



SwarmsLAB

Evolution with the world

SxLAB Family Member

SwarmFish

-- The Artificial Fish Swarm Algorithm (AFSA)

Ver. 1003





Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

Workflow of multi-objective AFSA

How to download SwarmFish

How to set work path for SwarmFish

Case Studies

FAQ



Contents

→ What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

Workflow of multi-objective AFSA

How to download SwarmFish

How to set work path for SwarmFish

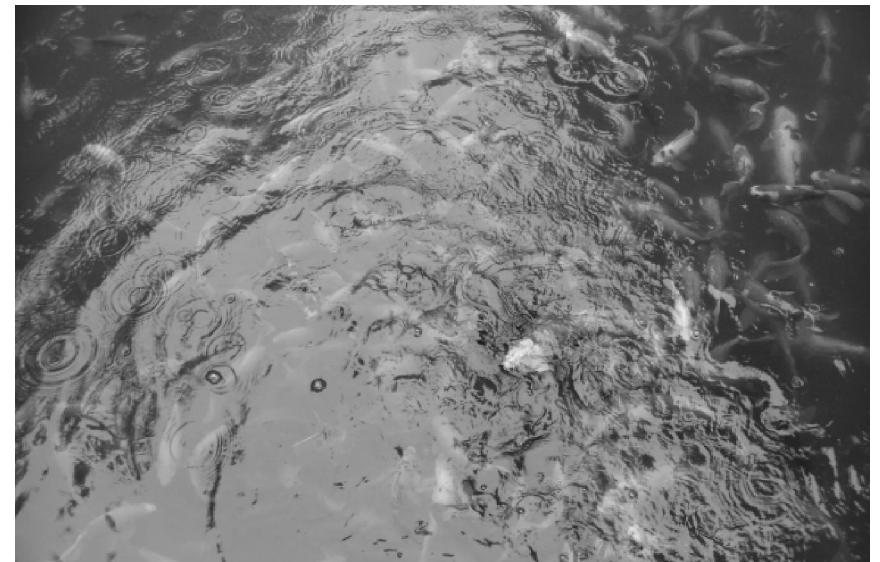
Case Studies

FAQ



Artificial Fish Swarm Algorithm (AFSA)

The artificial fish swarm algorithm (AFSA) was first proposed in 2002, inspired by the social behaviours of the fish school in searching, swarming and following. A schooling fish can take quickly response to the changes in the direction and speed of their neighbours, information of their behaviours have been passing to others which help them moving from one configuration to another almost as one unit. By borrowing this intelligence of the social behaviours, the AFSA is parallel, independent to the initial values and able to achieve a global optimum.





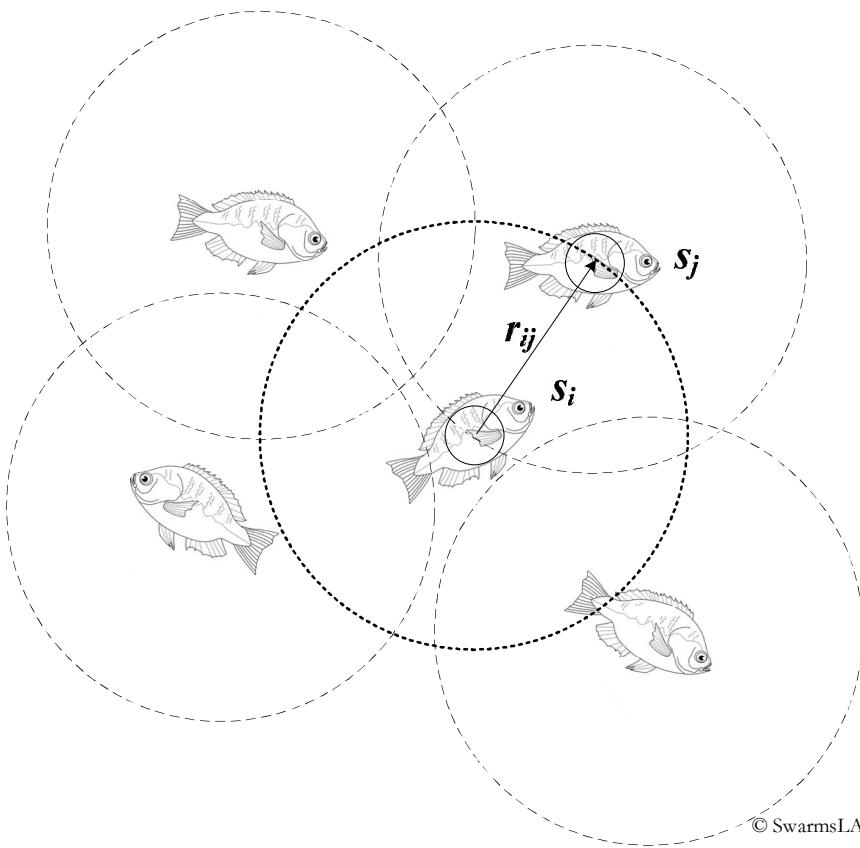
Artificial Fish Swarm Algorithm (AFSA)





Artificial Fish Swarm Algorithm (AFSA)

the AFSA includes five steps of operations: (1) **behaviour selection**, (2) **searching behaviour**, (3) **swarming behaviour**, (4) **following behaviour** and (5) **bulletin**. A 'max-generation' is the trial number of an AF school searching for food under given initial conditions, which is one of the widely used criteria for the simulation termination.





Reference

- [1] X.L. Li, Z.J. Shao, J.X. Qian, ``An optimizing method based on autonomous animate: fish swarm algorithm", System Engineering Theory and Practice, vol. 22, no. 11, pp. 32-38 (2002)
- [2] Chen, Yi; Zhang, Guangfeng; Li, Yiyang; Ding, Yi; Zheng, Bin; Miao, Qiang. 2013. "Quantitative Analysis of Dynamic Behaviours of Rural Areas at Provincial Level Using Public Data of Gross Domestic Product ." *Entropy* 15, no. 1: 10-31.

