Very Highly Advanced Artificial Intelligence (VHAAI)

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Abstract: A new field titled "Very Highly Advanced Artificial Intelligence (VHAAI)" is coined in this article. VHAAI is a new field which is the collection of the following fields:

1) Out of the Box Artificial Intelligence (OBAI)
2) Artificial Intelligence Plus Plus (AI++)
3) Artificial Excellence (AE)
4) Artificial God Optimization (AGO)
5) Artificial Human Optimization (AHO)
6) Artificial Soul Optimization (ASO)
7) Twenty Second Century Artificial Intelligence (TSCAI)
8) Deep Loving (DL)
9) Nature Plus Plus Inspired Computing (N++IC)
10) Artificial Satisfaction (AS)
11) The Interesting and Complete Artificial Intelligence (ICAI)
12) Lord Rama Artificial Intelligence (LRAI)
13) Data Science Plus Plus (DS++)
14) Stories Inspired Optimization Algorithms (SIOA)

Field 1

Out of the Box Artificial Intelligence (OBAI)

Out of the Box Artificial Intelligence (OBAI): The Beginning of a New Era in Artificial Intelligence

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A B S T R A C T

The main purpose of writing this article is to unify all the OUT OF THE BOX ideas (under Artificial Intelligence) invented by the corresponding author of this work during the period (2013-2022) under a single umbrella titled "Out of the BOX Artificial Intelligence Field (OBAI Field)". All the OUT OF THE BOX ideas which are proposed under Artificial Intelligence will come under new field titled OBAI Field which is defined in this work. A new Artificial Intelligence field titled "Artificial Cartoon Algorithms (ACA)" is invented in this work. ACA is a sub-field of OBAI field as it is an OUT OF THE BOX idea. Four new algorithms titled "Artificial Cartoon Popeye Algorithm", "Artificial Cartoon Chhota Bheem Algorithm", "Artificial Cartoon Jerry Algorithm" and "Artificial Cartoon Happy Kid Algorithm" are designed in this work.

Keywords:
Out of the Box, Artificial Intelligence, Out of the Box AI, AI, OBAI, Cartoon Algorithms, ACA, Artificial Cartoon Popeye Algorithm, Artificial Cartoon Chhota Bheem Algorithm, Artificial Cartoon Jerry Algorithm, Artificial Cartoon Happy Kid Algorithm

1. Literature Review and Definition of Out of the Box Artificial Intelligence

Artificial Human Optimization, Artificial Soul Optimization, Artificial God Optimization, Artificial Satisfaction, Deep Loving, Nature Plus Plus Inspired Computing, Artificial Heart Neural Networks, Artificial Excellence, Stories Inspired Optimization Algorithms, Artificial Intelligence Plus Plus (AI++), Twenty Second Century Artificial Intelligence, Super Artificial Neural Networks, Super Evolutionary Computing, Super Computational Intelligence, The Interesting and Complete Artificial Intelligence (ICAI) fields are OUT OF THE BOX ideas under Artificial Intelligence. Hence all these fields are part of the new field titled "Out of the Box Artificial Intelligence (OBAI)" (Satish Gajawada & Hassan M. H. Mustafa, 2019a; Satish Gajawada & Hassan M. H. Mustafa, 2019b; Satish Gajawada & Hassan M. H. Mustafa, 2020a; Satish Gajawada & Hassan M. H. Mustafa, 2020b; Satish Gajawada & Hassan M. H. Mustafa, 2020c; Satish Gajawada & Hassan M. H. Mustafa, 2020d; Satish Gajawada & Hassan M. H. Mustafa, 2021a; Satish Gajawada & Hassan M. H. Mustafa, 2021b; Satish Gajawada & Hassan M. H. Mustafa, 2021c; Satish Gajawada & Hassan M. H. Mustafa, 2021d; Satish Gajawada & Hassan M. H. Mustafa, 2021e; Satish Gajawada & Hassan M. H. Mustafa, 2021f). The new field Artificial Cartoon Algorithms (ACA) invented in this work is also the sub-field of OBAI Field.

Articles (A. Ahmadi-Javid, 2011; Ahmadi SA, 2017; Burman, R. et al., 2017; Dai C. et al., 2007; Da-Zheng Feng et al., 2015; Devika P. D et al, 2015; Edris Fattahi et al., 2018; Eita M.A. et al., 2010; Esmaeil Atashpaz-Gargari et al., 2007; Feng, X. et al., 2015; Hamid Reza Kamali et al., 2015; Hao Liu et al., 2014; Kaur, Rishemjit et al., 2013; L. M. Zhang et al., 2009; Mingyi Zhang et al., 2013; Muhammad Rizwan Tanweer et al., 2014; M. R. Tanweer et al., 2014; M.R. Tanweer et al., 2015a; M.R. Tanweer et al., 2015b; Prakasha S et al., 2013; Ruo-Li Tang et al., 2015; R.V.Rao et al., 2011; Satish Gajawada et al., 2019a; Singh M.K. et al., 2013; Sridhar N et al., 2014; Wang L. et al., 2014; Xu Y. et al., 2010) belong to Artificial Human Optimization field. Hence all these articles come under OBAI field.

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2. Artificial Cartoon Algorithms

All Artificial Intelligence algorithms inspired from Cartoons will belong to new field titled "Artificial Cartoon Algorithms (ACA)". Fig. 1. shows cartoon character "Popeye". Fig. 2. shows cartoon character "Chhota Bheem". Fig. 3. shows cartoon character "Jerry". Fig. 4. shows cartoon character "Happy Kid". Four ACA shown in Fig. 5., Fig. 6., Fig. 7. and Fig. 8. belong to new field "OBAI" which is created in this work.

Fig. 1. Popeye (with Spinach)

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Fig. 2. Chhota Bheem (with Laddu)

Fig. 3. Jerry (with Cheese)

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Fig. 4. Happy Kid

3. Artificial Cartoon Popeye Algorithm

All Artificial Popeyes are initialized in line number one. In line number two, iteration count is set to zero. In line number three, local best of all Artificial Popeyes are identified. In line number four, global best of all Artificial Popeyes are identified. Based on random number generated and PopeyeSpinachProbability in line number 6, the Popeye is classified as "Popeye with Spinach" or "Popeye without Spinach". "Popeye with Spinach" eats Spinach and hence he can move in search space irrespective of anything. Based on random number generated and HelpOfPopeyeWithSpinachProbability in line number 10, "Popeye without Spinach" either receives help from "Popeye with Spinach" or not. In line numbers 11 and 12, "Popeye without Spinach" moves in search space and updates position and velocity as he receives help from "Popeye with Spinach". On the other hand, "Popeye without Spinach" is halted and doesn't do anything if he doesn't receive help from "Popeye with Spinach". This process is repeated for all the Artificial Popeyes in the population. In line number 18, the iteration count is incremented by one and the control goes to next generation. This process continues until termination condition reached is true.

```
1) All Artificial Popeyes are initialized
2) Generations count is initialized with zero
3) All Artificial Popeyes identify their local best
4) All Artificial Popeyes identify their global best
5)  loop through for each particle do
6)      if ( random_number_generate (0,1) < PopeyeSpinachProbability ) then
7)          Popeye with Spinach updates Velocity
8)          Popeye with Spinach updates Position
9)      else // Popeye without Spinach
10)         if ( random_number_generate (0,1) < HelpOfPopeyeWithSpinachProbability) then
11)                 Popeye without Spinach updates Velocity
12)                 Popeye without Spinach updates Position
13)         else
14)
15)         end if
16)     end if
17) end for
18) generations += 1
```

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19) **while** (termination condition not reached)

Fig. 5. Artificial Cartoon Popeye Algorithm

4. Artificial Cartoon Chhota Bheem Algorithm

All Artificial Chhota Bheems are initialized in line number one. In line number two, iteration count is set to zero. In line number three, local best of all Artificial Chhota Bheems are identified. In line number four, global best of all Artificial Chhota Bheems are identified. Based on random number generated and ChhotaBheemLadduProbability in line number 6, the Chhota Bheem is classified as "Chhota Bheem with Laddu" or "Chhota Bheem without Laddu". "Chhota Bheem with Laddu" eats Laddu and hence he can move in search space irrespective of anything. Based on random number generated and HelpOfChhotaBheemWithLadduProbability in line number 10, "Chhota Bheem without Laddu" either receives help from "Chhota Bheem with Laddu" or not. In line numbers 11 and 12, "Chhota Bheem without Laddu" moves in search space and updates position and velocity as he receives help from "Chhota Bheem with Laddu". On the other hand, "Chhota Bheem without Laddu" is halted and doesn't do anything if he doesn't receive help from "Chhota Bheem with Laddu". This process is repeated for all the Artificial Chhota Bheems in the population. In line number 18, the iteration count is incremented by one and the control goes to next generation. This process continues until termination condition reached is true.

```
1) All Artificial Chhota Bheems are initialized
2) Generations count is initialized with zero
3) All Artificial Chhota Bheems identify their local best
4) All Artificial Chhota Bheems identify their global best
5)  loop through for each particle do
6)      if ( random_number_generate (0,1) < ChhotaBheemLadduProbability ) then
7)          Chhota Bheem with Laddu updates Velocity
8)          Chhota Bheem with Laddu updates Position
9)      else // Chhota Bheem without Laddu
10)         if ( random_number_generate (0,1) < HelpOfChhotaBheemWithLadduProbability) then
11)                 Chhota Bheem without Laddu updates Velocity
12)                 Chhota Bheem without Laddu updates Position
13)         else
14)
15)         end if
16)     end if
17) end for
18) generations += 1
19) while (termination condition not reached)
```

Fig. 6. Artificial Cartoon Chhota Bheem Algorithm

5. Artificial Cartoon Jerry Algorithm

All Artificial Jerrys are initialized in line number one. In line number two, iteration count is set to zero. In line number three, local best of all Artificial Jerrys are identified. In line number four, global best of all Artificial Jerrys are identified. Based on random number generated and JerryCheeseProbability in line number 6, the Jerry is classified as "Jerry with Cheese" or "Jerry

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without Cheese". "Jerry with Cheese" eats Cheese and hence he can move in search space irrespective of anything. Based on random number generated and HelpOfJerryWithCheeseProbability in line number 10, "Jerry without Cheese" either receives help from "Jerry with Cheese" or not. In line numbers 11 and 12, "Jerry without Cheese" moves in search space and updates position and velocity as he receives help from "Jerry with Cheese". On the other hand, "Jerry without Cheese" is halted and doesn't do anything if he doesn't receive help from "Jerry with Cheese". This process is repeated for all the Artificial Jerrys in the population. In line number 18, the iteration count is incremented by one and the control goes to next generation. This process continues until termination condition reached is true.

```
1) All Artificial Jerrys are initialized
2) Generations count is initialized with zero
3) All Artificial Jerrys identify their local best
4) All Artificial Jerrys identify their global best
5)  loop through for each particle do
6)      if ( random_number_generate (0,1) < JerryCheeseProbability ) then
7)          Jerry with Cheese updates Velocity
8)          Jerry with Cheese updates Position
9)      else // Jerry without Cheese
10)         if ( random_number_generate (0,1) < HelpOfJerryWithCheeseProbability) then
11)                 Jerry without Cheese updates Velocity
12)                 Jerry without Cheese updates Position
13)         else
14)
15)         end if
16)     end if
17) end for
18) generations += 1
19) while (termination condition not reached)
```

Fig. 7. Artificial Cartoon Jerry Algorithm

6. Artificial Cartoon Happy Kid Algorithm

All Happy Kids are initialized in line number one. In line number two, iteration count is set to zero. In line number three, local best of all Artificial Happy Kids are identified. In line number four, global best of all Artificial Happy Kids are identified. Based on random number generated and HappyKidBananaProbability in line number 6, the Happy Kid is classified as "Happy Kid with Banana" or "Happy Kid without Banana". "Happy Kid with Banana" eats Banana and hence he can move in search space irrespective of anything. Based on random number generated and HelpOfHappyKidWithBananaProbability in line number 10, "Happy Kid without Banana" either receives help from "Happy Kid with Banana" or not. In line numbers 11 and 12, "Happy Kid without Banana" moves in search space and updates position and velocity as he receives help from "Happy Kid with Banana". On the other hand, "Happy Kid without Banana" is halted and doesn't do anything if he doesn't receive help from "Happy Kid with Banana". This process is repeated for all the Artificial Happy Kids in the population. In line number 18, the iteration count is incremented by one and the control goes to next generation. This process continues until termination condition reached is true.

