Pathway Scheming via Environment Stimulation Algorithm

Anupama Sharma
CSVTU,BHILAI(C.G.)
SSCET,BHILAI(C.G.)

Sampada Satav
CSVTU,BHILAI(C.G.)
SSCET,BHILAI(C.G.)

ABSTRACT
Pathway scheming algorithm is based on the calculation of the shortest distance between the foundation point and the aim point. And also we consider obstacle, in which the pathway should not crash with the obstacles and also find the shortest coldness so that the smallest amount strength is consumed. in the direction of settle on the direct coldness and keep away from the collision we have taken into consideration BFO algorithms i.e. environment stimulated algorithms, BFOA is inspired by the communal foraging performance of Escherichia coli. BFOA has already drawn the concentration of researchers because of its effectiveness in solving real-world optimization problems arising in several application domains. The intention meaning used to work out the minimum coldness is the Euclidean coldness between the point To avoid the obstacles various constraint have been applied. At the end, the pathway is generated which is collision free and the pathway is straight between the foundation point and the aim point.

Keywords
NIA, course plotting, chemotaxix, reproduction, elimination dispersal, E.coli, flagella, tumble, swims.

1. INTRODUCTION
In an obstacle avoidance we find a path from an actual position the to a desired goal position, with respect to positions and shapes of known obstacles. While all these parameters stand as the inputs of the algorithm, the output can be direction from the actual position respecting locally optimal trajectory. The penalty functions to be minimized by the pathway shceming algorithm. In the first one, we evaluates a length of the course (or time needed to execute the course), the second Part ensures safety of the course (i.e. distance to obstacles). To find an acceptable compromise between these requirements stands for core problems of the obstacle avoidance itself. [10], [2], [12].
Bacteria Foraging Optimization Algorithm (BFOA), proposed by Passino [1], is a new comer to the family of nature-inspired optimization algorithms. Passino proposed the BFOA in [1]. Application of group foraging strategy of a swarm of *E.coli* bacteria in multi-optimal function optimization is the key idea of the new algorithm. Bacteria search for nutrients in a manner to maximize energy obtained per unit time. Individual bacterium also communicates with Bacteria Foraging Optimization Algorithm (BFOA), proposed by Passino, is a new comer to the family of nature-inspired optimization algorithms.[] During foraging of the real bacteria, locomotion is achieved by a set of tensile flagella. in which a bacterium moves by taking small steps while searching for nutrients, is called chemo taxis and key idea of BFOA is mimicking chemotacic movement of virtual bacteria in the problem search space.

2. METHODOLOGY
In these algorithms, we represent the position of each member in the population of the bacteria at the *j*-th chemotacic step, *k*-th reproduction step, and *l*-th elimination-dispersal event. In our approach, we will use much smaller population sizes and will keep the population size fixed. BFOA, so that we can apply the method to higher dimensional optimization problems. We briefly describe the four prime steps –

(1) Chemo taxis
(2) Swarming
(3) Reproduction
(4) Elimination and Dispersal

2.1 Chemotaxix step
Simulates the association of an *E.coli* cell through swimming and tumbling via flagella. in nature an *E.coli* bacterium can move in two diverse behavior. It can swim for a age of time in the equivalent route or it may tumble, and interchange flanked by these two mode of process for the entire lifetime.

2.2 Swarming step
A group of *E.coli* cells assemble themselves in a wandering loop by affecting awake the nutrient gradient when placed amidst a semisolid medium with a particular nutrient chemo-effecter. The cells when stimulated by a high level of *succinate*, release an attractant *aspertate*, which helps them to aggregate into groups and thus move as concentric patterns of swarms with high bacterial density.

2.3 Reproduction step
It consist the smallest amount in good physical shape microorganisms eventually die while each of the improved microorganisms (those yielding lower value of the objective function) asexually split into two bacteria, which are then placed in the same location. This keeps the swarm size constant.

2.4 Elimination and dispersal step
We have taken Gradual or sudden changes in the local environment where a bacterium population lives may occur due to various reasons e.g. a significant local rise of temperature may kill a group of bacteria that are currently in a region with a high concentration of nutrient gradients. Events can take place in such a fashion that all the bacteria in a region are killed.

There are two basic operations performed by a bacterium at the time of foraging []. When they rotate the flagella in the clockwise direction, each flagellum pulls on the cell. That results in the moving of flagella independently and finally the bacterium tumbles with lesser number of tumbling whereas in

a harmful place it tumbles frequently to find a nutrient gradient. Moving the flagella in the counterclockwise direction helps the bacterium to swim at a very fast rate. In the above-mentioned algorithm the bacteria undergoes chemo taxis, where they like to move towards a nutrient gradient and avoid noxious environment. Generally the bacteria move for a longer distance in a friendly environment. The movement of bacterium in clockwise and counter clockwise is take place in nutrient solution.
in the problem search space.

3. PROPOSED ALGORTIHM

Algorithm 1 Path navigation Algorithm using BFO
Parameters:
PHASE 1[Initialization Phase]
Step-1Initialize parameters
Algorithm:
Step-2 Elimination dispersal loop: l=l+1
Step-3 Reproduction loop= k+1
Step-4 Chemo taxis loop= j+1
Step -5 go to step 4. In this case continue chemo taxis since the life of the bacteria is not over.
Step 6 Reproductions:
Step 7- goes to step 3. In this case, we have not reached the number of specified reproduction steps, so we start the next generation of the chemo tactic loop.
Step 8- Elimination-dispersal, eliminate and disperse each bacterium (this keeps the number of bacteria in the population constant). To do this, if a bacterium is eliminated, simply disperse another one to a random location on the optimization domain. Then go to step 2; otherwise end.