<http://www.mdpi.com/1099-4300/15/1/10>



Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

→ **Workflow of simple AFSA**

Workflow of multi-objective AFSA

How to download SwarmFish

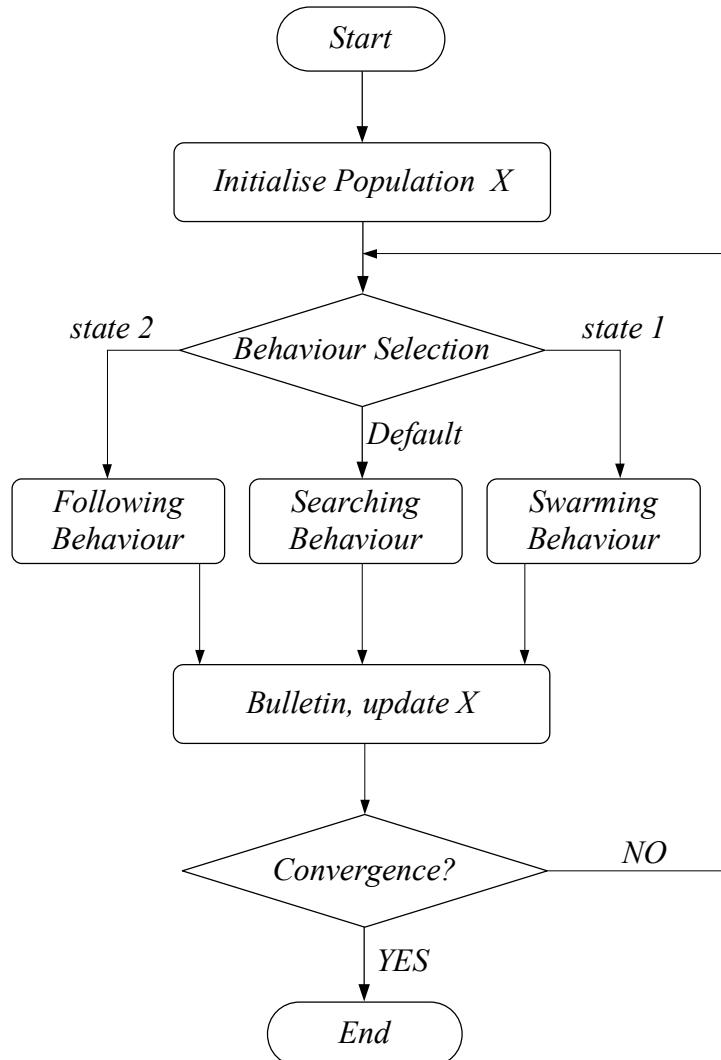
How to set work path for SwarmFish

Case Studies

FAQ



Workflow of simple AFSA



Begin (1)

```
t = 0 ;
Initialise X(0);
```

While (Not termination-condition) do

Begin (2)

```
{
t = t + 1;
```

Switch(Evaluation X(t))

```
{
state 1: swarming behaviour;
state 2: following behaviour;
default: searching behaviour;
}
```

```
bulletin X(t);
}
```

End (2)

End (1)



Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

→ **Workflow of multi-objective AFSA**

How to download SwarmFish

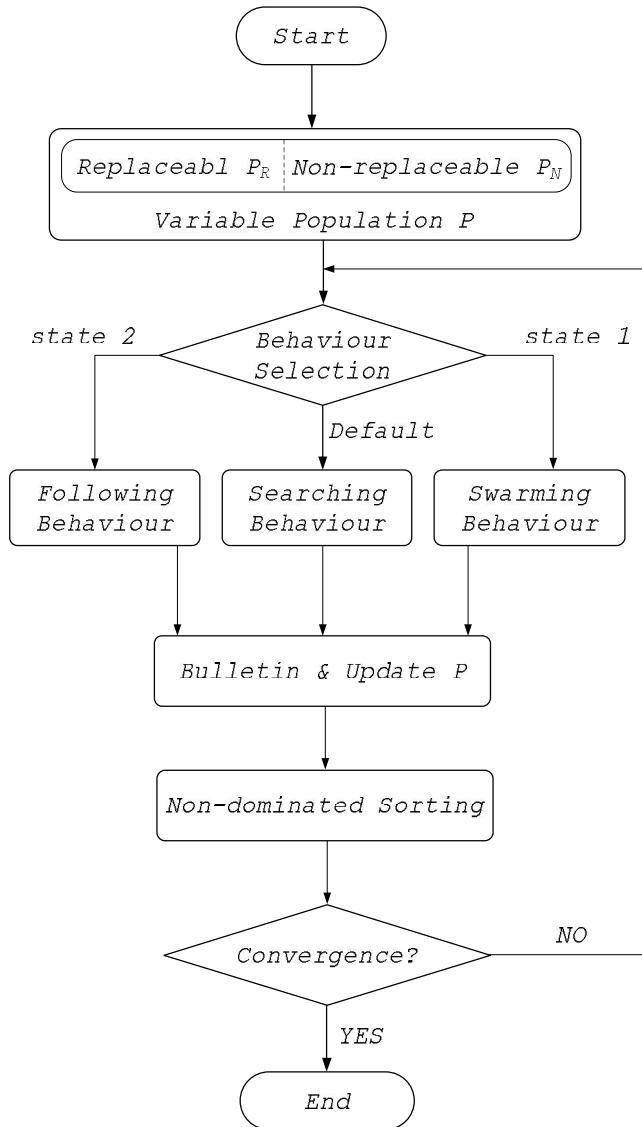
How to set work path for SwarmFish

Case Studies

FAQ



Workflow of multi-objective AFSA



Begin (1)

```

t = 0 ;
Initialise P(0);

while ( Not termination-condition) do

  Begin (2)
  {
    t      = t + 1;
    flag = Evaluation P(t);

    switch( Behaviour Selection( flag ) )
    {
      state 1: swarming behaviour;
      state 2: following behaviour;
      default: searching behaviour;
    }

    bulletin P(t)= PR + PN;

    % Non-dominated Sorting
    Step 1: Fast non-dominated sort
    Step 2: crowding distance assignment
    Step 3: crowded-comparison operator
  }

End (2)

```

End (1)



Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

Workflow of multi-objective AFSA

→ How to download SwarmFish

How to set work path for SwarmFish

Case Studies

FAQ



How to download SwarmFish

1. Search “SwarmFish” in **file exchange @ mathwork.com**

SwarmFish - The Artificial Fish Swarm Algorithm

<http://www.mathworks.com/matlabcentral/fileexchange/32022>

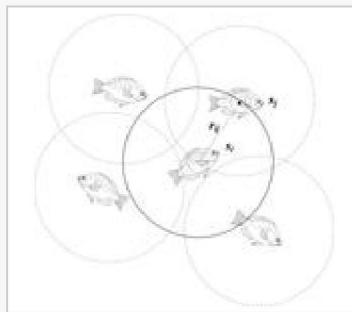
2. Search “SwarmFish” via Google or skydrive

