Artificial Human Optimization – An Introduction

Satish Gajawada
Alumnus, Indian Institute of Technology Roorkee, INDIA
Intern, ThinCI Semiconductor Technologies India Pvt. Ltd.
gajawadasatish@gmail.com

ABSTRACT

The goal of this article is :

1) To popularize "Artificial Human Optimization" field

2) To show opportunities that exist in "Artificial Human Optimization" field.

3) To Design an optimization method based on Artificial Humans

4) To show reviews of papers in "Artificial Human Optimization" field

5) To make corrections to my previous work in "Artificial Human Optimization" field

6) To encourage researchers across the globe to work in "Artificial Human Optimization" field

7) To give Artificial Human Optimization award to researchers who contributed to this new field

KEYWORDS: Artificial Intelligence, Machine Learning, Global Optimization Techniques, Genetic Algorithms, Particle Swarm Optimization, Ant Colony Optimization, Artificial Fish Swarm Optimization, Firefly Optimization Algorithm, Flower Pollination Algorithm, Artificial Human Optimization

1 Introduction

Recently a new field titled "Artificial Human Optimization" has been proposed in literature [1]. In this paper the focus is completely on "Artificial Human Optimization" field.

Rest of the paper is organized as follows:

1) Section 2: This section shows corrections to earlier work in Artificial Human Optimization field

2) Section 3: This section shows design of new optimization method based on Artificial Humans. "Multiple Strategy Human Optimization" is the title of this new method.

3) Section 4: This section shows reviews of experts in Artificial Human Optimization field.

4) Section 5: This section encourages future researchers to work in Artificial Human Optimization field.

5) Section 6: To show opportunities that exist in "Artificial Human Optimization" field.

6) Section 7: To show details related to the "Founder of Artificial Human Optimization" field.

7) Section 8: This section shows list of researchers who worked in Artificial Human Optimization field and got Artificial Human Optimization Award (which is given by the founder of Artificial Human Optimization).

2 Corrections to Earlier Work

13 abstracts of papers in Artificial Human Optimization field are shown in [1]. In [1] it was given that 2012 was the year in which first paper in the field was proposed. But the first optimization method based on Artificial Humans was proposed in 2009 [2]. The abstracts of papers missed in [1] are shown below:

The abstract given in [2] is shown below as it is:

"The Human-Inspired Algorithm (HIA) is a new algorithm that uses a given population (a group of candidate solutions) to improve the search for optimal solutions to continuous functions in different optimization applications such as non-linear programming. HIA imitates the intelligent search strategies of mountain climbers who use modern techniques (such as binoculars and cell phones) to effectively find the highest mountain in a given region. Different from Genetic Algorithms (GAs) and Bees Algorithms (BAs), HIA divides a whole search space into multiple equal subspaces, evenly assigns the population in the subspaces, finds an elite subspace with the largest sum of function values, and uses more climbers (candidate solutions) to explore the elite subspace and fewer ones to explore the rest of the whole search space. BAs use random search in local neighborhood search, whereas HIA uses GAs in local neighborhood search to obtain better results. HIA locates a point with the largest function value among the elite sites and creates a hypercube with the point as its center. The assigned climbers in the hypercube and the elite subspace continue to search for the optimal solution iteratively. In each loop, the hypercube and the elite subspace become smaller to have a larger chance to pinpoint the optimal solution. Simulation results for three continuous functions with constraints and three continuous functions with box constraints can indicate that HIA is more efficient than GAs and BAs. Finally, conclusions and future works are given."

The abstract given in [3] is shown below as it is:

"This paper introduces Anarchic Society Optimization (ASO), which is inspired by a social grouping in which members behave anarchically to improve their situations. The basis of ASO is a group of individuals who are fickle, adventurous, dislike stability, and frequently behave irrationally, moving toward inferior positions they have visited during the exploration phase. The level of anarchic behavior among members intensifies as the level of difference among members' situations increases. Using these anarchic members, ASO explores the solution space perfectly and avoids falling into local optimum traps. First we present a unified framework for ASO, which can easily be used for both continuous and discrete problems. Then, we show that Particle Swarm Optimization (PSO), for which a general introduction was initially implemented for continuous optimization problems, is a special case of this framework. To evaluate the performance of ASO for discrete optimization, we develop an ASO algorithm for a challenging scheduling problem. The numerical results show that the proposed ASO algorithm significantly outperforms other effective algorithms in the literature. Our study indicates that developing an ASO algorithm is basically straightforward for any problem to which a PSO or Genetic algorithm has been applied. Finally, it is shown that under mild conditions an ASO algorithm converges to a global optimum with probability one."