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```
All Artificial Happy Kids are initialized
Generations count is initialized with zero
All Artificial Happy Kids identify their local best
All Artificial Happy Kids identify their global best
loop through for each particle do
    if ( random_number_generate (0,1) < HappyKidBananaProbability ) then
        Happy Kid with Banana updates Velocity
        Happy Kid with Banana updates Position
    else //
        if ( random_number_generate (0,1) < HelpOfHappyKidWithBananaProbability) then
                Happy Kid without Banana updates Velocity
                Happy Kid without Banana updates Position
        else

        end if
    end if
end for
generations += 1
while (termination condition not reached)
```

Fig. 8. Artificial Cartoon Happy Kid Algorithm

7. Opportunities in Out of the Box Artificial Intelligence Field

According to us, there is no end to the list of the opportunities in "Out of the Box Artificial Intelligence (OBAI)" field. Some of them are listed below:

1) International Institute of OBAI, Germany
2) Indian Institute of OBAI, India
3) IBM OBAI Research Labs, Switzerland
4) Google OBAI Research Labs, USA
5) B.Tech, OBAI at IIT Mumbai
6) M.Tech, OBAI at University of Texas
7) PhD, OBAI at University of Australia
8) PostDoc, OBAI at Harvard University
9) International Conference on OBAI, Singapore
10) International Journal on OBAI, United Kingdom
11) Out of the Box Artificial Intelligence – A New Course on Coursera
12) Seminar on OBAI, Africa
13) Book on OBAI, Elsevier Publishers

8. Conclusions

A new field titled "Out of the Box Artificial Intelligence (OBAI)" is invented in this work. The main point to be noted from this work is that the Artificial Intelligence Algorithms can take inspiration from anything and anywhere. The inspiration can come from cartoons like "Popeye", "Chhota Bheem", "Jerry" and "Happy Kid" too. Another important point is that in this work Particle Swarm Optimization algorithm is modified by adding the concepts of ACA field and four new algorithms titled "Artificial Cartoon Popeye Algorithm", "Artificial Cartoon Chhota Bheem Algorithm", "Artificial Cartoon Jerry Algorithm" and "Artificial Cartoon Happy Kid Algorithm" are

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created. This is done for the sake of simplicity. The ideal method is to create “Artificial Cartoon Algorithms” from scratch.

Acknowledgement

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Biography of Authors

Satish Gajawada

Satish Gajawada is the Designer of new field titled "Artificial Heart Neural Networks (AHNN)". He received a SALUTE and APPRECIATION from the IEEE chair, Dr. Eng. Sattar B. Sadkhan for his numerous achievements within the field of science. His Research Project is featured by NASA Astrophysics Data System. His Research Project is indexed in AGRIS (maintained by the Food and Agriculture Organization of the United Nations (FAO)). One of his research projects has been partially funded by a research grant received from IBM Corporation as part of the IBM Shared University Research Award (IBM SUR Award). He is called “Father of Artificial Human Optimization Field” by few experts for his valuable contribution to the new field titled “Artificial Human Optimization (AHO).” He got "5 out of 5" for "Contribution to Existing Knowledge" and "Evidence Supports Conclusion" for his article "Artificial God Optimization - A Creation" published at Computer and Information Science, Canada. He received invitation for a fully-funded Summer INTERNSHIP project in 2009 from Telecom Sud Paris, Cedex, France. He is the Creator of "Smile Gita - The Song of Smile" approved by Social Science Research Network, Elsevier. He is the Creator of new branches under or related to Artificial Intelligence like Artificial Satisfaction, Deep Loving and Nature++ Inspired Computing. He coined the terms under Artificial Intelligence like "Artificial Human Optimization", "Artificial Soul Optimization" and "Artificial God Optimization". Search the phrase “father of Artificial Human Optimization” on "Google Search Engine" and it displays content related to him. He is the Program Committee Member of Artificial Intelligence Conference "SCAI2021". He published 50+ publications. He is the Creator of new branches titled "Artificial Excellence", "Stories Inspired Optimization Algorithms" and "Artificial Intelligence Plus Plus (AI++)". He is the author of book "Twenty Second Century Artificial Intelligence". He is the inventor of new AI branch titled "The Interesting and Complete Artificial Intelligence (ICAI)". He is the Founder and Father of new field titled "Out of the Box Artificial Intelligence (OBAI)". He got selected as "International Best Researcher" at INSO 2021 Scientist Awards.

Hassan M. H. Mustafa

Department of Educational Technology, Banha University, Egypt. He was born in Cairo, on first of October 1947. He received his B.Sc. Degree and M.Sc. Degrees in Electrical Engineering from Military Technical College Cairo-Egypt in 1970, and1983 respectively. He received his Ph.D. degree at Computer Engineering and Systems in 1996 from Ain Shams University –Faculty of Engineering Cairo–Egypt. Currently, he is an Associate Professor with Computer Engineering, Department, Al-Baha University K.S.A. He is a member with a set of Scientific, Engineering, and educational technology Societies such as IIIS (International Institute of Informatics and Systemics), the Society of Digital Information and Wireless Communications (SDIWC). And at the International Association of Online Engineering IAOE. He is a senior member at International Economics Development Research Center (IEDRC) organization. Furthermore, he has been appointed as a member of technical comity for Artificial Neural Networks research work at IASTED organization during the period (2009-2012). He is one of advisors with ELIXIR Journal and he has been appointed as a reviewer member at

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WCSIT Journal. His fields of interest include Artificial Neural Networks, Natural Inspired Computations, and their applications for simulation, modelling and evaluation of learning processes /phenomena. Recently, he has been nominated as the Grand-father of AHO according to Satish Gajawada the founder of AHO. He is an author / co-author for more than 150 published papers & technical reports & books. All articles have been published at international specialized conferences and journals during time period from 1983 till 2021.

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Field 2

Artificial Intelligence Plus Plus (AI++)

AI++ : Artificial Intelligence Plus Plus

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John McCarthy (September 4, 1927 - October 24, 2011) was an American Computer Scientist and Cognitive Scientist. He co-authored the document that coined "Artificial Intelligence (AI)". Satish Gajawada (March 12, 1988 - Present) is an Indian Independent Inventor and Scientist. In this letter he coined "Artificial Intelligence Plus Plus (AI++)".

Acknowledgments: We would like to thank Professor Er Meng Joo (TMLAI Editor), TMLAI Editorial Team and Reviewers for accepting our innovative invention titled "Artificial Intelligence Plus Plus (AI++)".

In this letter we coined, invented and defined a new branch titled "Artificial Intelligence Plus Plus (AI++)".

Definition of Artificial Human Optimization: All Optimization Algorithms which are based on Artificial Humans will come under Artificial Human Optimization Field. The basic entities in Particle Swarm Optimization are Artificial Birds. Similarly the basic entities in Artificial Human Optimization Field Algorithms are Artificial Humans. More details and algorithms related to Artificial Human Optimization Field are shown in [1].

Definition of Artificial Soul Optimization: The basic entities in Artificial Soul Optimization are Artificial Souls. These Artificial Souls move in search space to solve Optimization problems. Complete definition of Artificial Soul Optimization Field is given in [2].

Definition of Artificial God Optimization: The basic entities in Artificial God Optimization are Artificial Gods. The complete definition of Artificial God Optimization Field is shown in [3].

Definition of Artificial Satisfied Beings Optimization: Artificial Satisfaction branch is defined in [4]. Artificial Satisfied Beings Optimization is a sub-field of Artificial Satisfaction. The basic entities in Artificial Satisfied Beings Optimization are Artificial Satisfied Beings. The Artificial Satisfaction Algorithm

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defined in [4] belongs to Artificial Satisfied Beings Optimization area.

Definition of Deep Loving: Deep Loving is another name given for Artificial Mother Optimization. The basic entities in Deep Loving field algorithms are Artificial Mothers. More details related to Deep Loving area can be found in [5].

Definition of Artificial Children Optimization: Artificial Children move in search space and solves optimization problems in Artificial Children Optimization Field. The Children Cycle Riding Algorithm which belongs to Artificial Children Optimization Field is explained in [6].

Definition of Artificial Excellence: Artificial Excellence is a sub-field of Artificial Human Optimization Field. The basic entities in Artificial Excellence field algorithms are particular Artificial Humans. The world's first Artificial Excellence field algorithm is explained in [7].

Definition of Stories Inspired Optimization Algorithms: This is a new area where optimization algorithms are created by taking inspiration from stories. More details related to this new field are shown in [8].

Definition of Super Evolutionary Computing: Artificial Human Optimization, Artificial Soul Optimization, Artificial God Optimization, Artificial Satisfied Beings Optimization, Deep Loving, Artificial Children Optimization, Artificial Excellence and Stories Inspired Optimization Algorithms are sub-fields of Super Evolutionary Computing field.

Definition of Super Artificial Neural Networks: All Artificial Neural Networks Field algorithms which are created by taking inspiration from both Heart and Brain will belong to Super Artificial Neural Networks Field. The Artificial Heart Neural Networks Field defined in [9] is a sub-field of Super Artificial Neural Networks Field.

Definition of Super Computational Intelligence: Super Evolutionary Computing and Super Artificial Neural Networks are sub-fields of Super Computational Intelligence field.

Definition of Artificial Intelligence Plus Plus (AI++): Artificial Intelligence Plus Plus (AI++) is a superset of Artificial Intelligence (AI). Evolutionary Computing and Artificial Neural Networks are sub-fields of Computational Intelligence. Computational Intelligence is an area of Artificial Intelligence. Similarly Super Evolutionary Computing and Super Artificial Neural Networks are sub-fields of Super Computational Intelligence. Super Computational Intelligence is an area of Artificial Intelligence Plus Plus. Hence in addition to Artificial Intelligence, AI++ consists of Super Computational Intelligence. Super Computational Intelligence is made up of Super Evolutionary Computing and

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Super Artificial Neural Networks. Super Evolutionary Computing, Super Artificial Neural Networks and Super Computational Intelligence belongs only to AI++ and not AI.

Conclusions: In this letter we coined several new branches like "Artificial Intelligence Plus Plus (AI++)", "Super Evolutionary Computing", "Super Artificial Neural Networks", "Super Computational Intelligence". According to [7], there are INFINITE opportunities and INFINITE articles possible in Artificial Excellence field. Artificial Excellence is a sub-field of Artificial Human Optimization. Artificial Human Optimization is a sub-field of Super Evolutionary Computing. Super Evolutionary Computing is an area of Super Computational Intelligence. Super Computational Intelligence is a sub-field of Artificial Intelligence Plus Plus. Hence there are INFINITE articles and INFINITE opportunities possible in the new Artificial Intelligence Plus Plus field which is invented in this letter.

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[2] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3728413

[3] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3728414

[4] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3726532

[5] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3726540

[6] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3726545

[7] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3857132

[8] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3882817

[9] https://computerresearch.org/index.php/computer/article/view/2023

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Field 3

Artificial Excellence (AE)

Artificial Excellence - A New Branch of Artificial Intelligence

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Abstract

"Artificial Excellence" is a new field which is invented in this article. Artificial Excellence is a new field which belongs to Artificial Human Optimization field. Artificial Human Optimization is a sub-field of Evolutionary Computing. Evolutionary Computing is a sub-field of Computational Intelligence. Computational Intelligence is an area of Artificial Intelligence. Hence after the publication of this article, "Artificial Excellence (AE)" will become popular as a new branch of Artificial Intelligence (AI). A new algorithm titled "Artificial Satish Gajawada and Durga Toshniwal Algorithm (ASGDTA)" is designed in this work. The definition of AE is given in this article followed by many opportunities in the new AE field. The Literature Review of Artificial Excellence field is shown after showing the definition of Artificial Intelligence. The new ASGDTA Algorithm is explained followed by Results and Conclusions.

Keywords: Artificial Excellence, Artificial Human Optimization, Evolutionary Computing, Computational Intelligence, Artificial Intelligence, Artificial Satish Gajawada, Artificial Durga Toshniwal, Artificial Satish Gajawada and Durga Toshniwal Algorithm, ASGDTA Algorithm, Particle Swarm Optimization Algorithm, PSO Algorithm

1. Definition of Artificial Excellence Field

The basic entities in Particle Swarm Optimization, Artificial Soul Optimization and Artificial God Optimization are Artificial Birds, Artificial Souls and Artificial Gods respectively. Similarly, the basic entities in Artificial Human Optimization field algorithms are Artificial Humans. "Artificial Excellence (AE)" is a sub-field of Artificial Human Optimization field. Hence the basic entities in AE field are also Artificial Humans only. But there is a difference. Artificial Human Optimization is about imitating Humans in general. There is no concept of imitating particular Human beings. AE is based on imitating particular Human beings. The basic entities in AE field algorithms are particular Human beings. Every Human is different. Hence imitating Humans in general (Artificial Human Optimization) and imitating particular Human beings (Artificial Excellence) will yield different results. If we take particular Human being (Say Ankush Mittal) then we can design algorithm "Artificial Ankush Mittal Algorithm" where the search space consists of Artificial Ankush Mittals and this Ankush Mittal Algorithm belongs to Artificial Excellence (AE) field. Section 5 of this article designs and describes world's first AE field algorithm. This algorithm is named as "Artificial Satish Gajawada and Durga Toshniwal Algorithm (ASGDTA Algorithm)". The basic entities in ASGDTA Algorithm are Artificial Satish Gajawadas and Artificial Durga Toshniwals. Just like Satish Gajawada and Durga Toshniwal move in real world and solves problems. Similarly, Artificial Satish Gajawadas and Artificial Durga Toshniwals move in search space and solves optimization problems.

2. Opportunities in the new Artificial Excellence Field

There are many opportunities in the new Artificial Excellence field. Some of them are shown below:

1) International Institute of Artificial Excellence, Hyderabad, INDIA

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2) Indian Institute of Technology Roorkee Artificial Excellence Labs, IIT Roorkee

3) Foundation of Artificial Excellence, New York, USA.

4) IEEE Artificial Excellence Society

5) ELSEVIER journals in Artificial Excellence

6) Applied Artificial Excellence – A New Subject

7) Advanced Artificial Excellence – A New Course

8) Invited Speech on "Artificial Excellence" in world-class Artificial Intelligence Conferences

9) A Special Issue on "Artificial Excellence" in a Springer published Journal

10) A Seminar on "Recent Advances in Artificial Excellence" at Technical Festivals in colleges

11) International Association of Artificial Excellence

12) Transactions on Artificial Excellence

13) International Journal of Artificial Excellence

14) International Conference on Artificial Excellence

15) www.ArtificialExcellence.com

16) B.Tech in Artificial Excellence

17) M.Tech in Artificial Excellence

18) Ph.D. in Artificial Excellence

19) PostDoc in Artificial Excellence

20) IBM the Artificial Excellence Labs

21) To become "Father of Artificial Excellence" field

3. Artificial Intelligence

The following is the definition of Artificial Intelligence according to Investopedia shown in double quotes as it is:

"Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving" (Investopedia, 2020).

4. Literature Review

Lot of research was done in Artificial Intelligence field till date. But Artificial Excellence (AE) field invented in this article is not yet explored. The world's first AE algorithm is "Artificial Satish Gajawada and Durga Toshniwal Algorithm" which is designed and developed in this article. For the sake of completeness, articles (Al-Awami, A.T.; Zerguine, A.; Cheded, L.; Zidouri, A.; Saif, W., 2011), (Al-Shaikhi, A.A., Khan, A.H., Al-Awami, A.T. et al, 2019), (Anita, Yadav A., Kumar N., 2020), (C. Ciliberto, M. Herbster, A.D. Ialongo, M. Pontil, A. Rocchetto, S. Severini, L. Wossnig, 2018), (Deep, Kusum; Mebrahtu, Hadush, 2011), (Dileep, M. V., & Kamath, S., 2015), (Gajawada, S., 2016), (Gajawada, S., and Hassan Mustafa, 2019a), (Gajawada, S., & Hassan Mustafa., 2019b), (Gajawada, S., & Hassan Mustafa., 2020), (H Singh, MM Gupta, T Meitzler, ZG Hou, KK Garg, AMG Solo, LA Zadeh, 2013), (Imma Ribas, Ramon Companys, Xavier Tort-Martorell, 2015), (Kumar, S., Durga Toshniwal, 2016), (Martínek, J., Lenc, L. & Král, P, 2020), (M. Mitchell, 1998), (P Kumar, A Mittal, P Kumar, 2006), (S Chopra, R Mitra, V Kumar, 2007), (S Das, A Abraham, UK Chakraborty, A Konar, 2009), (S Dey, S Bhattacharyya, U Maulik, 2014), (Whitley, D, 1994), (W. Hong, K. Tang, A. Zhou, H. Ishibuchi, X. Yao, 2018) and (Zhang, L., Pang, Y., Su, Y. et al, 2008) show research articles under Artificial Intelligence field. For the sake of simplicity we are showing same articles under Artificial Intelligence as shown in article "Artificial Satisfaction - The Brother of Artificial Intelligence" published by Satish Gajawada et al in 2020 year. The focus of this paper is on designing AE field and describing AE field algorithms rather than on showing Artificial Intelligence literature. Hence we saved time by showing Artificial Intelligence field literature from a previous paper by Satish Gajawada et al.

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5. The Artificial Satish Gajawada and Durga Toshniwal Algorithm

This section explains Artificial Satish Gajawada and Durga Toshniwal Algorithm (ASGDTA). Figure 1 shows ASGDTA. All Artificial Satish Gajawadas and Artificial Durga Toshniwals are initialized in line number 1. The iterations count is set to zero in line number 2. The local best and global best of all particles are found in line number 3 and line number 4 respectively. In line number 6, if the random number generated is less than DurgaToshniwalProbability then the Artificial Human is identified as Artificial Durga Toshniwal and hence Velocity and Position of Artificial Durga Toshniwal are updated in line number 7 and line number 8 respectively. On the other hand if the random number generated in line number 6 is greater than DurgaToshniwalProbability then the Artificial Human is identified as Artificial Satish Gajawada. Artificial Satish Gajawada has two possibilities. Either Artificial Satish Gajawada receives help from Artificial Durga Toshniwal or not. This is decided by HelpOfDurgaToshniwalProbability. In line number 10, if the random number generated is less than HelpOfDurgaToshniwalProbability then Artificial Satish Gajawada receives help from Artificial Durga Toshniwal and hence Artificial Satish Gajawada updates Velocity and Position in line number 11 and line number 12 respectively. On the other hand if the random number generated in line number 10 is greater than HelpOfDurgaToshniwalProbability then Artificial Satish Gajawada doesn't receive help from Artificial Durga Toshniwal and hence Artificial Satish Gajawada doesn't update Velocity and Position in line number 14. The generations or iterations count is incremented by 1 in line number 18. If termination condition reached is not true in line number 19 then the control goes back to line number 3 and the algorithm continues. If the termination condition reached is true in line number 19 then the algorithm terminates.