SwarmFish1002

<http://sdrv.ms/10Nvnzi>



File Exchange



SwarmFish - The Artificial Fish Swarm Algorithm

by Yi Chen

01 Jul 2011

SwarmFish - The Artificial Fish Swarm Algorithm
Simulation Tool

[Watch this File](#)



5.0 | 1 rating

[Rate this file](#)

0 Downloads (last 30 days)

File Size: 1.07 MB

File ID: #32022

[Download All](#)

Code covered by the [BSD License](#) (1)

Highlights from SwarmFish - The Artificial Fish Swarm Algorithm

 [SGA_FITNESS_function\(x,y\)](#)

*/*M-FILE FUNCTION*

[SGA_FITNESS_function](#) MMM

*SGALAB */ %*

 [SwarmFish_demo_SO_std.m](#)

[View all files](#)

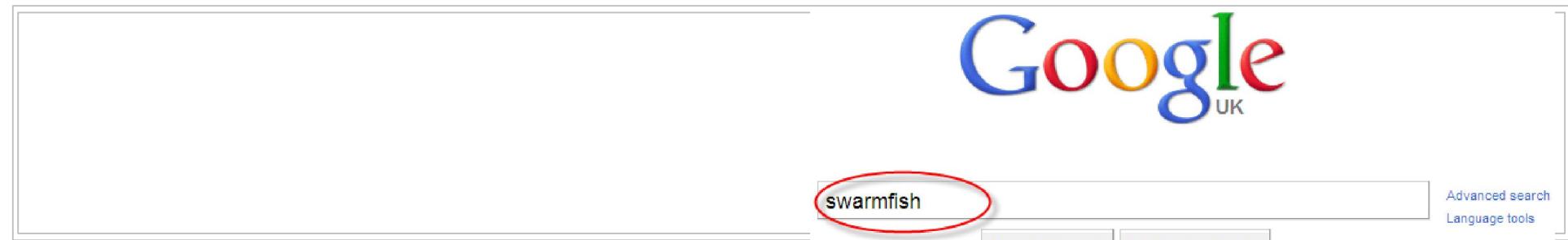
File Information

Description the AFSA includes five steps of operations: (1) behaviour selection, (2) searching behaviour, (3) swarming behaviour, (4) following behaviour and (5) bulletin. A 'max-generation' is the trial number of an AF school searching for food under given initial conditions, which is one of the widely used criteria for the simulation termination.

Acknowledgements The author wishes to acknowledge the following in the creation of this submission:
[SGALAB 1003 Beta 5.0.0.8\(Matrix Varable Inputs \)](#)

Required Products Communications System Toolbox

MATLAB release MATLAB 7.10 (2010a)



Web Images Videos Maps News Shopping Gmail more ▾

Search: the web pages from the UK

Advanced search
Language tools



swarm fish matlab

Make Google my homepage

[Advertising Programmes](#) [Business Solutions](#) [About Google](#) [Go to Google.com](#)

© 2011 - Privacy

Everything

Images

Videos

News

Shopping

More

Show search tools

[**SwarmFish - The Artificial Fish Swarm Algorithm - File Exchange ...**](#)

1 Jul 2011 ... Highlights from SwarmFish - The Artificial Fish Swarm Algorithm •
SGA_FITNESS_function(x,y) /*M-FILE FUNCTION SGA_FITNESS_function MMM ...
www.mathworks.co.uk/matlabcentral/.../32022-swarmfish-the-artificial-fish-swarm-algorithm
- Cached - Similar

[**SwarmFish - The Artificial Fish Swarm Algorithm ...**](#)

File exchange, MATLAB Answers, newsgroup access, Links, and Blogs for the MATLAB ...
[SwarmFish - The Artificial Fish Swarm Algorithm Simulation Tool ...](http://www.mathworks.com/matlabcentral/.../swarmfish...fish-swarm.../SwarmFish_demo_SO_std.m)
www.mathworks.com/matlabcentral/.../swarmfish...fish-swarm.../SwarmFish_demo_SO_std.m - Cached - Similar

[**AFSA-matlab The achievement of fish-swarm algorithm www.pudn.com**](#)

25 Apr 2009 ... Describe: The achievement of fish-swarm algorithm matlab. File list(time
2007060808~2009101715)(Click to check if it's the file you need, ...
en.pudn.com/downloads161/sourcecode/.../detail729990_en.html - Cached - Similar

[**Yi Chen - File Exchange - MATLAB Central**](#)

SwarmFish - The Artificial Fish Swarm Algorithm. SwarmFish1001 with ONLY m files
[http://www.mathworks.com/matlabcentral/fileexchange/32022 ...](http://www.mathworks.com/matlabcentral/fileexchange/32022)
www.mathworks.fr/matlabcentral/fileexchange/authors/15500 - Cached - Similar

[**Comments and Ratings - File Exchange - MATLAB Central**](#)

SwarmFish - The Artificial Fish Swarm Algorithm. SwarmFish1001 with ONLY m files
[http://www.mathworks.com/matlabcentral/fileexchange/32022 ...](http://www.mathworks.com/matlabcentral/fileexchange/32022)
www.mathworks.se/matlabcentral/fileexchange/feedbacks?page=1 - Cached - Similar



Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

Workflow of multi-objective AFSA

How to download SwarmFish

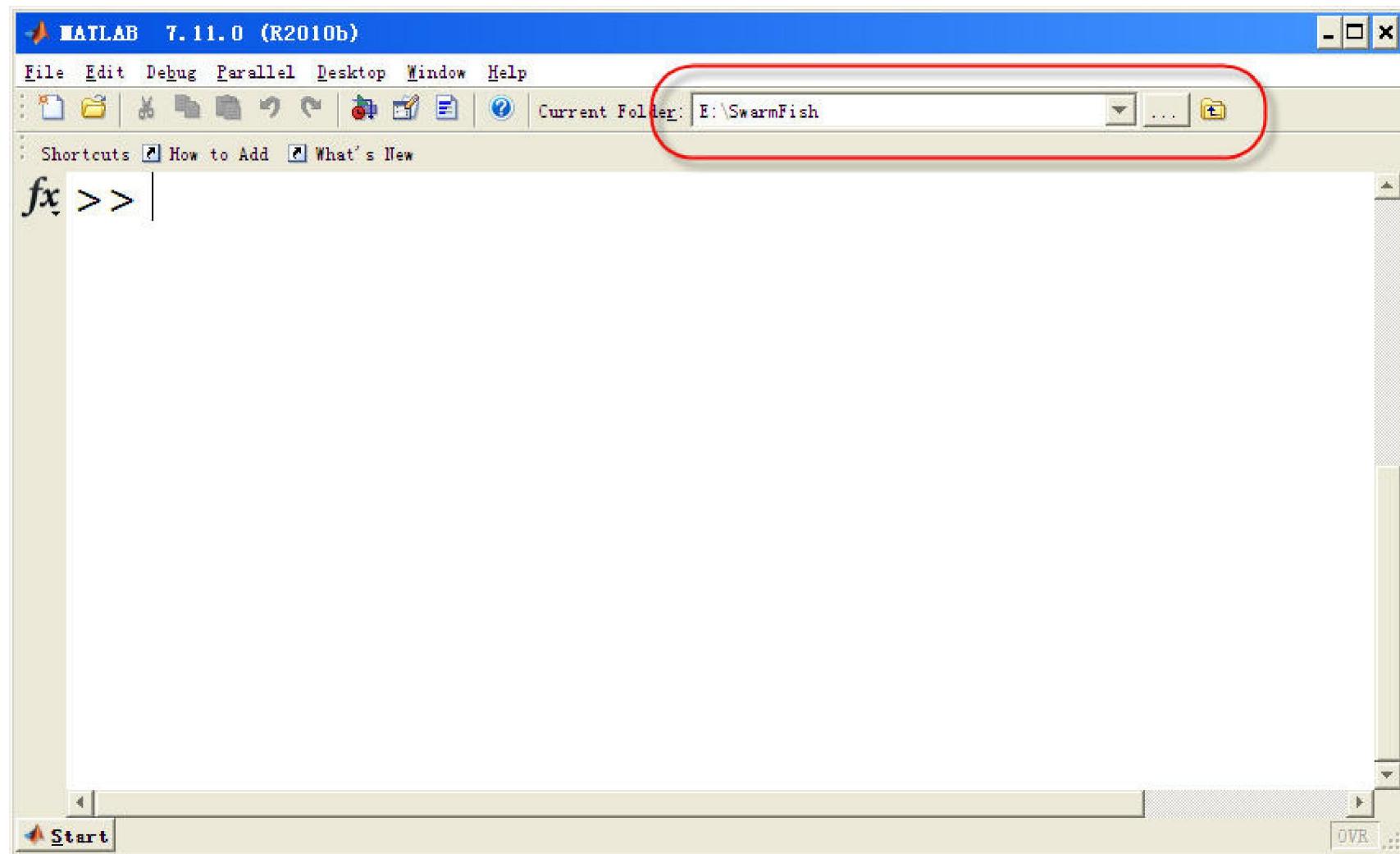
→ **How to set work path for SwarmFish**

