) | [selDoubleTournament()](http://deap.readthedocs.io/en/master/api/tools.html#deap.tools.selDoubleTournament) | |
| [genHalfAndHalf()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.genHalfAndHalf) | |  | [mutNodeReplacement()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.mutNodeReplacement) |  | |
|  | |  | [mutEphemeral()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.mutEphemeral) |  | |
|  | |  | [mutInsert()](http://deap.readthedocs.io/en/master/api/tools.html#deap.gp.mutInsert) |  | |

Initialization

**deap.tools.initRepeat**(***container*, *func*, *n***)

Call the function *container* with a generator function corresponding to the calling *n* times the function *func*.

|  |  |
| --- | --- |
| **Parameters:** | * **container** – The type to put in the data from func. * **func** – The function that will be called n times to fill the container. * **n** – The number of times to repeat func. |
| **Returns:** | An instance of the container filled with data from func. |

This helper function can can be used in conjunction with a Toolbox to register a generator of filled containers, as individuals or population.

初始化函數，包括三個參數：容器、函數、重複次數，如以下函數，容器是list，函數是random.random，重複兩次

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1. >>> initRepeat(list, random.random, 2)
2. ...
3. [0.4761..., 0.6302...]

deap.tools.**initIterate**(*container*, *generator*)

Call the function *container* with an iterable as its only argument. The iterable must be returned by the method or the object *generator*.

|  |  |
| --- | --- |
| **Parameters:** | * **container** – The type to put in the data from func. * **generator** – A function returning an iterable (list, tuple, ...), the content of this iterable will fill the container. |
| **Returns:** | An instance of the container filled with data from the generator. |

This helper function can can be used in conjunction with a Toolbox to register a generator of filled containers, as individuals or population.