```
1) All Artificial Satish Gajawadas and Artificial Durga Toshniwals are initialized
2) Set iterations or generations count to zero
3) Find local best of all Artificial Satish Gajawadas and Artificial Durga Toshniwals
4) Find global best of all Artificial Satish Gajawadas and Artificial Durga Toshniwals
5)    for each particle i do
6)        if ( generate_random_number (0,1) < DurgaToshniwalProbability ) then // Durga Toshniwal
7)            Update Velocity of Artificial Durga Toshniwal
8)            Update Position of Artificial Durga Toshniwal
9)        else // Satish Gajawada
10)           if ( random(0,1) < HelpOfDurgaToshniwalProbability) then // Satish Gajawada with Help
11)               Update Velocity of Artificial Satish Gajawada
12)           Update Position of Artificial Satish Gajawada
13)           else // Satish Gajawada without help does nothing
14)
15)           end if
16)       end if
17)   end for
18)   generations (iterations) = generations (iterations) + 1
19) while ( termination_condition not reached is true)
```

Figure 1: Artificial Satish Gajawada and Durga Toshniwal Algorithm (ASGDTA)

6. Results

The benchmark functions are taken from article (Gajawada, S., and Hassan Mustafa, 2019a). The ASGDTA and PSO are applied on 5 benchmark functions shown in figure 2 to figure 6.

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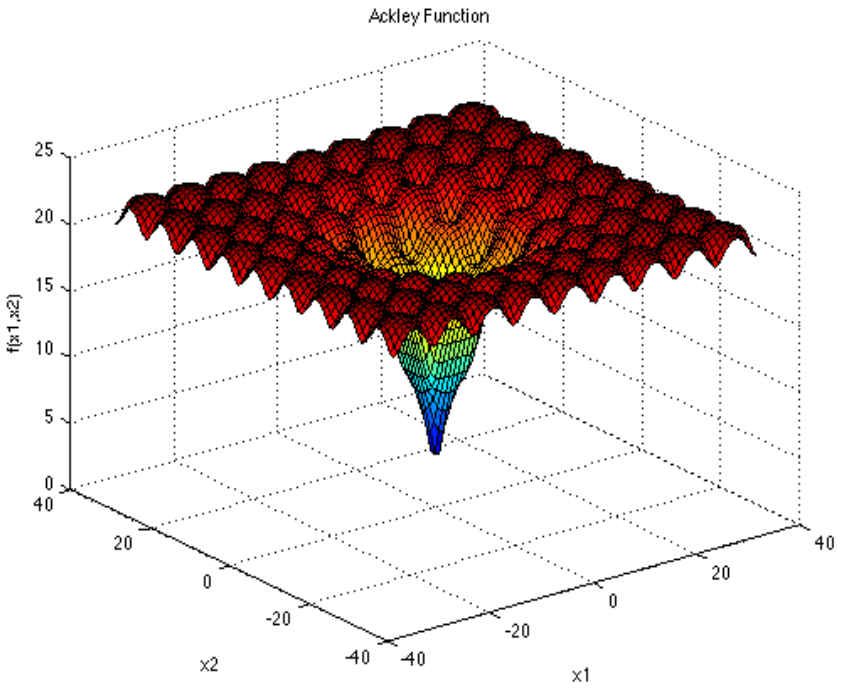

Figure 2. Ackley Function

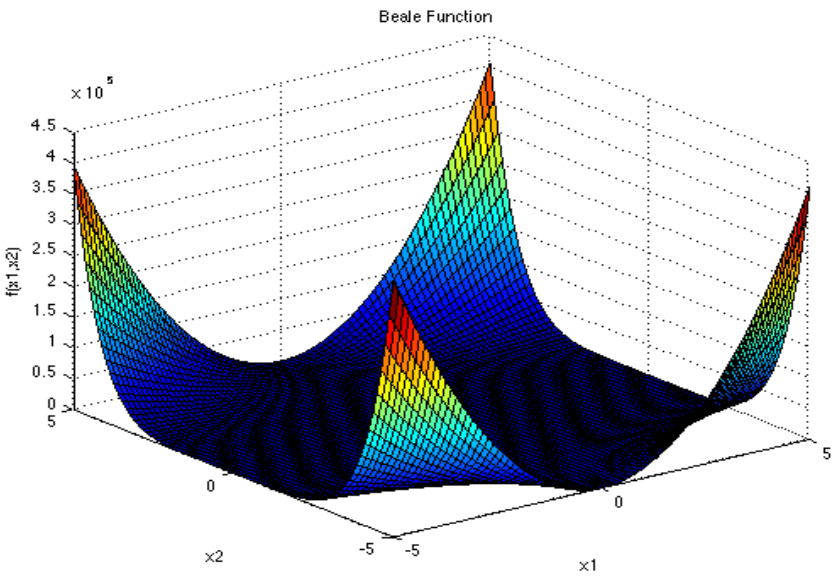

Figure 3. Beale Function

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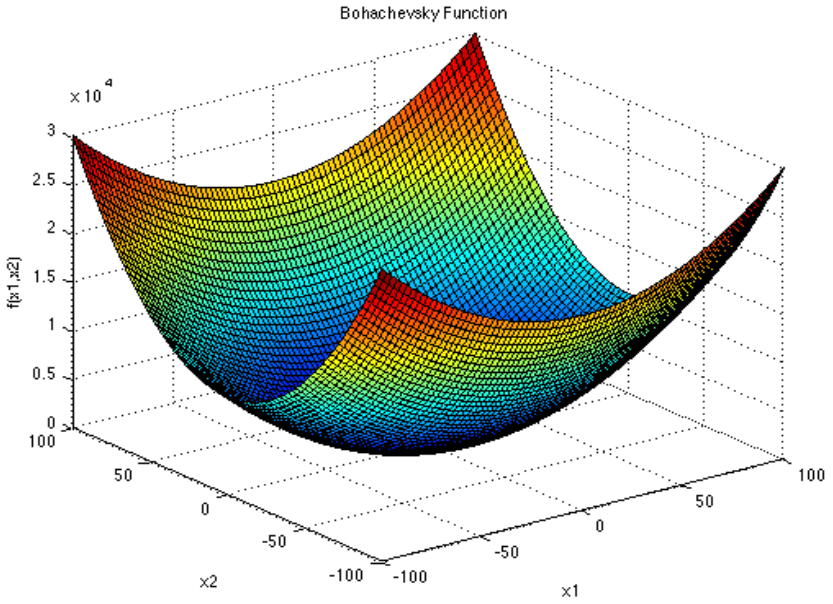

Figure 4. Bohachevsky Function

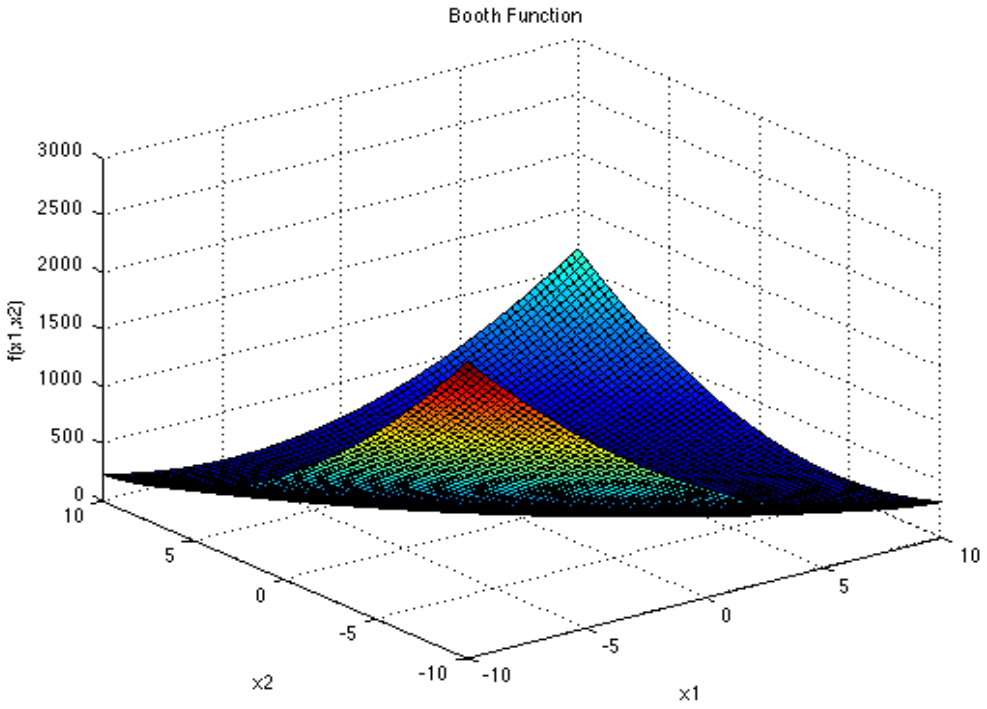

Figure 5. Booth Function

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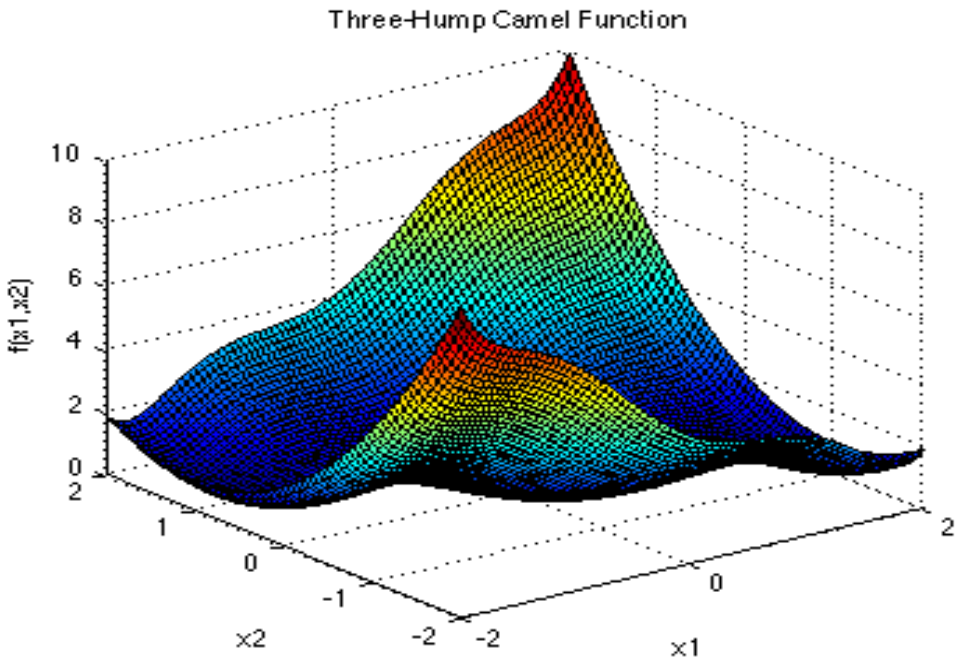

Figure 6. Three-Hump Camel Function

Table 1 shows the results obtained. Green represents performed well. Red represents not performed well. Blue represents performed between well and not well. From Table 1, we can see that all cells are green in color which means the PSO algorithm and developed ASGDTA performed well on all benchmark functions.

Table 1. Obtained Result

Benchmark Function / Algorithm	Artificial Satish Gajawada and Durga Toshniwal Algorithm (ASGDTA)	PSO Algorithm
Ackley Function		
Beale Function		
Bohachevsky Function		
Booth Function		
Three-Hump Camel Function		

7. Conclusions

A new field titled "Artificial Excellence (AE)" is invented and defined in this work. Researchers in Artificial Intelligence field can follow the path shown in this paper and create algorithms like "Artificial Narendra Modi Algorithm", "Artificial Abdul Kalam Algorithm", "Artificial Mahatma Gandhi Algorithm", "Artificial Mother Teresa Algorithm" and "Artificial Raju Algorithm" by imitating particular humans like Narendra Modi, Abdul Kalam, Mahatma Gandhi, Mother Teresa and Raju respectively. If there are 100 crores population then we can imitate all these population and create more than 100 crores algorithms. If there are 20 people in a project solving real world problems. Then we can create a AE field algorithm imitating these particular 20 people. If we

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have particular Humans Raju and Rani in real world and AE field algorithm size is 20 then there will be multiple particular Artificial Humans in search space like 10 Artificial Rajus and 10 Artificial Ranis. Hence from this article it is clear that there are INFINITE articles and INFINITE opportunities possible in the new AE field invented in this work.

Acknowledgments

Thanks to everyone (and everything) who directly or indirectly helped me to reach the stage where I am now today. Thanks to EXCELLENT Editorial Team and Reviewers for accepting my new invention titled "Artificial Excellence field".

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Field 4

Artificial God Optimization (AGO)

Artificial God Optimization – A Creation

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Abstract: Nature Inspired Optimization Algorithms have become popular for solving complex Optimization problems. Two most popular Global Optimization Algorithms are Genetic Algorithms (GA) and Particle Swarm Optimization (PSO). Of the two, PSO is very simple and many Research Scientists have used PSO to solve complex Optimization Problems. Hence PSO is chosen in this work. The primary focus of this paper is on imitating God who created the nature. Hence the term "Artificial God Optimization (AGO)" is coined in this paper. AGO is a new field which is invented in this work. A new Algorithm titled "God Particle Swarm Optimization (GoPSO)" is created and applied on various benchmark functions. The World's first Hybrid PSO Algorithm based on Artificial Gods is created in this work. GoPSO is a hybrid Algorithm which comes under AGO Field as well as PSO Field. Results obtained by PSO are compared with created GoPSO algorithm. A list of opportunities that are available in AGO field for Artificial Intelligence field experts are shown in this work.

Keywords: Artificial Gods, Artificial God Optimization, Artificial God Computing, Computational Intelligence, Evolutionary Computing, Particle Swarm Optimization, Genetic Algorithms, Artificial Human Optimization, Bio-Inspired Computing, Nature Inspired Computing, Machine Learning, Artificial Intelligence.

1 Introduction

John Henry Holland proposed Genetic Algorithms in 1970's. From 1970's to till date, there are hundreds of Nature Inspired Optimization Algorithms proposed in literature. A Research scientist asked on Researchgate the following question in March 2015:

"Question: What are the various Nature Inspired Optimization Algorithms?"

Another Research Scientist replied the following algorithms as answer to the above question:

Answer: “The following is the list of various Nature Inspired Optimization Algorithms:

1. Genetic Algorithms (GA)
2. Simulated annealing (SA)
3. Artificial immune systems (AIS)
4. Boids
5. Tabu Search
6. Memetic Algorithm (MA)
7. Ant Colony Optimization Algorithm (ACO)
8. Cultural Algorithms (CA)
9. Particle Swarm Optimization (PSO)
10. Self-propelled Particles
11. Differential Evolution (DE)
12. Bacterial Foraging Optimization
13. Harmony Search (HS)
14. MBO: Marriage in Honey Bees Optimization
15. Artificial Fish School Algorithm
16. Bacteria Chemotaxis (BC) Algorithm
17. Social Cognitive Optimization (SCO)
18. Artificial Bee Colony Algorithm
19. Bees Algorithm
20. Glowworm Swarm Optimization (GSO)
21. Honey-Bees Mating Optimization (HBMO) Algorithm
22. Invasive Weed Optimization (IWO)
23. Shuffled Frog Leaping Algorithm (SFLA)
24. Central Force Optimization
25. Intelligent Water Drops algorithm, or the IWD algorithm
26. River Formation Dynamics
27. Biogeography-based Optimization (BBO)
28. Roach Infestation Optimization (RIO)
29. Bacterial Evolutionary Algorithm (BEA)
30. Cuckoo Search (CS)

31. Firefly Algorithm (FA)
32. Gravitational Search Algorithm (GSA)