Case Studies

FAQ



Set SwarmFish work path





Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

Workflow of multi-objective AFSA

How to download SwarmFish

How to set work path for SwarmFish

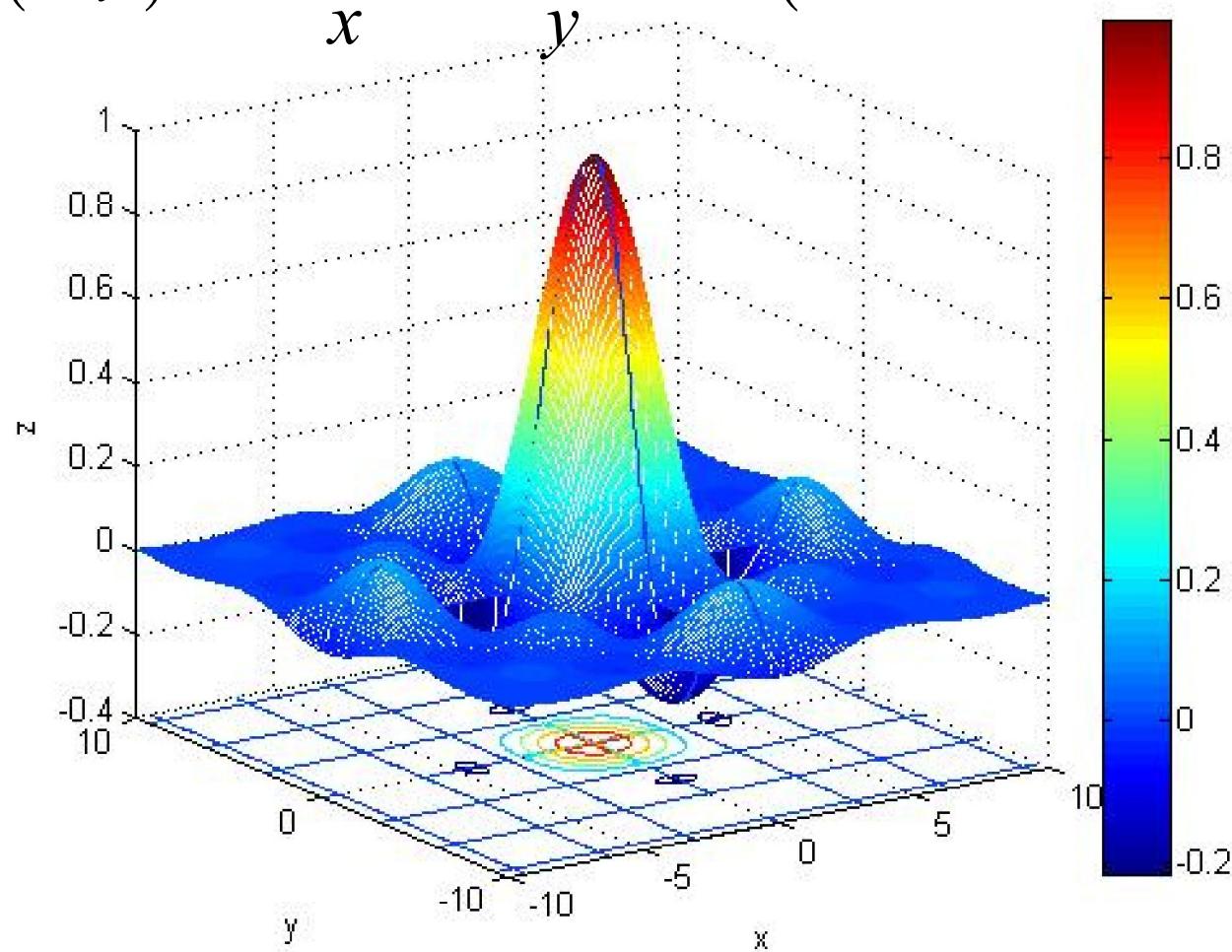
→ **Case Studies**

FAQ



Case Study 1 – Single Objective Without Constraints

$$Max : f(x, y) = \frac{\sin(x)}{x} \frac{\sin(y)}{y} \quad (-10 \leq x \leq 10, -10 \leq y \leq 10)$$





Case Study 1 – Single Objective Without Constraints

$$\text{Max : } f(x, y) = \frac{\sin(x)}{x} \frac{\sin(y)}{y} \quad (-10 \leq x \leq 10, -10 \leq y \leq 10)$$

[SGA_FITNESS_function.m](#)

```
function [ fitness ] = SGA_FITNESS_function( x, y )
```

```
%SGA_FITNESS_function begin
```

```
%User can design their own fitness function here
```

```
%as a standard matlab function
```

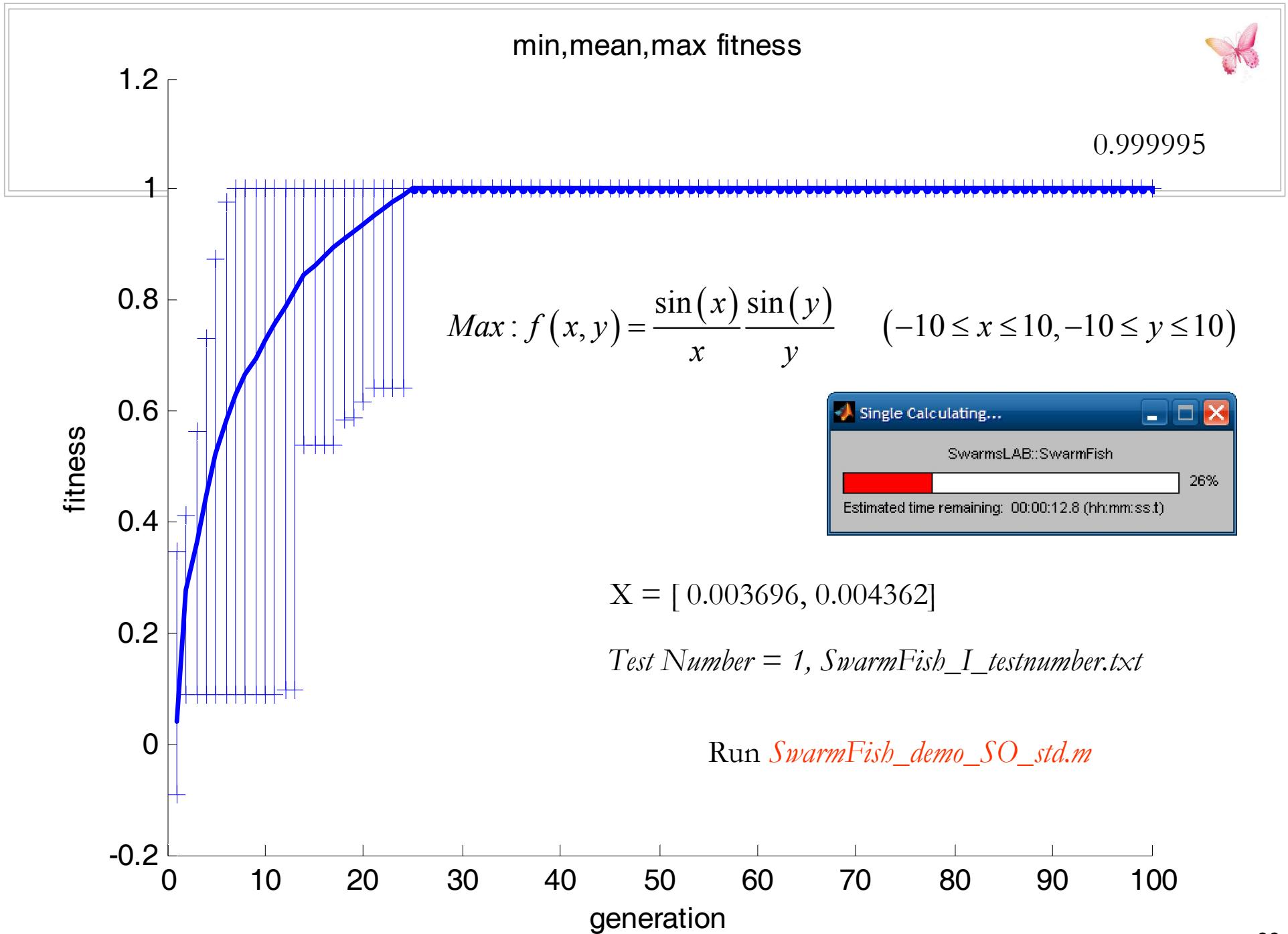
```
fitness = (sin(x)./(x+eps)).*(sin(y)./(y+eps));
```