3 Proposed Method

Please read "Terminology" section in paper [4] to understand the below explanation of proposed method: In initialization stage Locations of Humans, Guidance Locations of Humans, Love Array and Step are initialized. There are 2 generations inside the while loop shown in Figure 1. As shown in [4] computation of Generation x (Gen x) is done. The only difference is that a new method is designed for updating

Guidance Locations of Humans. Circle Best is the best fitness value among all fitness values of Guidance Locations of particular Human. Complete Best is the best fitness value among all fitness values of Guidance Locations of all Humans. Probabilities are assigned to Circle Best and Complete Best based on their fitness values. Probabilities are calculated from fitness values of Circle Best and Complete Best in the same way probabilities are calculated in [4]. A random number is generated to select either Circle Best or Complete Best. A particular Guidance Location moves towards the selected and this movement is similar to movement of Humans described in [4]. The difference is that Guidance Locations move towards the selected by the value of Step. The same strategy is used to update all Guidance Locations of all Humans. In Generation x+1, Guidance Locations are updated in the same way Guidance Locations are updated in Generation x (Gen x). The difference between Gen x and Gen x+1 lies in the movement of humans. In Gen x, humans move towards Guidance Locations of higher fitness values with higher probability. But in Gen x+1, humans move away from lower fitness values with higher probability. Functions Update Gen x() and Update Gen x+1() are shown in Figure 1. These functions update Guidance Locations, Love Array and Step values.

```
main (){

    Initialization();

            while(Termination_Condition_Reached not equal to true){

                    Generation x : Human moves towards higher fitness Guidance Locations.

                            Update Gen x().

                    Generation x+1 : Human moves away from lower fitness values.

                            Update Gen x+1().

            }

    }
```

Figure 1. Multiple Strategy Human Optimization

4 Reviews

Review 1 given in [5] is shown below as it is:

"This paper studies a so-called human optimization method which falls into the research topic of optimization. The proposed method was presented on the first page followed by some discussions. The paper clearly makes no novel contribution to the state of the art on optimization algorithms and techniques. Thus, because of this lack of new contribution, the paper is not appropriate for the conference."

Review 2 given in [5] is shown below as it is:

"Based on the review of your abstract, the following editorial comments should be taken into consideration:

Please submit an abstract. Change font type. Remove PhD from the title.

Please follow the abstract guidelines".

Review 3 given in [5] is shown below as it is:

"Nothing to evaluate."

Review 4 given in [5] is shown below as it is:

"Funny paper, especially the notion of "love array" :)"

Review 5 given in [5] is shown below as it is:

"This is not a research paper. It should not have been submitted for review.

Rationale and results are completely lacking. I do not even think there is a research idea in there."

Review 6 given in [5] is shown below as it is:

"General conclusion is 'Accept without reservation'.

Further comments of the evaluator are below:

The title should be changed to be more comprehensive. The clarity and relevance of the problem is well stated. How is the problem scientifically analyzed through the text? the main propositions of the paper are crystal clear. The conclusion part should also contain more details expressing if other researches in the field support the results. The text needs to be re-considered by a native English speaker to edit the errors. It is recommended that the author adds more sources since the year 2012. The research method should be explained in more details."

Review 7 given in [5] is shown below as it is:

"General conclusion is 'Accept without reservation'.

Further comments of the evaluator are below:

The title is well in accord with the body of the text. The clarity and relevance of the problem is well stated. How is the problem scientifically analyzed through the text? Reasoning of main propositions are satisfying. In conclusion part, It is needed to support the result of the research by other recent researches. The English language needs little modification in abstract part. The references are good but it is recommended that the author uses more references from the recent years. The author needs to make the main goals crystal clear."

Review 8 given in [5] is shown below as it is:

"Paper has been ACCEPTED.

Specific behavior of the human has to be specified for the model.

Few Examples/scenarios where this could be applied has to be explained.

The time complexity of the optimization algorithm has to be demonstrated over the brute force method.

Initialization of Guidance location and generalized form of updating the guidance location/love array should be explained in detail with appropriate formula.

Paper is very abstract about the idea discussed."

Review 9 given in [5] is shown below as it is:

"Main advantages of the work:

1.   Rather conceptual work pondering another interesting approach to optimization problem solution. Goals are clearly stated and the new algorithm is provided and explained.

Main disadvantages of the work:

1.   Qualitative comparison to other optimization algorithms is not provided. Why proposed algorithm could be thought as specifically modeling human optimization is not fully explicated.
2.   It is not clearly stated whether Guidance Locations and Love array are local or global, i.e. are they vectors or matrices? Seems like the latter.

Decision: this paper should be accepted for participation in the conference".

Review 10 given in [5] is shown below as it is:

"Main advantages of the work:

2.   New method for the creation of innovative optimization algorithms is proposed in the work.
3.   The function Update Locations of Humans in optimization algorithm explained in depth.
4.   An overview of existing works on the same topic is provided.
5.   Calculations of the fitness values of guidance locations of the Human are analyzed.