33. Group Search Optimizer
34. League Championship Algorithm (LCA)
35. Bat Algorithm
36. Bumble Bees Mating Optimization (BBMO) Algorithm
37. Eagle Strategy
38. Fireworks algorithm for optimization
39. Hunting Search
40. Altruism Algorithm
41. Spiral Dynamic Algorithm (SDA)
42. Strawberry Algorithm
43. Artificial Algae Algorithm (AAA)
44. Bacterial Colony Optimization
45. Differential Search Algorithm (DS
46. Flower pollination algorithm (FPA)
47. Krill Herd
48. Water Cycle Algorithm
49. Black Holes Algorithm
50. Cuttlefish Algorithm
51. Gases Brownian Motion Optimization
52. Mine blast algorithm
53. Plant Propagation Algorithm
54. Social Spider Optimization (SSO)
55. Spider Monkey Optimization (SMO) algorithm
56. Animal Migration Optimization (AMO) Algorithm
57. Artificial Ecosystem Algorithm (AEA)
58. Bird Mating Optimizer
59. Forest Optimization Algorithm
60. Golden Ball
61. Grey Wolf Optimizer

62. Seed Based Plant Propagation Algorithm
63. Lion Optimization Algorithm (LOA): A Nature-Inspired Meta heuristic Algorithm
64. Optics Inspired Optimization (OIO)
65. The Raven Roosting Optimization Algorithm
66. Vortex Search Algorithm
67. Water Wave Optimization
68. collective animal behavior CAB algorithm
69. Bumble bees mating optimization BBM
70. Flower Pollinated Algorithm
71. Chaos Optimization
72. Wind Driven Algorithm
73. Parliamentary optimization algorithm POA
74. Aritificial Chemical Process Algorithm
75. Aritificial Chemical Reaction Optimization Algorithm
76. Chemical Reaction Algorithm
77. Bull optimization algorithm
78. Elephent herding optimization (EHO)
79. Rain Optimization Algorithm".

From the above answer we can find that many Nature Inspired Optimization algorithms are proposed in literature till date. But there is not even a single algorithm which takes God (who created the nature) as Inspiration for creating innovative optimization algorithms. Hence a new field titled "Artificial God Optimization (AGO)" is invented in this work. AGO field is defined as follows:

Artificial Birds are the basic entities in Particle Swarm Optimization algorithm. Similarly, Artificial Gods are the basic entities in Artificial God Optimization (AGO). All the optimization algorithms which are proposed based on Artificial Gods will come under AGO Field. Each Artificial God corresponds to a point in search space. In addition to Artificial Gods there can be Artificial non-Gods in the population. Each Artificial non-God corresponds to a point in the search space. Artificial non-Gods are less powerful than Artificial Gods.

Details related to God can be found in Ancient Hindu Religious Texts [1-2]. AGO Field concepts are applied to Particle Swarm Optimization (PSO) algorithm to create New AGO Field algorithms. PSO field details are given in articles [3-9]. Articles [10-28] show details related to Hybrid PSO Algorithms that are created by modifying PSO algorithm. Till date, there are no Artificial God Optimization Algorithms (AGO Algorithms) proposed in literature. This work makes use of this research gap and invents AGO field.

The rest of the article is organized as follows:

Particle Swarm Optimization algorithm is shown in Section 2. Section 3 shows "God Particle Swarm Optimization (GoPSO)". Results are explained in Section 4. Opportunities that are present in AGO Field are shown in Section 5. Conclusions are given in Section 6.

2 Particle Swarm Optimization

Particle Swarm Optimization (PSO) was proposed by Kennedy and Eberhart in 1995. PSO is based on Artificial Birds. It has been applied to solve complex optimization problems.

In PSO, first we initialize all particles as shown below. Two variables $pbest_i$ and gbest are maintained. $pbest_i$ is the best fitness value achieved by i^{th} particle so far and gbest is the best fitness value achieved by all particles so far. Lines 4 to 11 in the below text helps in maintaining particle best and global best. Then the velocity is updated by rule shown in line no. 14. Line 15 updates position of ith particle. Line 19 increments the number of iterations and then the control goes back to line 4. This process of a particle moving towards its local best and also moving towards global best of particles is continued until termination criteria will be reached.

Procedure: Particle Swarm Optimization (PSO)

1) Initialize all particles
2) iterations = 0
3) **do**
4) **for** each particle i **do**
5) **If** ($f(x_i) < f(pbest_i)$) **then**
6) $pbest_i = x_i$
7) **end if**
8) **if** ($f(pbest_i) < f(gbest)$) **then**
9) $gbest = pbest_i$
10) **end if**
11) **end for**
12) **for** each particle i **do**
13) **for** each dimension d **do**
14) $v_{i,d} = w*v_{i,d} +$
$C_1*Random(0,1)*(pbest_{i,d} - x_{i,d})$
$+ C_2*Random(0,1)*(gbest_d - x_{i,d})$
15) $x_{i,d} = x_{i,d} + v_{i,d}$
17) **end for**
18) **end for**
19) iterations = iterations + 1
20) **while** (termination condition is false)

3 God Particle Swarm Optimization

The basic entities in the God Particle Swarm Optimization (GoPSO) are Artificial Gods and Artificial non-Gods. Gods can always move in the search space. Whereas non-Gods can move in the search space only if non-God receives blessings of Gods. Based on random number generated and GodProbability, the particle is classified into either Artificial non-God or Artificial God. If a particle is classified as Artificial God then it will update position and velocity irrespective of anything. If particle is classified as Artificial non-God then there are two cases. Based on random number generated and BlessingsOfGodProbability the particle is classified into Blessed non-God or not blessed non-God. Blessed non-God can move in search space and hence updates velocity and position. Not Blessed non-God cannot move in search space and hence doesn't update velocity and position.

If the random number generated in line number 13 is less than GodProbability then particle is classified as Artificial God else it is classified as Artificial non-God. Lines 14-17 are executed by God. Lines 19-26 are executed by non-God. If the random number generated is less than BlessingsOfGodProbability then the non-God is blessed else it is not blessed non-God. Blessed non-God executes lines 20-23. Hence velocity and position are updated for Blessed non-God. Line number 25 is blank. Hence Not Blessed non-God is blocked and does nothing. The same procedure is repeated for all particles in first generation.

In second generation, line number 13 is again executed. Particle classified as God in first generation can be classified as non-God in second generation. Particle classified as non-God in first generation can be classified as God in second generation. Similarly, in second generation, line number 19 is again executed. So, whether non-God receives blessings of God or not is dependent on the random number generated and BlessingsOfGodProbability. The remaining procedure is same as that of first generation.

Procedure: God Particle Swarm Optimization (GoPSO)