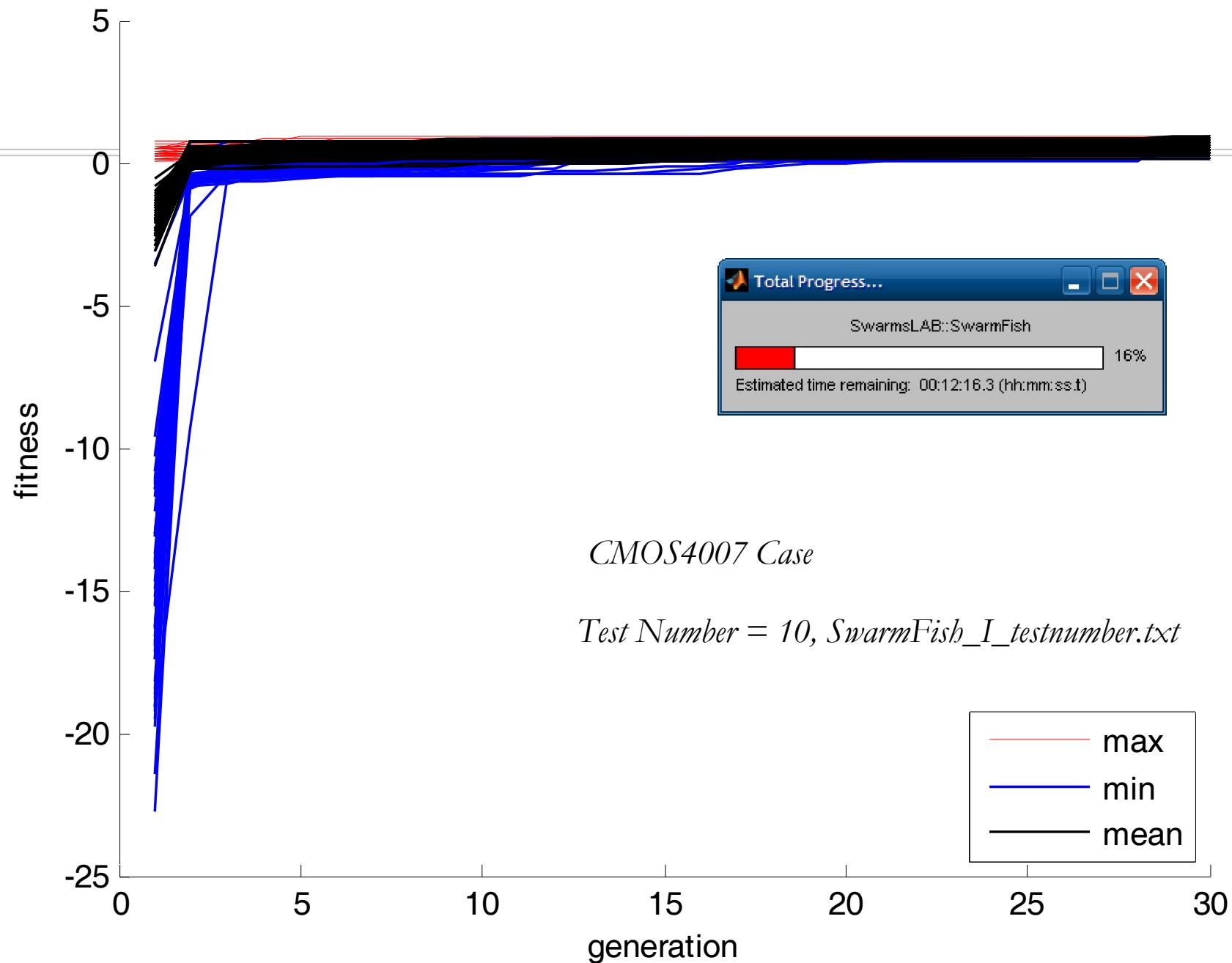
```
%SGA_FITNESS_function end
```



Set parameters – **I**nput files (*SwarmFish_I_**)

Parameters	Value	file
<i>Max Generation</i>	100	<i>SwarmFish_I_max_generation.txt</i>
<i>Crowd Factor</i>	0.618	<i>SwarmFish_I_crowd.txt</i>
<i>Population</i>	30	<i>SwarmFish_I_population.txt</i>
<i>Step</i>	0.01	<i>SwarmFish_I_steps.txt</i>
<i>Visual Factor</i>	2.5	<i>SwarmFish_I_visual.txt</i>
<i>Max Confines</i>	10 10	<i>SwarmFish_I_max_confines.txt</i>
<i>Min Confines</i>	-10 -10	<i>SwarmFish_I_min_confines.txt</i>
<i>Test Number</i>	10	<i>SwarmFish_I_testnumber.txt</i>
<i>Searching Try Number</i>	5	<i>SwarmFish_I_try_number.txt</i>



