Project 2 - Genetic Programming

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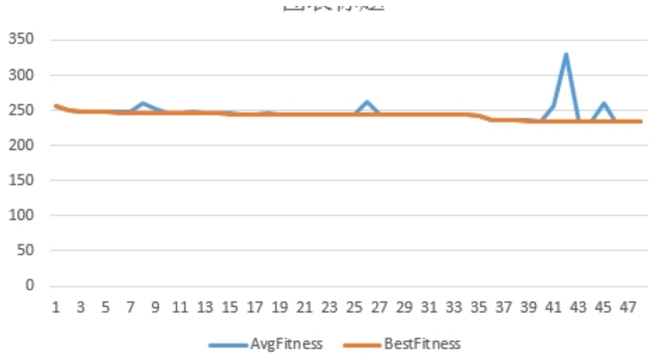
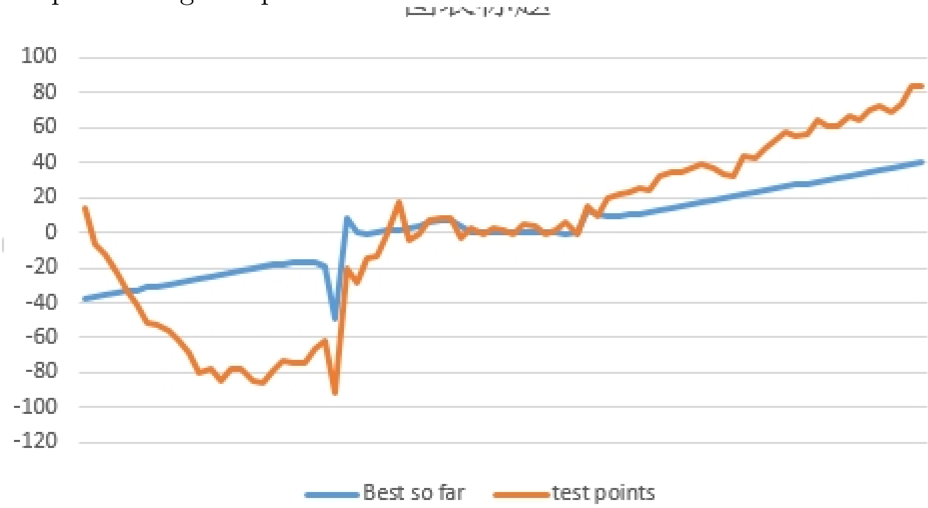
1 Abstract

Algorithm	Steady-state
Population size	100
Selection method	Tournament
Crossover method	Swap two random subtrees in two parents
Crossover rate	90% Non-terminal, 10% Terminal
Mutation method	Change the type of one random subnode
Operator/non-terminal set	$+, -, *, /$
Terminal set	0-9, x
Fitness function	$\sqrt{\sum e_i^2}$
Size control (if any)	

Graph showing average and best fitnesses evolving over time.



Graph showing test points and best evolved function.



2 Discussion

2.1 Average Fitness

So far, the best fitness and avg fitness is going better and better when the running time goes on. I got the best fitness around 70 during my test.

As the first graph shown, the average fitness is really high at the very begining, and has a fast drop for first several runs. Then during 60 to 90 running times, the slope becomes small and the fitness still drops a lot. Finally, after 90 running times, the change of fitness is really small. But if I add enough running times, the fitness would be able to be close to 0.

There are several average fitnesses went very high (changed a lot), which is shown on the second and third graphs. I think that is caused by mutation and crossover, which is unescapable.

2.2 Best Fitness

The best fitness is always less than the average fitness, and really changed a little.

2.3 Best Evolved Function

The graph is looking good I think...

2.4 Conclusion

Overall, my Genetic Programming works fine. I believe if I add more non-terminal sets, and do some size control, my GP would be better.