4. EXPERIMENTAL SETUP

The proposed method is path course-plotting algorithms implemented in visual c and has been tested in different environment with varying parameters.. Assuming the intend to be a point in the reference organizes structure and so model it in variety of a point, by capturing the schedule of bacteria obstacles is possible by taking a snapshot of the environment in every step of the algorithm. .

5. RESULT & CONCLUSION

In this section we include the results and also analyze the effectiveness of our projected algorithms compare with GA and also DE. The course which is generated after successful execution of our algorithms is shortest and having a collision free course with multiple obstacles. In the form of table we exhibit our outcome i.e. shortest distance is found and compare among the shortest distance is found between initial and goal points. We have presented a path course plotting algorithm based on the rule of bfo algorithm and shown it can be successful at finding a target. We have adapted this algorithm and achieved a computational model with computational cost. environment in every step of the algorithm.

Table 1.1

No. of bacteria	**20**
Primary point	**0**
Target point	**10**
Expanse	**30.2343 ms**

Table 2.2

No. of bacteria	30
Primary point	0
Target point	15
Expanse	26.854324 ms

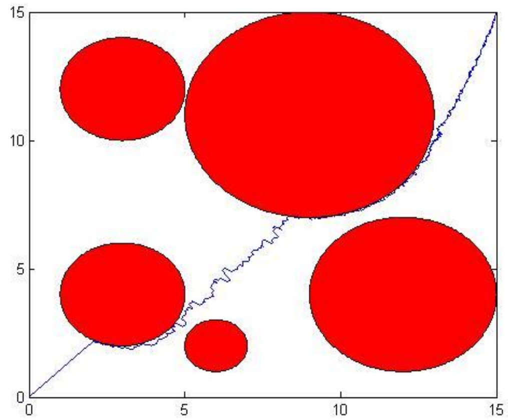

Figure 1. Path scheming using NIA

6. ACKNOWLEDGMENTS

I sincerely thanks to my guide Ms. Sampada Satav, who have guided me for implementing this project successfully and last but not the least I want to thank all the peoples who have helped me

7. REFERENCES

[1] Chakraborty, J., Konar, A., Chakraborty, U., Jain, L.: Distributed cooperative multi-robot path planning using differential evolution. In: Evolutionary Computation, 2008. CEC 2008.(IEEE World Congress on Computational Intelligence).IEEE Congress on.. IEEE.

[2] S. Doctor, G. K. Venayagamoorthy and V. Gudise, "Optimal PSO for Collective Robotic Search Applications," IEEE Congress on Evolutionary Computations, June 19-23, 2004, Portland OR, USA,

[3] Doctor, S., Venayagamoorthy, G.: Unmanned vehicle navigation using swarm intelligence. In: Proc. of Int. Conf. on Intelligent Sensing and Information Processing. (2004).

[4] Doctor, S., Venayagamoorthy, G.: Unmanned vehicle navigation using swarm intelligence. In: Proc. of Int. Conf. on Intelligent Sensing and Information Processing. (2004).

[5] Chen, X., Li, Y.: Smooth path planning of a mobile robot using stochastic particle swarm optimization. In: Mechatronics and Automation, Proceedings of the 2006 IEEE International Conference on, IEEE (2006).

[6] Hao, Y., Zu, W., Zhao, Y.: Real-Time Obstacle Avoidance Method based on Polar Coordination Particle Swarm Optimization in Dynamic Environment. In: Industrial Electronics and Applications, 2007. ICIEA 2007. 2nd IEEE Conference on. IEEE (2007).

[7] Wang, L., Liu, Y., Deng, H., Xu, Y.: Obstacle-avoidance path planning for soccer robots using particle swarm optimization. In: Robotics and Biomimetics, 2006. ROBIO'06. IEEE International Conference on. IEEE (2006).

[8] Li, L., Ye, T., Tan, M., Chen, X.: Present state and future development of mobile robot technology research. Robot 24(5), (2002)

[9] Koren, Y., Borenstein, J.: Potential field methods and their inherent limitations for mobile robot navigation. In: Robotics and Automation, 1991. Proceedings. 1991 IEEE.

[10] Berg, H. C. (2003)E. coli in motion.Springer-Verlag, NY.

[11] Swagatam Das, Arijit Biswas, Sambarta Dasgupta, and Ajith Abraham, "Bacterial Foraging Optimization Algorithm: Theoretical Foundations,Analysis,andApplications", foundation of computer Intel. Volume-3 ,SCI 203,2009.

[12] J. Barraquand and J. C. Latombe, "Robot motion planning: A distributed representation approach," Int. J. Robot. Res.,vol. 10, no. 6, 1991

[13] M. Gerke and H. Hoyer, "Planning of optimal paths for autonomous agents moving in inhomogeneous environments," in Proceedings of the 8th International Conference on Advanced Robotics , July 1997.

[14] Z. Bien and J. Lee, "A Minimum-Time Trajectory Planning Method for Two Robots," IEEE Trans. on Robotics and Automation , vol. 8, , June 1992.

[15] J. Kennedy and R. Eberhart, "Particle swarm optimization," Proceedings, IEEE International Conference on Neural Networks, vol. 4, 1942 – 1948.