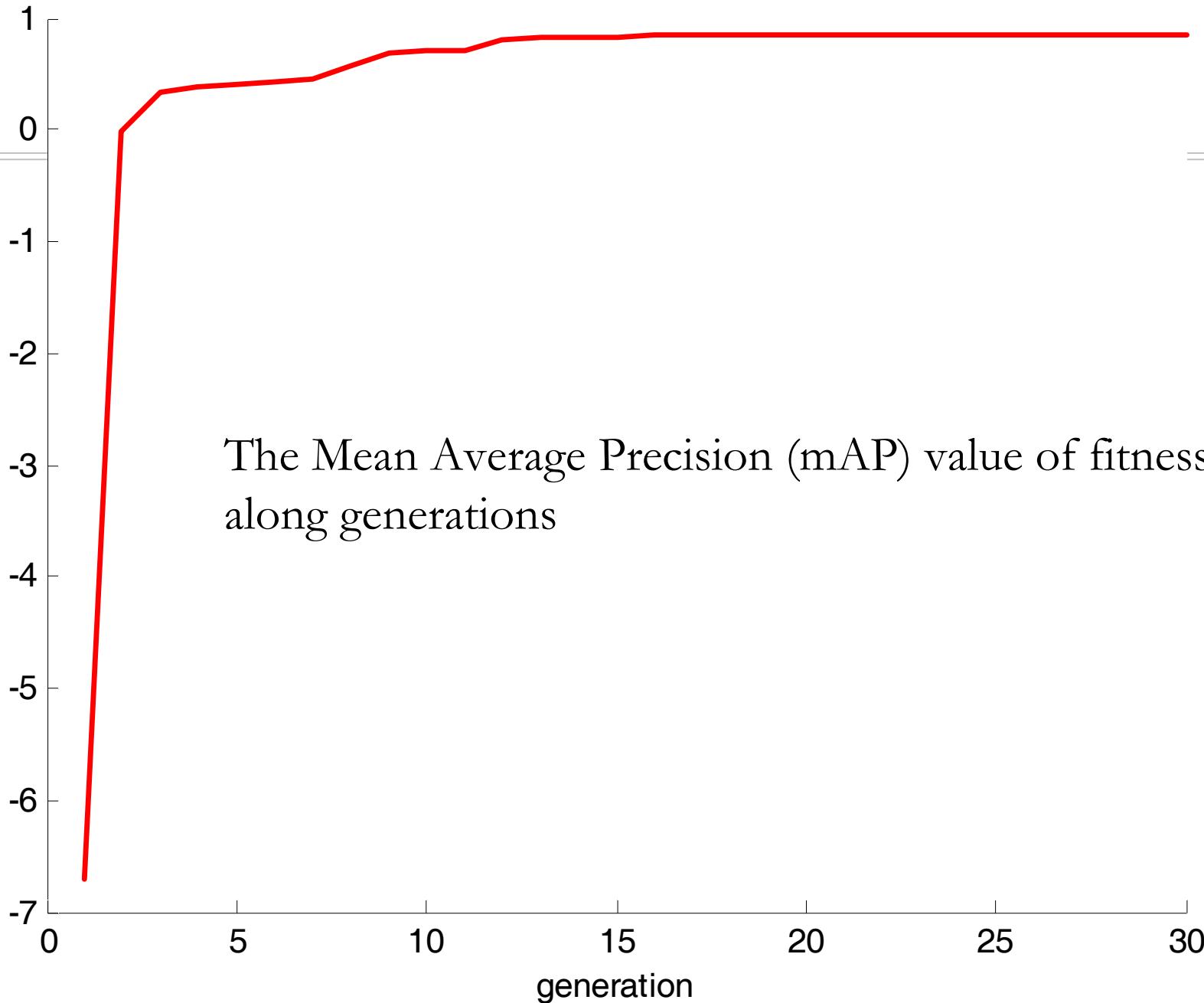




MIN,MEAN and MAX fitness mAP -- generation

fitness mAP

The Mean Average Precision (mAP) value of fitness along generations





Solve and results – **O**utput files (*SwarmFish_O_**)

Results in ‘*SwarmFish_O_*.txt*’ \longrightarrow Single Objective Problem **ONLY**

Results	Value	File
$F(x_0) _{\max}$	0.9909	<i>SwarmFish_O_maxfitness.txt</i>
$F(x_0) _{\min}$	0.060569	<i>SwarmFish_O_minfitness.txt</i>
$F(x_0) _{\text{mean}}$	0.934436	<i>SwarmFish_O_meanfitness.txt</i>
x_0	0.003696, 0.004362	<i>SwarmFish_O_best_result_space.txt</i>
Cost time (sec.)	1.2350	In command window

Multi-objective Problem check ‘*SwarmFish_O_MO*.mat*’

To plot the Pareto Front see **FAQ 8 in SGALAB_FAQ_QuickStart_1.pdf**



Contents

What is the Artificial Fish Swarm Algorithm (AFSA)

Workflow of simple AFSA

Workflow of multi-objective AFSA

How to download SwarmFish

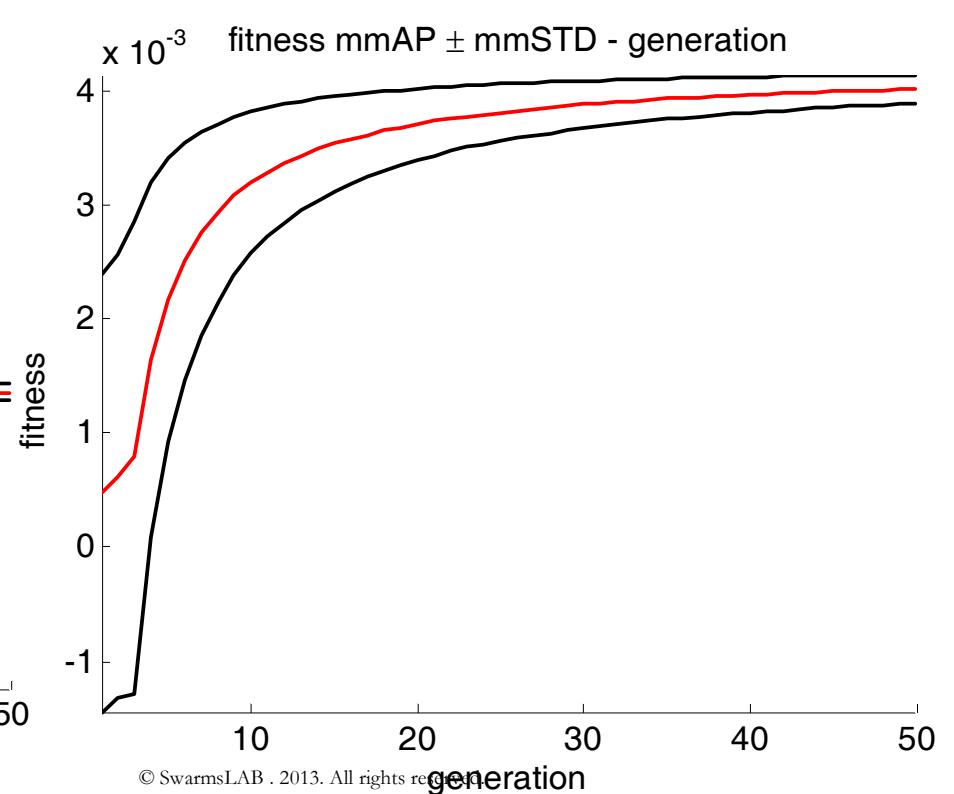
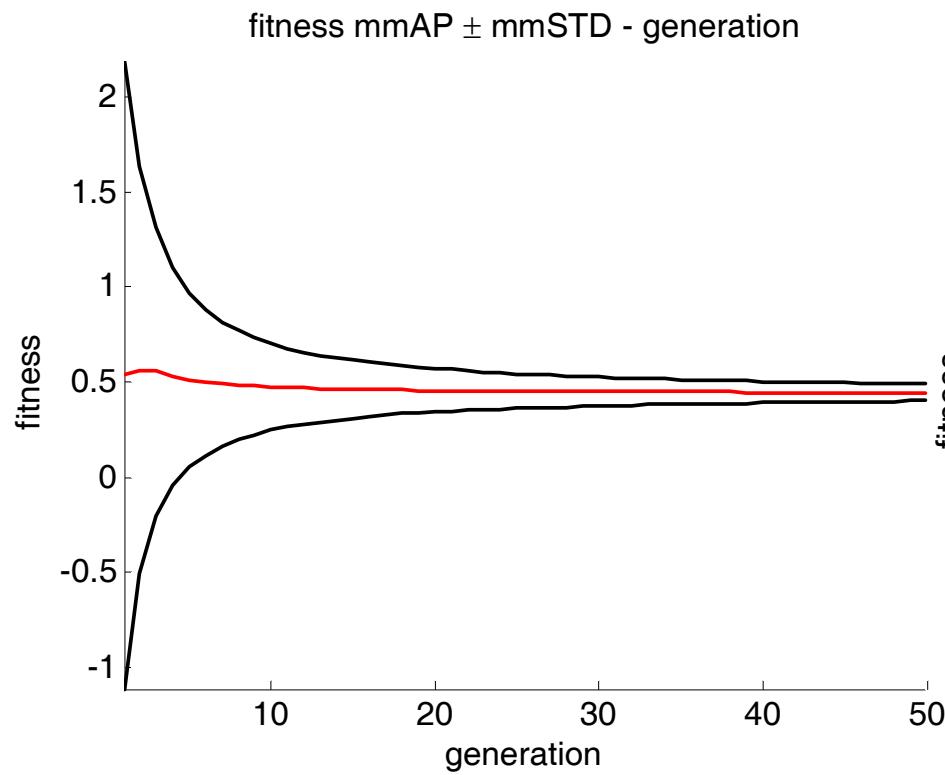
How to set work path for SwarmFish