```
1) Initialize all particles
2) iterations = 0
3) do
4)      for each particle i do
5)              If ( f( x_i ) < f( pbest_i ) ) then
6)                      pbest_i = x_i
7)              end if
8)              if ( f( pbest_i ) < f( gbest ) ) then
9)                      gbest = pbest_i
10)             end if
11)     end for
12)     for each particle i do
13)             if ( random(0,1) <GodProbability )then //God
14)                     for each dimension d do
15)                             v_i,d = w*v_i,d +
                                C_1*Random(0,1)*(pbest_i,d – x_i,d)
                                + C_2*Random(0,1)*(gbest_d – x_i,d)
16)                             x_i,d = x_i,d + v_i,d
```

```
                    end for
            else //non-God
                    if ( random(0,1) <BlessingsOfGodProbability) then// Blessed non-God
                            for each dimension d do
                                    v_{i,d} = w*v_{i,d} +
                                    C_1*Random(0,1)*(pbest_{i,d} – x_{i,d})
                                     + C_2*Random(0,1)*(gbest_d – x_{i,d})
                                    x_{i,d} = x_{i,d} + v_{i,d}
                            end for
                    else // non-God without blessings does nothing

                    end if
            end if
    end for
    iterations = iterations + 1
while ( termination condition is false)
```

4 Results

Benchmark Functions used in this paper are taken from [29]. The proposed God Particle Swarm Optimization (GoPSO) is applied on five benchmark functions. Results obtained are compared with PSO.

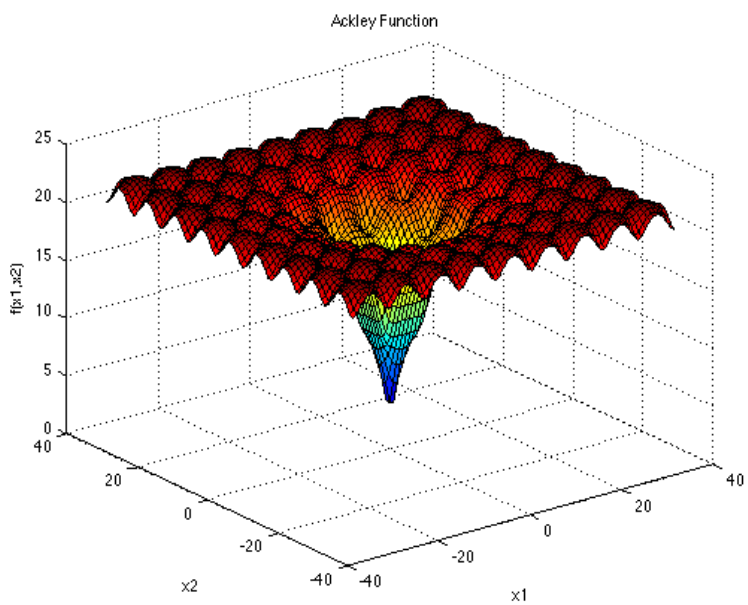

Figure 1. Ackley Function

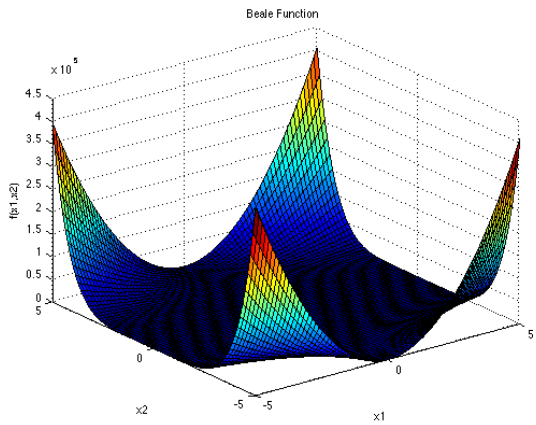

Figure 2. Beale Function

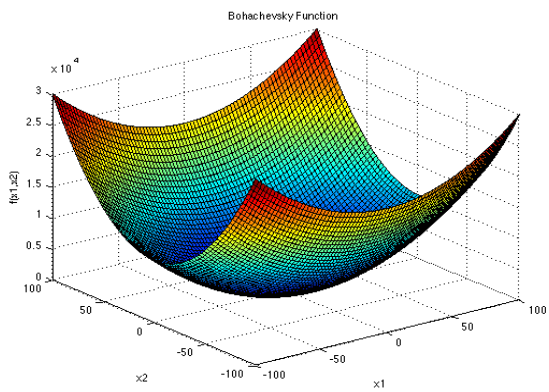

Figure 3. Bohachevsky Function

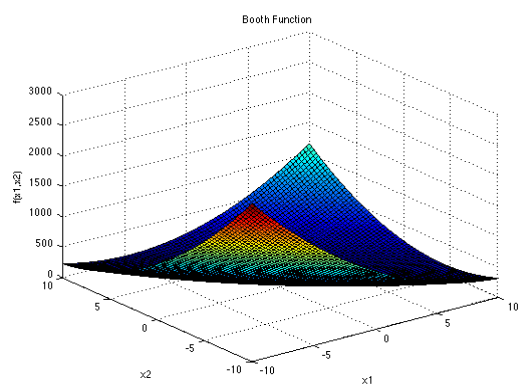

Figure 4. Booth Function

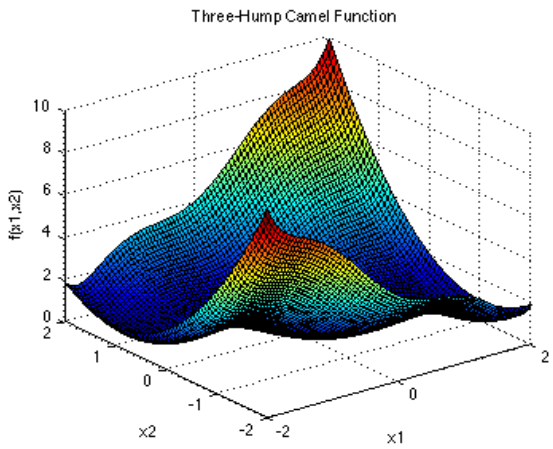

Figure 5. Three-Hump Camel Function

Benchmark Function / Algorithm	GoPSO	PSO
Ackley Function		
Beale Function		
Bohachevsky Function		
Booth Function		
Three-Hump Camel Function		

Table 1. Overall Result

In Table 1 Green represents Performed well. Red represents didn't performed well. Blue represents performed between well and not well. From Table 1 we can see that both GoPSO and PSO performed well on all benchmark functions.

5 Interesting Opportunities in Artificial God Optimization Field

The following are the opportunities in Artificial God Optimization field (AGO field) for experts in Artificial Intelligence field:

1) International Institute of Artificial God Optimization, Hyderabad, INDIA
2) Indian Institute of Technology Roorkee Artificial God Optimization Labs, IIT Roorkee
3) Foundation of Artificial God Optimization, New York, USA.
4) IEEE Artificial God Optimization Society
5) ELSEVIER journals in Artificial God Optimization

6) Applied Artificial God Optimization – A New Subject
7) Advanced Artificial God Optimization – A New Course
8) Invited Speech on "Artificial God Optimization" in world class Artificial Intelligence Conferences
9) A Special issue on "Artificial God Optimization" in a Springer published Journal
10) A Seminar on "Recent Advances in Artificial God Optimization" at Technical Festivals in colleges
11) International Association of Artificial God Optimization (IAAGO)
12) Transactions on Artificial God Optimization (TAGO)
13) International Journal of Artificial God Optimization (IJAGO)
14) International Conference on Artificial God Optimization (ICAGO)
15) www.ArtificialGodOptimization.com
16) B.Tech in Artificial God Optimization
17) M.Tech in Artificial God Optimization
18) PhD in Artificial God Optimization
19) PostDoc in Artificial God Optimization
20) Artificial God Optimization Labs
21) To become "Father of Artificial God Optimization" field

6 Conclusions

Artificial God Optimization field (AGO field) is invented in this work. A novel God Particle Swarm Optimization (GoPSO) is created in this work. PSO and GoPSO performed well on all benchmark functions. The invented AGO field comes under Artificial God Computing Field. As mentioned in arXiv pre-print, arXiv: 1903.12011 [cs.NE], there is scope for many PhD's and PostDoc's in Artificial Human Optimization field. It is also mentioned that there are millions of articles possible in AHO field. Similarly, we can easily prove that AGO field invented in this work has millions of opportunities which are yet to be explored by Research Scientists across the globe.

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Field 5

Artificial Human Optimization (AHO)

Ten Artificial Human Optimization Algorithms

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Abstract: The term "Artificial Human Optimization" was first coined by the corresponding author of this work in December 2016 when he published a paper titled "Entrepreneur : Artificial Human Optimization" at Transactions on Machine Learning and Artificial Intelligence (TMLAI) Volume 4, No 6 (December 2016). According to that paper published in 2016, Artificial Human Optimization Field is defined as the collection of all those optimization algorithms which were proposed based on Artificial Humans. In real world we (Humans) solve the problems. In the same way Artificial Humans imitate real Humans in the search space and solve the optimization problems. In Particle Swarm Optimization (PSO) the basic entities in the solution space are Artificial Birds where as in Artificial Human Optimization the basic entities in search space are Artificial Humans. Each Artificial Human corresponds to a point in the solution space. Ten Artificial Human Optimization methods titled "Human Bhagavad Gita Particle Swarm Optimization (HBGPSO)", "Human Poverty Particle Swarm Optimization (HPPSO)", "Human Dedication Particle Swarm Optimization (HuDePSO)", "Human Selection Particle Swarm Optimization (HuSePSO)", "Human Safety Particle Swarm Optimization (HuSaPSO)", "Human Kindness Particle Swarm Optimization (HKPSO)", "Human Relaxation Particle Swarm Optimization (HRPSO)", "Multiple Strategy Human Particle Swarm Optimization (MSHPSO)", "Human Thinking Particle Swarm Optimization (HTPSO)", "Human Disease Particle Swarm Optimization (HDPSO)" are applied on various benchmark functions and results obtained are shown in this work.

Keywords: Computational Intelligence, Evolutionary Computing, Artificial Humans, Artificial Human Optimization, Particle Swarm Optimization, Genetic Algorithms, Hybrid Algorithms, Global Optimization Techniques, Nature Inspired Computing, Bio-Inspired Computing, Artificial Intelligence, Machine Learning

Highlights:

1) World's First Hybrid PSO algorithm based on Human Bhagavad Gita is designed in this work.

2) World's First Hybrid PSO algorithm based on Human Poverty is designed in this work.

3) World's First Hybrid PSO algorithm based on Human Dedication is designed in this work.

4) World's First Hybrid PSO algorithm based on Human Selection is designed in this work.

5) The concept of Money is introduced into Particle Swarm Optimization algorithm for the first time in research industry history to create a new Hybrid PSO algorithm which comes under Artificial Human Optimization Field.

6) Ten Hybrid PSO algorithms which come under Artificial Human Optimization Field are shown in this work.

1 Introduction

The goal of 'Human Optimization' is to increase the performance of real humans through various methods. But 'Artificial Human Optimization' is a new field which took its birth recently in December 2016 as explained in abstract of this paper. This new filed is a sub-field of Evolutionary Computing which in turn is a sub-field of Computational Intelligence field. Hence 'Human Optimization (Real Human Optimization)' is different from Artificial Human Optimization (AHO).

The following is the review obtained from an expert in 2013 for a work under AHO Field. The review is shown below in double quotes as it is:

"The motivation of the paper is interesting. But the paper does not present any evaluation of the proposed algorithm. So we have an idea but we are not able to assess it on the basis of the paper. Next, there seems to be a difference between birds, fishes, ants, bacteria, bees etc. on one side, and human beings on the other side. Birds, fishes, ants, bacteria, bees etc. are more or less the same. People are different. I dare say that taxi drivers are different from politicians, or preschool teachers for example. Some people prefer money or power than love. It is not so difficult to guess which way ants will go but it is not so obvious when we consider people behavior. In my opinion the paper is a very first step to build the algorithm assumed but still lots of work is needed to achieve the goal."

The algorithms under Artificial Human Optimization Field (AHO Field) were proposed in literature starting from year 2003. But from the above review it is clear that the expert felt there are no algorithms under Artificial Human Optimization Field as on 2013 and corresponding author's work is the very first step. Experts are very familiar with Genetic Algorithms, Particle Swarm Optimization, Ant Colony

Optimization etc but according to corresponding author's observation many experts are unaware of the fact that there are algorithms under AHO Field before 2013. Even corresponding author of this work felt that his work submitted for review in 2013 is the beginning of Artificial Human Optimization Field Algorithms. But this was a mistake and it was corrected in later papers. It is also clear from above review shown in double quotes that imitating Humans and creating Evolutionary Computing algorithms is not as easy as imitating beings Birds, fishes, ants, bacteria, bees etc and creating algorithms under Evolutionary Computation domain.

In this work the focus is on creating new AHO Field algorithms by modifying Particle Swarm Optimization (PSO) algorithm. Articles [1-7] give an overview of existing PSO algorithms and other details. Artificial Human Optimization Algorithms that are created by modifying PSO algorithm were shown in [8-12]. Articles [13-25] gives complete details related to Artificial Human Optimization Field and its algorithms. Benchmark Functions used in this paper are taken from [26].

The rest of the article is organized as follows:
Section 2 shows Particle Swarm Optimization algorithm. Section 3 to Section 12 shows "Human Bhagavad Gita Particle Swarm Optimization (HBGPSO)", "Human Poverty Particle Swarm Optimization (HPPSO)", "Human Dedication Particle Swarm Optimization (HuDePSO)", "Human Selection Particle Swarm Optimization (HuSePSO)", "Human Safety Particle Swarm Optimization (HuSaPSO)", "Human Kindness Particle Swarm Optimization (HKPSO)", "Human Relaxation Particle Swarm Optimization (HRPSO)", "Multiple Strategy Human Particle Swarm Optimization (MSHPSO)", "Human Thinking Particle Swarm Optimization (HTPSO)", "Human Disease Particle Swarm Optimization (HDPSO)" respectively. Results are explained in Section 13. Section 14 gives Conclusions.

2 Particle Swarm Optimization

Particle Swarm Optimization (PSO) was proposed by Kennedy and Eberhart in 1995. PSO is based on Artificial Birds. It has been applied to solve complex optimization problems.

In PSO, first we initialize all particles as shown below. Two variables $pbest_i$ and gbest are maintained. $pbest_i$ is the best fitness value achieved by i^{th} particle so far and gbest is the best fitness value achieved by all particles so far. Lines 4 to 11 in the below text helps in maintaining particle best and global best. Then the velocity is updated by rule shown in line no. 14. Line 15 updates position of ith particle. Line 19 increments the number of iterations and then the control goes back to line 4. This process of a particle moving towards its local best and also moving towards global best of particles is continued until termination criteria will be reached.

Procedure: Particle Swarm Optimization (PSO)

1) Initialize all particles
2) iterations = 0
3) **do**
4) **for** each particle i **do**
5) **If** ($f(x_i) < f(pbest_i)$) **then**

