



# Genetic Algorithms Basic and it's Engineering Applications Using SGALAB Toolbox

à Simple Genetic Algorithms Laboratory  
Toolbox For Matlab 7.x  
User's Guide

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## Revision History

<b>Doc Rev.#</b>	<b>Date of change</b>	<b>Name of person making change</b>	<b>Description of Change</b>	<b>SGALAB Version</b>
1.0	7th Mar., 2005	Chen Yi	Initial version	1003

DRAFT

# Preface

Genetic Algorithms(GAs or GA) was formally introduced in the United States in the 1970s by John Holland at University of Michigan. It is inspired by Darwin's theory about evolution. Solution to a problem solved by GAs is evolved. GAs has been widely studied, experimented and applied in many fields in engineering worlds. Not only does GAs provide a group of alternative methods to solve problems, but also it consistently outperforms other traditional methods in most of the problems link. Many of the real world problems involved finding optimal parameters, which might prove difficult for traditional methods but ideal for GAs. However, because of its outstanding performance in optimization, GAs has been wrongly regarded as a family of function optimizers. In particular, genetic algorithms works very well on mixed (continuous and discrete), combinatorial problems. GAs is started with a set of solutions (represented by chromosomes) called population. Solutions from one population are taken and used to form a new population. This is motivated by a hope, that the new population will be better than the old one. Solutions which are selected to form new solutions (offspring) are selected according to their fitness - the more suitable they are the more chances they have to produce. This is repeated until some condition (for example number of populations or improvement of the best solution) is satisfied. GAs is less susceptible to getting 'stuck' at local optima than gradient search methods. But it tends to be computationally expensive.

To use a genetic algorithms, you must represent a solution to your problem as a genome (or chromosome). The genetic algorithms then creates a population of solutions and applies genetic operators such as mutation and crossover to evolve the solutions in order to find the best one(s). This presentation outlines some of the basics of genetic algorithms. The three most important aspects of using a genetic algorithms are: (1)definition of the objective function (Fitness Function); (2)definition and implementation of the genetic representation(En-coding Method); (3)definition and implementation of the genetic operators. Once these three have been defined, the generic genetic algorithm should work fairly well. Beyond that you can try many different variations to improve performance, find multiple optima (species - if they exist), or parallelize the algorithms.

Simple Genetic Algorithms Laboratory (SGALAB)Toolbox for Matlab is a generic toolbox of genetic algorithms. The first version of SGALAB was made in April, 2002, when the author was still a post-graduate student in the State Key Laboratory of Mechanical Transmission of Chongqing University. His interesting on the Genetic Algorithms ,Fuzzy Logic Control, Artificial Neural Network or some related things

was and is pushing him to update the SGALAB toolbox, even now. Yes, it is a hard work need much efforts and it also thanks to the SGALAB to give the author a clue to insist on his study.

During the studying and growing period, the author wrote a poem as a motto for himself to encourage him to keep the evolutionary and adaptive attitude like GAs in his everyday life. Now, the author gives this poem to those people whose interesting is also on genetic algorithms, See the following:

[ 蝶恋花 ]  
潇潇夜雨润菊篱，  
黄叶蝶飞，  
老去太容易。  
渡河船头愁云散，  
数点瘦雁何时还？

纸上墨痕书中意，  
推推敲敲，  
总是抹不去。  
斜月寒窗还少眠，  
清风作伴到天明。

## Author's Info



Chen Yi is a versatile guy from Chongqing, China. Leo is his English name he gave to himself. He graduated from the State Key Laboratory of Mechanical Transmission, Chongqing University in the July 2004, with the major Automotive Engineering.

After that, he attended UGS on July 5<sup>th</sup>, 2004. And now he's working as a Software Engineer in PLM Product Development Center of UGS Company, Shanghai.

If you are interested in Genetic Algorithms or SGALAB Toolbox, we can have a discussion about it, the best place to find leo is in the following forum:

[bbs.matwav.com](http://bbs.matwav.com) ID: see\_moonlight

[www.dytrol.com](http://www.dytrol.com) ID: gas\_boy

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[ 临江仙 ]

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春去遇秋来，天际寻鹄鸿。

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一路风雨兼程行，  
唯清风明月，独在情怀中。

and you can also contact the author directly in these way :