Case Studies

→ **FAQ**



Case Study 3 – Two Objectives





FAQ

1. Can handle single objective problems?

YES

2. Can handle multi-objective problems ?

YES

3. Where can I find .p files?

<http://sdrv.ms/10Nvnzi>



FAQ

4. How to cite this toolbox?

\bibitem{SwarmFish2013}

Y. Chen,

SwarmFish - The Artificial Fish Swarm Algorithm,

<http://www.mathworks.com/matlabcentral/fileexchange/32022>
(2013)



SwarmsLAB

Evolution with the world

SxLAB Family Member

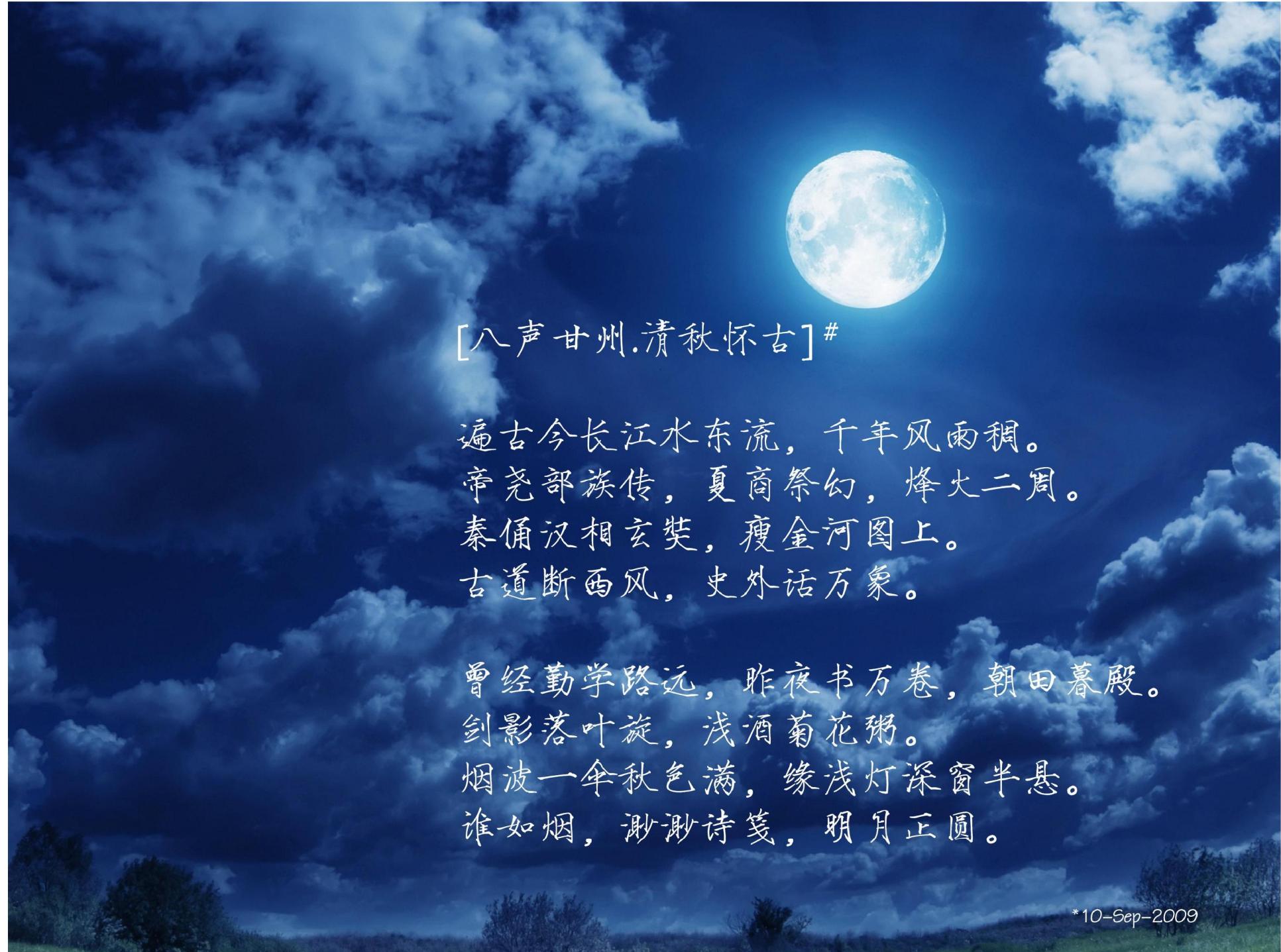
END

SwarmFish

-- The Artificial Fish Swarm Algorithm (AFSA)

Ver. 1003





[八声甘州·清秋怀古][#]

遍古今长江水东流，千年风雨稠。
帝尧部族传，夏商祭幻，烽火二周。
秦俑汉相玄奘，瘦金河图上。
古道断西风，史外话万象。

曾经勤学路远，昨夜书万卷，朝天暮殿。
剑影落叶旋，浅酒菊花粥。
烟波一伞秋色满，缘浅灯深窗半悬。
谁如烟，渺渺诗笺，明月正圆。