```
6)                  pbest_i = x_i
7)          end if
8)          if ( f( pbest_i ) < f( gbest ) ) then
9)                  gbest = pbest_i
10)         end if
11)     end for
12)     for each particle i do
13)         for each dimension d do
14)                 v_i,d = w*v_i,d +
                        C_1*Random(0,1)*(pbest_i,d – x_i,d)
                       + C_2*Random(0,1)*(gbest_d – x_i,d)
15)                 x_i,d = x_i,d + v_i,d
17)         end for
18)     end for
19)     iterations = iterations + 1
20) while ( termination condition is false)
```

3 Human Bhagavad Gita Particle Swarm Optimization

Bhagavad Gita is a Hindu sacred text. There are no Hybrid PSO algorithms based on Bhagavad Gita till date. According to Bhagavad Gita "He who is successful is not ideal. He who failed is not ideal. Only he is ideal and revered who irrespective of success or failure stands steadfast in the pursuit of his mission". Human Bhagavad Gita Particle Swarm Optimization (HBGPSO) is designed based on this fact.

The population consists of ideal and non ideal candidates. Based on random number generated and IdealCandidateProbability, the human is classified into either ideal or non ideal candidate. Ideal candidate is not affected by success or failure and he moves in search space without any halt. So velocity and position are always updated as shown in line number 15 and 16 irrespective of anything. But this is not the case for non ideal candidate. Based on random number generated and SuccessProbability, non-ideal candidate is classified to facing either success or failure. Non ideal candidate will not update velocity and position and moves into halted state when he faces failure as shown in line number 25. He updates velocity and position when he faces success as shown in line number 21 and 22. Hence failure or success is not a matter for ideal candidate. But non ideal candidate will stop progress when he faces failure.

Procedure: Human Bhagavad Gita Particle Swarm Optimization (HBGPSO)

```
1) Initialize all particles
2) iterations = 0
3) do
4)      for each particle i do
5)          If ( f( x_i ) < f( pbest_i ) ) then
6)                  pbest_i = x_i
7)          end if
8)          if ( f( pbest_i ) < f( gbest ) ) then
9)                  gbest = pbest_i
10)         end if
```

```
11)     end for
12)     for each particle i do
13)             if ( random(0,1) < IdealCandidateProbability ) then // ideal candidate
14)                     for each dimension d do
15)                             v_{i,d} = w*v_{i,d} +
                                C_1*Random(0,1)*(pbest_{i,d} – x_{i,d})
                                + C_2*Random(0,1)*(gbest_d – x_{i,d})
16)                             x_{i,d} = x_{i,d} + v_{i,d}
17)                     end for
18)             else // non ideal candidate
19)                     if ( random(0,1) < SuccessProbability) then
20)                             for each dimension d do
21)                                     v_{i,d} = w*v_{i,d} +
                                        C_1*Random(0,1)*(pbest_{i,d} – x_{i,d})
                                        + C_2*Random(0,1)*(gbest_d – x_{i,d})
22)                                     x_{i,d} = x_{i,d} + v_{i,d}
23)                             end for
24)                     else // non ideal candidate with failure
25)                             // non ideal candidate with failure doesnot update position and velocity
26)                     end if
27)             end if
28)     end for
29)     iterations = iterations + 1
30) while ( termination condition is false)
```

4 Human Poverty Particle Swarm Optimization

There are no Hybrid PSO algorithms based on Human Poverty till date. The population consists of Rich Humans and Poor Humans. Based on random number generated and RichCandidateProbability, the human is classified into either Rich or Poor. Rich Humans have enough money to move in the search space without any halt. So velocity and position are always updated as shown in line number 15 and 16 irrespective of anything. But this is not the case for poor Humans. Based on random number generated and DonationsProbability, Poor Human is classified to having enough money to move in the search space or having insufficient money. Poor Human will not update velocity and position and moves into halted state when he doesn't have enough money as shown in line number 25. He updates velocity and position when he gets donations and has enough money to travel in search space as shown in line number 21 and 22. Hence money is not a matter for Rich Human. But Poor candidate will stop progress when he did not get sufficient money to travel in search space.

Procedure: Human Poverty Particle Swarm Optimization (HPPSO)

```
1) Initialize all particles
2) iterations = 0
3) do
4)      for each particle i do
5)              If ( f( x_i ) < f( pbest_i ) ) then
```

```
6)                  pbest_i = x_i
7)          end if
8)          if ( f( pbest_i ) < f( gbest ) ) then
9)                  gbest = pbest_i
10)         end if
11)     end for
12)     for each particle i do
13)         if ( random(0,1) < RichCandidateProbability ) then // rich candidate
14)                 for each dimension d do
15)                         v_i,d = w*v_i,d +
                            C_1*Random(0,1)*(pbest_i,d – x_i,d)
                            + C_2*Random(0,1)*(gbest_d – x_i,d)
16)                         x_i,d = x_i,d + v_i,d
17)                 end for
18)         else // poor candidate
19)                 if ( random(0,1) < DonationsProbability) then // poor candidate gets donations
20)                         for each dimension d do
21)                                 v_i,d = w*v_i,d +
                                    C_1*Random(0,1)*(pbest_i,d – x_i,d)
                                    + C_2*Random(0,1)*(gbest_d – x_i,d)
22)                                 x_i,d = x_i,d + v_i,d
23)                         end for
24)                 else
25)                         // poor candidate with no donations doesnot update position and velocity
26)                 end if
27)         end if
28)     end for
29)     iterations = iterations + 1
30) while ( termination condition is false)
```

5 Human Dedication Particle Swarm Optimization

There are no Hybrid PSO algorithms based on Human Dedication till date. Based on random number generated and HumanDedicationProbability, Human is classified into either Dedicated Human or Non Dedicated Human. Dedicated Humans move faster in search space by having a high dedication factor of 0.9 as shown in line number 16. But Non Dedicated Humans have a low dedication factor of 0.1 and move slower in search space than Dedicated Humans as shown in line number 21.

Procedure: Human Dedication Particle Swarm Optimization (HuDePSO)

```
1) Initialize all particles
2) iterations = 0
3) do
4)      for each particle i do
5)              If ( f( x_i ) < f( pbest_i ) ) then
```

```
6)                  pbest_i = x_i
7)          end if
8)          if ( f( pbest_i ) < f( gbest ) ) then
9)                  gbest = pbest_i
10)         end if
11)     end for
12)     for each particle i do
13)         if ( rand(0,1) < HumanDedicationProbability) // dedicated humans
14)                 for each dimension d do
15)                         v_i,d = w*v_i,d +
                                C_1*Random(0,1)*(pbest_i,d – x_i,d)
                                + C_2*Random(0,1)*(gbest_d – x_i,d)
16)                         x_i,d = x_i,d + 0.9 * v_i,d
17)                 end for
18)         else // non-dedicated humans
19)                 for each dimension d do
20)                         v_i,d = w*v_i,d +
                                C_1*Random(0,1)*(pbest_i,d – x_i,d)
                                + C_2*Random(0,1)*(gbest_d – x_i,d)
21)                         x_i,d = x_i,d + 0.1 * v_i,d
22)                 end for
23)         end if
24)     end for
25)     iterations = iterations + 1
26) while ( termination condition is false)
```

6 Human Selection Particle Swarm Optimization

There are no Hybrid PSO algorithms based on Human Selection till date. There are 2 options to select from for Humans. Either Humans move towards local best position or they move towards global best position. Based on random number generated and HumanSelectionProbability, Humans select from 2 options available. If random number generated is less than HumanSelectionProbability then Human move towards local best as shown in line number 15. Otherwise, Human move towards global best position as shown in line number 20.

Procedure: Human Selection Particle Swarm Optimization (HuSePSO)

```
1) Initialize all particles
2) iterations = 0
3) do
4)      for each particle i do
5)          If ( f( x_i ) < f( pbest_i ) ) then
6)                  pbest_i = x_i
7)          end if
```

```
            if ( f( pbest_i ) < f( gbest ) ) then
                gbest = pbest_i
            end if
        end for
        for each particle i do
            if ( rand(0,1) < HumanSelectionProbability) // moves towards local best
                for each dimension d do
                    v_i,d = w*v_i,d +
                        C_1*Random(0,1)*(pbest_i,d – x_i,d)
                    x_i,d = x_i,d + v_i,d
                end for
            else // moves towards global best
                for each dimension d do
                    v_i,d = w*v_i,d +
                        C_2*Random(0,1)*(gbest_d – x_i,d)
                    x_i,d = x_i,d + v_i,d
                end for
            end if
        end for
        iterations = iterations + 1
    while ( termination condition is false)
```

7 Human Safety Particle Swarm Optimization

Please see [25], to understand Human Safety Particle Swarm Optimization (HuSaPSO). The code for HuSaPSO is shown below.

Procedure: Human Safety Particle Swarm Optimization (HuSaPSO)

```
Initialize all particles
iterations = 0
do
    for each particle i do
        If ( f( x_i ) < f( pbest_i ) ) then
            pbest_i = x_i
        end if
        if ( f( pbest_i ) < f( gbest ) ) then
            gbest = pbest_i
        end if
    end for
    for each particle i do
        for each dimension d do
            v_i,d = w*v_i,d +
                C_1*Random(0,1)*( x_i,d – pworst_i,d)
                + C_2*Random(0,1)*( x_i,d – gworst_d)
```

```
                    x_{i,d} = x_{i,d} + v_{i,d}
            end for
    end for
    iterations = iterations + 1
while ( termination condition is false)
```

8 Human Kindness Particle Swarm Optimization

Please see [25], to understand Human Kindness Particle Swarm Optimization (HKPSO). The code for HKPSO is shown below.

Procedure: Human Kindness Particle Swarm Optimization (HKPSO)