Main disadvantages of the work:

1.   It is not demonstrated how PhD method have been applied for solving complex optimization problems.
2.   It is not clear either there are some software implementation of Human Optimization that confirm practical feasibility of the method.

Decision: this paper should be accepted for participation in the conference."

Review 11 given in [5] is shown below as it is:

"Review 11 a: A very interesting paper.

Review 11 b: I have to admit that I had a hard time grasping the key concepts revealed in this manuscript. The author has set a very ambitious goal. But I am still searching for the elements that will make this goal a reality. The proposed algorithm is simply too abstract to be of substantial value."

5 Encouragement to Future Researchers

From section 4 it is clear that some experts are against to Optimization methods based on Artificial Humans whereas other experts are supporting Artificial Human Optimization field. The author of this paper received review "Very Interesting work" from IEEE TAAI 2013 conference for a work in Artificial Human Optimization field. Now there are already more than 15 papers published in this field. There is scope for many PhD's and PostDoc's in Artificial Human Optimization field.

For the sake of encouraging researchers, 15 titles of papers published in Artificial Human Optimization field are shown below. 13 abstracts are already shown in [1]. Titles of papers shown in [1] are given in double quotes:

"(1)   Manoj Kumar Singh," A New Optimization Method Based on Adaptive Social Behavior: ASBO", AISC 174, pp. 823–831. Springer, 2012."

"(2)   Satish Gajawada, "POSTDOC : The Human Optimization", Computer Science & Information Technology (CS & IT), CSCP, pp. 183-187, 2013."

"(3)   Liu H, Xu G, Ding GY, Sun YB, "Human behavior-based particle swarm optimization", The Scientific World Journal, 2014."

"(4)   Da-Zheng Feng, Han-Zhe Feng, Hai-Qin Zhang, "Human Behavior Algorithms for Highly Efficient Global Optimization", https://arxiv.org/abs/1507.04718, 2015."

"(5)   Seyed-Alireza Ahmadi, "Human behavior-based optimization: a novel metaheuristic approach to solve complex optimization problems", Neural Computing and Applications, 2016."

"(6)   Ruo-Li Tang, Yan-Jun Fang, "Modification of particle swarm optimization with human simulated property", Neurocomputing, Volume 153, Pages 319–331, 2015."

"(7)   Muhammad Rizwan Tanweer, Suresh Sundaram, "Human cognition inspired particle swarm optimization algorithm",2014 IEEE Ninth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), 2014."

"(8)   M. R. Tanweer, S. Suresh, N. Sundararajan, "Human meta-cognition inspired collaborative search algorithm for optimization", 2014 International Conference on Multisensor Fusion and Information Integration for Intelligent Systems (MFI), pp. 1-6, 2014."

"(9)   M.R. Tanweer, S. Suresh, N. Sundararajan, "Self regulating particle swarm optimization algorithm", Information Sciences: an International Journal, Volume 294, Issue C, Pages 182-202, 2015."

"(10)   M. R. Tanweer, S. Suresh, N. Sundararajan, "Improved SRPSO algorithm for solving CEC 2015 computationally expensive numerical optimization problems", 2015 IEEE Congress on Evolutionary Computation (CEC), pp. 1943-1949, 2015."

"(11)   Prakasha S, H R Shashidhar, Manoj Kumar Singh, G T Raju, "Clustering of Text Document based on ASBO", Wulfenia journal, Vol 20, No. 6; pp: 152-165, 2013."

"(12)   Sridhar N, Nagaraj Ramrao, Manoj Kumar Singh, "PID Controller Auto tuning using ASBO Technique", Journal of Control Engineering and Technology, Vol. 4, Iss. 3, PP. 192-204, 2014."

"(13)   Devika P. D, Dinesh P. A, Rama Krishna Prasad, Manoj Kumar Singh, "ASBO Based Compositional in Combinatorial Catalyst", J. Math.Comput.Sci.5 (2015), No.3, 351-393, ISSN: 1927-5307, 2015."

(14)   L. M. Zhang, C. Dahlmann and Y. Zhang. Human-inspired algorithms for continuous function optimization. In IEEE International Conference on Intelligent Computing and Intelligent Systems, 2009, vol. 1, pp. 318-321.

(15)   A. Ahmadi-Javid, "Anarchic Society Optimization: A human-inspired method", Proc. 2011 IEEE Congr. Evol. Comput., pp. 2586-2592, 2011.