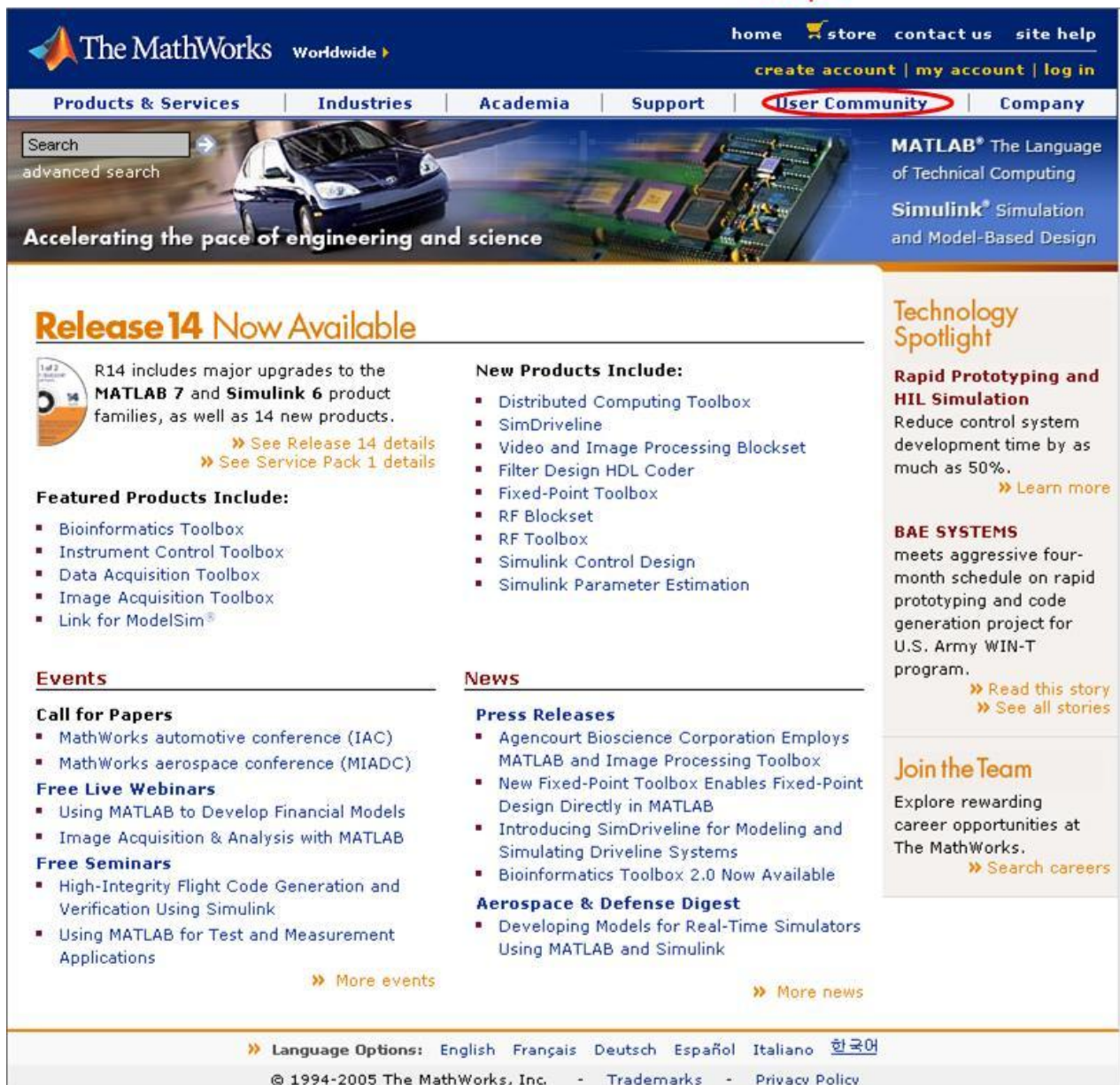
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Step 1



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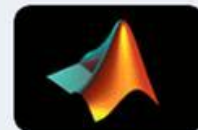
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0.0 0 rating(s)	<a href="#">Fast 2D Walsh-Hadamard Transform</a> The function implement the 2D dyadic(Paley) ordered fast in-place Walsh-Hadamard transform. Author: <a href="#">Gylson Thomas</a> Category: Transforms	2005-02-09	82

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[公告]为即将成立的Miss Abiqua招贴版主	(1 2 3)	ChinaBaker	21	563	2005-3-6 14:30   kokoko
[公告]IEEE CS 专题会议征稿	(1 2 3 4)	xgan	24	1909	2005-3-4 10:35   xgan
[讨论]论位置定位的问题	(1 2 3)	午夜流星	29	561	2005-1-24 22:00   cwit
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[原创] 搭建算法工具箱SGA_Fxy_Toolbox Ver...	haha (1 2 3)	Gdx_Boy	12	618	2005-3-1 17:34   Gdx_Boy
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做课题使用的控制方法及相关技术调查之一	(1 2)	zouton	14	125	2004-11-18 20:51   zouton
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做课题使用的控制方法及相关技术调查之二		zouton	0	29	2004-9-16 21:53   zouton
有没有对自适应控制感兴趣的网友?	haha	cin99ad17	8	1	2005-3-8 9:37   cin99ad17
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[原创]MATLAB模糊逻辑工具箱的分析与应用	(1 2 3 4)	liao	36	104	2005-3-4 11:54   yus12296



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