```
Initialize all particles
iterations = 0
do
    for each particle i do
        If ( f( x_i ) < f( pbest_i ) ) then
            pbest_i = x_i
        end if
        if ( f( pbest_i ) < f( gbest ) ) then
            gbest = pbest_i
        end if
    end for
    for each particle i do
        for each dimension d do
            v_{i,d} = w*v_{i,d} +
                C_1*Random(0,1)*(pbest_{i,d} – x_{i,d})
                + C_2*Random(0,1)*(gbest_d – x_{i,d})
            x_{i,d} = x_{i,d} + KindnessFactor_i * v_{i,d}
        end for
    end for
    iterations = iterations + 1
while ( termination condition is false)
```

9 Human Relaxation Particle Swarm Optimization

Please see [25], to understand Human Relaxation Particle Swarm Optimization (HRPSO). The code for HRPSO is shown below.

Procedure: Human Relaxation Particle Swarm Optimization (HRPSO)

```
Initialize all particles
Initialize RelaxationProbability
iterations = 0
do
```

```
    for each particle i do
        If ( f( x_i ) < f( pbest_i ) ) then
            pbest_i = x_i
        end if
        if ( f( pbest_i ) < f( gbest ) ) then
            gbest = pbest_i
        end if
    end for
    for each particle i do
        if  Random(0,1) < = RelaxationProbability
            continue   // continues to next particle
        end if
        for each dimension d do
            v_i,d = w*v_i,d +
                C_1*Random(0,1)*(pbest_i,d – x_i,d)
                + C_2*Random(0,1)*(gbest_d – x_i,d)
            x_i,d = x_i,d + v_i,d
        end for
    end for
    iterations = iterations + 1
while ( termination condition is false)
```

10 Multiple Strategy Human Particle Swarm Optimization

Please see [25], to understand Multiple Strategy Human Particle Swarm Optimization (MSHPSO). The code for MSHPSO is shown below.

Procedure: Multiple Strategy Human Particle Swarm Optimization (MSHPSO)

```
Initialize all particles
iterations = 0
do
    for each particle i do
        If ( f( x_i ) < f( pbest_i ) ) then
            pbest_i = x_i
        end if
        if ( f( pbest_i ) < f( gbest ) ) then
            gbest = pbest_i
        end if
        If ( f( x_i ) > f( pworst_i ) ) then
            pworst_i = x_i
        end if
        if ( f( pworst_i ) > f( gworst ) ) then
            gworst = pworst_i
        end if
    end for
```

```
    If ((iterations == 0) || (iterations%2==0)) then
            // for starting and even iterations
            for each particle i do
                for each dimension d do
                    v_{i,d} = w*v_{i,d} +
                        C_1*Random(0,1)*(pbest_{i,d} – x_{i,d})
                        +C_2*Random(0,1)*(gbest_d – x_{i,d})
                    x_{i,d} = x_{i,d} + v_{i,d}
                end for
            end for
    else // for odd iterations
            for each particle i do
                for each dimension d do
                    v_{i,d} = w*v_{i,d} +
                        C_1*Random(0,1)*( x_{i,d} - pworst_{i,d} )
                        + C_2*Random(0,1)*( x_{i,d} - gworst_d)
                    x_{i,d} = x_{i,d} + v_{i,d}
                end for
            end for
    end if
    iterations = iterations + 1
while ( termination condition is false)
```

11 Human Thinking Particle Swarm Optimization

Please see [25], to understand Human Thinking Particle Swarm Optimization (HTPSO). The code for HTPSO is shown below.

Procedure: Human Thinking Particle Swarm Optimization (HTPSO)

```
Initialize all particles
iterations = 0
do
    for each particle i do
        If ( f( x_i ) < f( pbest_i ) ) then
            pbest_i = x_i
        end if
        if ( f( pbest_i ) < f( gbest ) ) then
            gbest = pbest_i
        end if
        If ( f( x_i ) > f( pworst_i ) ) then
            pworst_i = x_i
        end if
        if ( f( pworst_i ) > f( gworst ) ) then
```

```
                    gworst = pworst_i
            end if
    end for
    for each particle i do
            for each dimension d do
                    v_i,d = w*v_i,d + Random(0,1)*(pbest_i,d – x_i,d) + Random(0,1)*(gbest_d – x_i,d)
                    v_i,d = v_i,d + Random(0,1)*( x_i,d - pworst_i,d ) + Random(0,1)*( x_i,d - gworst_d)
                    x_i,d = x_i,d + v_i,d
            end for
    end for
    iterations = iterations + 1
while (termination condition is false)
```

12 Human Disease Particle Swarm Optimization

Please see [25], to understand Human Disease Particle Swarm Optimization (HDPSO). The code for HDPSO is shown below.

Procedure: Human Disease Particle Swarm Optimization (HDPSO)

```
Initialize all particles
iterations = 0
do
    for each particle i do
            If ( f( x_i ) < f( pbest_i ) ) then
                    pbest_i = x_i
            end if
            if ( f( pbest_i ) < f( gbest ) ) then
                    gbest = pbest_i
            end if
    end for

    If ((iterations == 0) || (iterations%2==0)) then
            // for starting and even iterations
            for each particle i do
                    for each dimension d do
                        v_i,d = w*v_i,d +
                                C_1*Random(0,1)*(pbest_i,d – x_i,d)
                                +C_2*Random(0,1)*(gbest_d – x_i,d)
                        x_i,d = x_i,d + v_i,d
                    end for
            end for
    else // for odd iterations
            for each particle i do
                    for each dimension d do
```

```
                    v_{i,d} = w*v_{i,d} +
                        C_1*Random(0,1)*( x_{i,d} - pbest_{i,d} )
                        + C_2*Random(0,1)*( x_{i,d} - gbest_d )
                    x_{i,d} = x_{i,d} + v_{i,d}
                end for
            end for
        end if
        iterations = iterations + 1
    while ( termination condition is false)
```

13 Results

Ten Artificial Human Optimization methods titled "Human Bhagavad Gita Particle Swarm Optimization (HBGPSO)", "Human Poverty Particle Swarm Optimization (HPPSO)", "Human Dedication Particle Swarm Optimization (HuDePSO)", "Human Selection Particle Swarm Optimization (HuSePSO)", "Human Safety Particle Swarm Optimization (HuSaPSO)", "Human Kindness Particle Swarm Optimization (HKPSO)", "Human Relaxation Particle Swarm Optimization (HRPSO)", "Multiple Strategy Human Particle Swarm Optimization (MSHPSO)", "Human Thinking Particle Swarm Optimization (HTPSO)", "Human Disease Particle Swarm Optimization (HDPSO)" are applied on Ackley, Beale, Bohachevsky, Booth and Three-Hump Camel Benchmark Functions and results obtained are shown in this section. The Figures of benchmark functions are taken from [26].

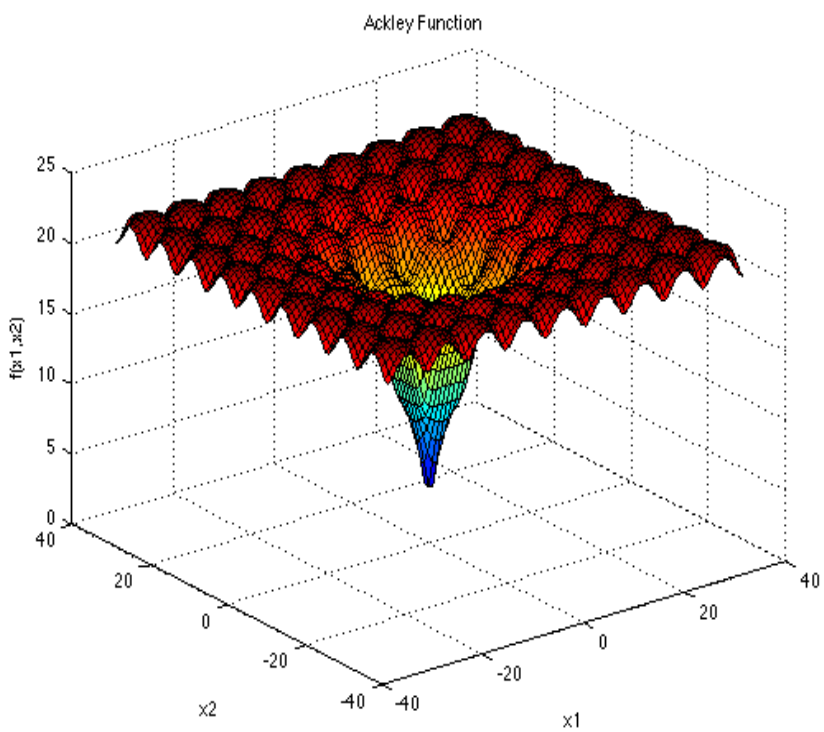

Figure 1. Ackley Function

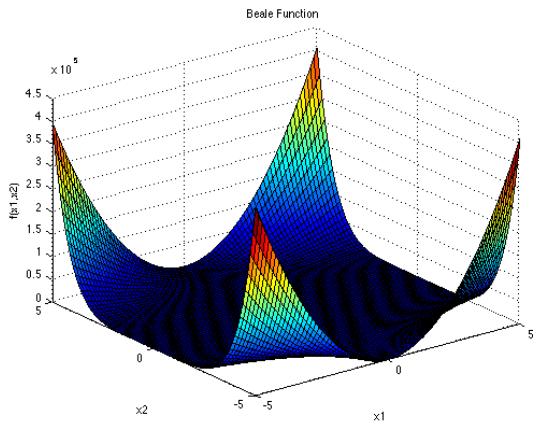

Figure 2. Beale Function

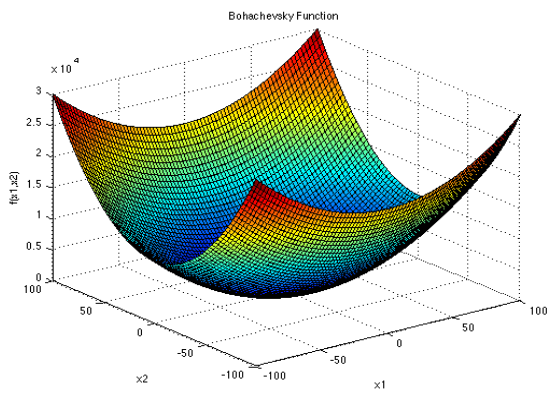

Figure 3. Bohachevsky Function

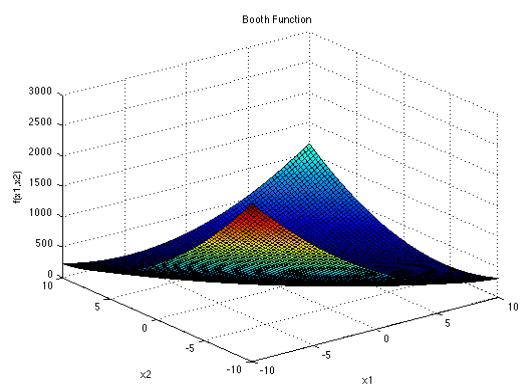

Figure 4. Booth Function

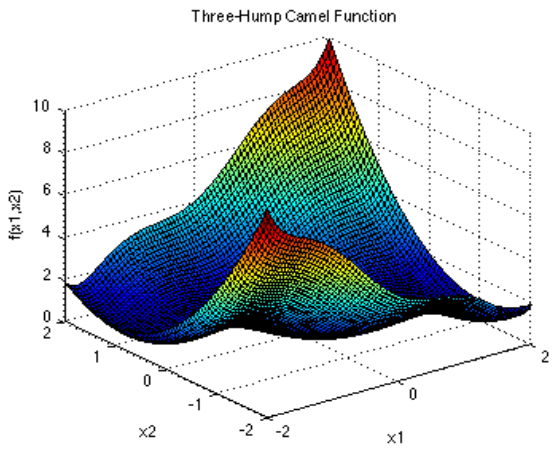

Figure 5. Three-Hump Camel Function

Benchmark Function / AHO Algorithm	PSO	HBGPSO	HPPSO	HuDePSO	HuSePSO	HKPSO	HRPSO
Ackley							
Beale							
Bohachevsky							
Booth							
Three-Hump Camel							

Figure 6. Overall Result Part One

Benchmark Function / AHO Algorithm	HuSaPSO	MSHPSO	HTPSO	HDPSO
Ackley				
Beale				
Bohachevsky				
Booth				
Three-Hump Camel				

Figure 7. Overall Result Part Two

In Figure 6 and Figure 7, first row shows AHO algorithms and first column shows benchmark functions. Green represents "Performed Well". Red represents "Didn't Performed Well". Blue represents "Performed Between Well and Not Well".

From Figure 6 it is clear that HBGPSO, HPPSO, HuDePSO, HuSePSO, HKPSO, HRPSO and PSO Performed Well for all benchmark functions.

From Figure 7 it can be observed that HuSaPSO didn't perform well even on single benchmark function. MSHPSO and HDPSO performed well on three benchmark functions. HTPSO performed well on only single benchmark function.

14 Conclusions

Artificial Human Optimization Algorithms (AHO Algorithms) inspired by Bhagavad Gita (HBGPSO), Human Poverty (HPPSO), Human Dedication (HuDePSO) and Human Selection (HuSePSO) are proposed in this work. Ten AHO algorithms are applied on 5 benchmark functions and results obtained are shown in this work. Six AHO algorithms performed as good as PSO algorithm where as remaining four AHO algorithms didn't performed as good as PSO. HuSaPSO performed worst among all algorithms used in this work. All algorithms designed in this work performed as good as PSO. A general misunderstanding among people is that algorithms inspired by Humans will perform better than other algorithms inspired by other beings. For example, let algorithm A is inspired by Birds and Algorithm B is inspired by Humans. Then because of misunderstanding, it will lead to conclusion that Algorithm B performs better than Algorithm A because Humans are best beings and most intelligent beings on this planet. In this work, we have found that HuSaPSO inspired by Humans did not performed well even on single benchmark function where as PSO inspired by birds performed well on all benchmark functions. Our future work is to design "Human Cricket Particle Swarm Optimization (HCPSO)", "Human Farming Particle Swarm Optimization (HFPSO)" inspired by Human Cricket game and Human Farming respectively. Artificial Human Optimization Algorithms designed from scratch will also be part of our future work.

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Field 6

Artificial Soul Optimization (ASO)

Artificial Soul Optimization - An Invention

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Abstract: The Soul is eternal and exists even after death of a person or animal. The main idea that is captured in this work is that soul continues to exist and takes a different body after the death. The primary goal of this work is to invent a new field titled "Artificial Soul Optimization (ASO)". The term "Artificial Soul Optimization" is coined in this paper. All the Optimization algorithms which are proposed based on Artificial Souls will come under "Artificial Soul Optimization" Field (ASO Field). In the Particle Swarm Optimization and Artificial Human Optimization, the basic entities in search space are Artificial Birds and Artificial Humans respectively. Similarly, in Artificial Soul Optimization, the basic entities in search space are Artificial Souls. In this work, the ASO Field concepts are added to Particle Swarm Optimization (PSO) algorithm to create a new hybrid algorithm titled "Soul Particle Swarm Optimization (SoPSO). The proposed SoPSO algorithm is applied on various benchmark functions. Results obtained are compared with PSO algorithm. The World's first Hybrid PSO algorithm based on Artificial Souls is created in this work.

Keywords: Artificial Souls, Artificial Soul Optimization, Artificial Soul Computing, Computational Intelligence, Evolutionary Computing, Particle Swarm Optimization, Genetic Algorithms, Artificial Human Optimization, Bio-Inspired Computing, Nature Inspired Computing, Machine Learning, Artificial Intelligence.

1 Introduction

The word Soul is present in sacred Hindu religious texts like Srimad Bhagavatham [1] and Bhagavad Gita [2]. “Soul Optimization” is something that deals with Real Souls. It can also be called as “Real Soul Optimization”. In this work, the focus is on Artificial Soul Optimization Field (ASO Field) which is defined in the abstract of this paper. Hence it is important to note that “Artificial Soul Optimization” and “Real Soul Optimization” are different.

The corresponding author asked, “Is there something like Soul Computing?” on Researchgate and an expert replied, “Just like I doubt you would find algorithms for ‘Unicorn computing’, I don't think you will find anything on ‘Soul computing’...”. Hence there is so much yet to be done in Real Soul Computing and Artificial Soul Computing fields.

Nikola Tesla said, "The day science begins to study non-physical phenomena, it will make more progress in one decade than in all the previous centuries of its existence". Hence authors would like to suggest scientists to study and do projects related to non-physical phenomena like Real Soul Computing and Artificial Soul Computing. The current work studies Artificial Soul Optimization which comes under Artificial Soul Computing.

New ASO Field algorithms are created in this work by modifying Particle Swarm Optimization (PSO) algorithm with ASO Field concepts. Articles [3-9] give details related to PSO algorithms. Hybrid PSO Algorithms that are created by modifying PSO algorithm were shown in [10-14]. Hybrid PSO algorithms that are created by modifying PSO algorithm with Artificial Human Optimization (AHO) Field concepts and details related to AHO Field are given in articles [15-28]. There are no Artificial Soul Optimization Algorithms (ASO Algorithms) proposed in literature till date. Benchmark Functions used in this paper are taken from [29].

The rest of the article is organized as follows:
Section 2 shows Particle Swarm Optimization algorithm. Section 3 shows “Soul Particle Swarm Optimization (SoPSO)”. Results are explained in Section 4. Section 5 gives opportunities that are present in ASO Field. Section 6 gives Conclusions.

2 Particle Swarm Optimization

Particle Swarm Optimization (PSO) was proposed by Kennedy and Eberhart in 1995. PSO is based on Artificial Birds. It has been applied to solve complex optimization problems.

In PSO, first we initialize all particles as shown below. Two variables $pbest_i$ and gbest are maintained. $pbest_i$ is the best fitness value achieved by i^{th} particle so far and gbest is the best fitness value achieved by all particles so far. Lines 4 to 11 in the below text helps in maintaining particle best and global best. Then the velocity is updated by rule shown in line no. 14. Line 15 updates position of ith particle. Line 19 increments the number of iterations and then the control goes back to line 4. This process of a particle moving towards its local best and also moving towards global best of particles is continued until termination criteria will be reached.

Procedure: Particle Swarm Optimization (PSO)

1) Initialize all particles
2) iterations = 0
3) **do**
4) **for** each particle i **do**
5) **If** ($f(x_i) < f(pbest_i)$) **then**