6 Opportunities in Artificial Human Optimization Field

Following are some of the opportunities that exist in Artificial Human Optimization field:

1) International Association of Artificial Human Optimization (IAAHO)
2) Transactions on Artificial Human Optimization (TAHO)

3) International Journal of Artificial Human Optimization (IJAHO)

4) International Conference on Artificial Human Optimization (ICAHO)

5) www.ArtificialHumanOptimization.com

6) B.Tech in Artificial Human Optimization

7) M.Tech in Artificial Human Optimization

8) PhD in Artificial Human Optimization

9) PostDoc in Artificial Human Optimization

10) Artificial Human Optimization Labs

11) To become "Father of Artificial Human Optimization" field

7 Founder of Artificial Human Optimization Field

In December 2016, Satish Gajawada proposed a new field titled "Artificial Human Optimization" which comes under Artificial Intelligence. This work was published in "Transactions on Machine Learning and Artificial Intelligence".

8 Artificial Human Optimization Awards

The following list of researchers are awarded "Artificial Human Optimization Award" for their valuable contribution to AHO field:

1) Manoj Kumar Singh

2) Liu H

3) Xu G

4) Ding GY

5) Sun YB

6) Da-Zheng Feng

7) Han-Zhe Feng

8) Hai-Qin Zhang

9) Seyed-Alireza Ahmadi

10) Ruo-Li Tang

11) Yan-Jun Fang

12) Muhammad Rizwan Tanweer

13) Suresh Sundaram

14) N. Sundararajan

15) Prakasha S

16) H R Shashidhar

17) G T Raju

18) Sridhar N

19) Nagaraj Ramrao

20) Devika P. D

21) Dinesh P. A

22) Rama Krishna Prasad

23) L. M. Zhang

24) C. Dahlmann

25) Y. Zhang

26) A. Ahmadi-Javid

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9 Conclusion

This paper shows how to contribute to new field titled "Artificial Human Optimization". There are many opportunities in Artificial Human Optimization field. There is scope for many PhD's and PostDoc's in Artificial Human Optimization field.

MOTIVATION

Great leaders dont tell you what to do, they show you how it's done -- from internet.

REFERENCES

[1]   Satish Gajawada; Entrepreneur: Artificial Human Optimization. Transactions on Machine Learning and Artificial Intelligence, Volume 4 No 6 December (2016); pp: 64-70.

[2]   L. M. Zhang, C. Dahlmann and Y. Zhang. Human-inspired algorithms for continuous function optimization. In IEEE International Conference on Intelligent Computing and Intelligent Systems, 2009, vol. 1, pp. 318-321.

[3]   A. Ahmadi-Javid, "Anarchic Society Optimization: A human-inspired method", Proc. 2011 IEEE Congr. Evol. Comput., pp. 2586-2592, 2011.

[4]   Satish Gajawada, "POSTDOC : The Human Optimization", Computer Science & Information Technology (CS & IT), CSCP, pp. 183-187, 2013.

[5]   Satish Gajawada, "CEO: Different Reviews on PhD in Artificial Intelligence", Global Journal of Advanced Research, vol. 1, no.2, pp. 155-158, 2014.

AUTHOR

In December 2016, Satish Gajawada proposed a new field titled "Artificial Human Optimization" which comes under Artificial Intelligence. This work was published in "Transactions on Machine Learning and Artificial Intelligence". He received a SALUTE and APPRECIATION from IEEE chair Dr. Eng. Sattar B. Sadkhan for his numerous achievements within the field of science. He completed his studies from world class institute "Indian Institute of Technology Roorkee (IIT Roorkee)". Below are some publications of author:

Satish Gajawada, Durga Toshniwal, Nagamma Patil and Kumkum Garg, "Optimal Clustering Method Based on Genetic Algorithm," International Conference on Soft Computing for Problem Solving (SocPros - 2011), Springer.

Satish Gajawada, Durga Toshniwal, "Hybrid Cluster Validation Techniques," International Conference on Computer Science, Engineering & Applications (ICCSEA - 2012), Springer.

Satish Gajawada, Durga Toshniwal, "Projected Clustering Using Particle Swarm Optimization," International Conference on Computer, Communication, Control and Information Technology (C3IT - 2012), Elsevier.

Satish Gajawada, Durga Toshniwal, "GAP: Genetic Algorithm Based Projected Clustering Method", 21st International Conference on Software Engineering and Data Engineering (SEDE 2012), USA.

Satish Gajawada, Durga Toshniwal, "Projected Clustering Particle Swarm Optimization and Classification", International Conference on Machine Learning and Computing (ICMLC-2012), Hong Kong.

Satish Gajawada, Durga Toshniwal, "VINAYAKA: A Semi-Supervised Projected Clustering Method

Using Differential Evolution," International Journal of Software Engineering and Applications (IJSEA),

2012.

Satish Gajawada, Durga Toshniwal, "A framework for classification using genetic algorithm based clustering", The International Conference on Intelligent Systems Design and Applications (ISDA), 2012, IEEE.

You can read all the work of the author at - https://iitr-in.academia.edu/SatishGajawada