```
6)                  pbest_i = x_i
7)          end if
8)          if ( f( pbest_i ) < f( gbest ) ) then
9)                  gbest = pbest_i
10)         end if
11)     end for
12)     for each particle i do
13)         for each dimension d do
14)                 v_i,d = w*v_i,d +
                        C_1*Random(0,1)*(pbest_i,d – x_i,d)
                        + C_2*Random(0,1)*(gbest_d – x_i,d)
15)                 x_i,d = x_i,d + v_i,d
17)         end for
18)     end for
19)     iterations = iterations + 1
20) while ( termination condition is false)
```

3 Soul Particle Swarm Optimization

The basic entities in Soul Particle Swarm Optimisation (SoPSO) are Artificial Souls. Each Artificial Soul corresponds to a point in search space. For the sake of simplicity, in this work we assume that there are two types of bodies that each Artificial Soul can take. The first body has Body Factor of BF1 and the second body has a Body Factor of BF2. In each generation, Artificial Souls take either first body or second body based on random number generated and BodySelectionProbability. If random number generated is less than BodySelectionProbability then first body is taken else second body is taken. In this study we took BF1 as 0.9 and BF2 as 0.1. Hence if Artificial Soul takes first body then it moves faster in search space because BF1 is 0.9. Whereas if Artificial Soul takes second body it moves slower in the search space because BF2 is 0.1. In each generation, body is dead after velocity and position are updated. Hence Artificial Soul takes new body in next generation. So the Artificial Soul remains eternal in all generations whereas the bodies taken are dead and a new body is taken in every generation by Artificial Souls.

In line number 13, a random number is generated and compared with BodySelectionProbability. If random number is less than BodySelectionProbability then the Soul takes first body else it takes second body. If first body is selected by Soul then lines 14-17 are executed and body factor BF1 is used in the position update equation. If second body is selected then lines 19-22 are executed and body factor BF2 is used in the position update equation. After velocity and position updates, the body taken by Soul is dead. This is the procedure shown for first generation and first Soul. The same procedure is repeated for all the Artificial Souls in first generation. Hence after velocity and position updates, all bodies taken by Souls are dead. Now the second generation is started and Souls take bodies based on random number and BodySelectionProbability as shown in line number 13. The remaining procedure is same as that of first generation. This process continues until termination criteria will be reached.

Procedure: Soul Particle Swarm Optimization (SoPSO)

1) Initialize all particles

```
iterations = 0
do
    for each particle i do
        If ( f( x_i ) < f( pbest_i ) ) then
            pbest_i = x_i
        end if
        if ( f( pbest_i ) < f( gbest ) ) then
            gbest = pbest_i
        end if
    end for
    for each particle i do
        if ( rand(0,1) <BodySelectionProbability) // Soul takes first body
            for each dimension d do
                v_i,d = w*v_i,d +
                    C_1*Random(0,1)*(pbest_i,d – x_i,d)
                    + C_2*Random(0,1)*(gbest_d – x_i,d)
                x_i,d = x_i,d + BF1* v_i,d
            end for
        else // Soul takes second body
            for each dimension d do
                v_i,d = w*v_i,d +
                    C_1*Random(0,1)*(pbest_i,d – x_i,d)
                    + C_2*Random(0,1)*(gbest_d – x_i,d)
                x_i,d = x_i,d + BF2* v_i,d
            end for
        end if
    end for
    iterations = iterations + 1
while ( termination condition is false)
```

4 Results

The proposed Soul Particle Swarm Optimization (SoPSO) is applied on five benchmark functions. Results obtained are compared with PSO.

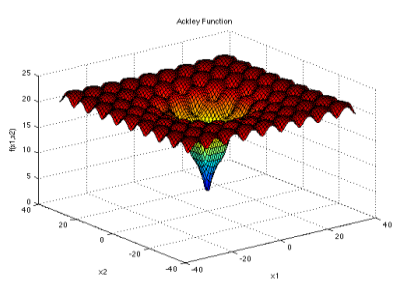

Figure 1. Ackley Function

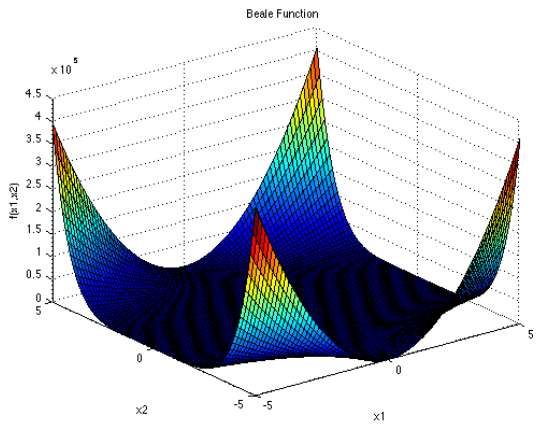

Figure 2. Beale Function

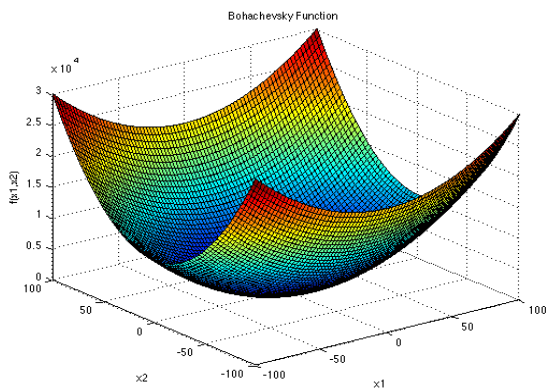

Figure 3. Bohachevsky Function

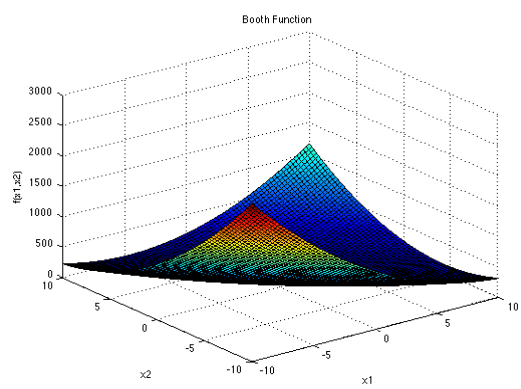

Figure 4. Booth Function

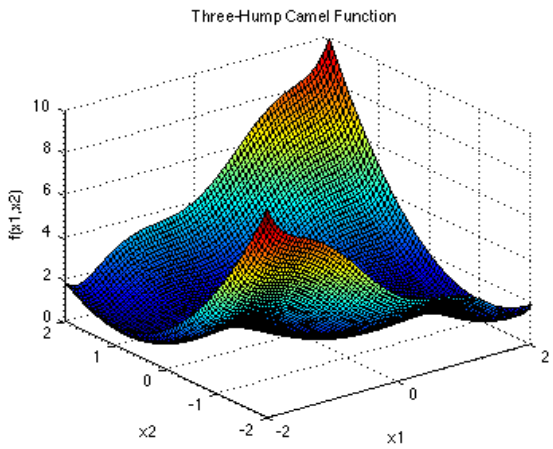

Figure 5. Three-Hump Camel Function

Benchmark Function / Algorithm	SoPSO	PSO
Ackley Function		
Beale Function		
Bohachevsky Function		
Booth Function		
Three-Hump Camel Function		

Table 1. Overall Result

In Table 1 Green represents Performed well. Red represents didn't performed well. Blue represents performed between well and not well. From Table 1 we can see that both SoPSO and PSO performed well on all benchmark functions.

5 Interesting Opportunities in Artificial Soul Optimization Field

The following are opportunities for experts in Computational Intelligence Field:

1) International Institute of Artificial Soul Optimization, Hyderabad, INDIA
2) Indian Institute of Technology Roorkee Artificial Soul Optimization Labs, IIT Roorkee
3) Foundation of Artificial Soul Optimization, New York, USA.
4) IEEE Artificial Soul Optimization Society
5) ELSEVIER journals in Artificial Soul Optimization
6) Applied Artificial Soul Optimization – A New Subject

7) Advanced Artificial Soul Optimization – A New Course
8) Invited Speech on “Artificial Soul Optimization” in world class Artificial Intelligence Conferences
9) A Special issue on “Artificial Soul Optimization” in a Springer published Journal
10) A Seminar on “Recent Advances in Artificial Soul Optimization” at Technical Festivals in colleges
11) International Association of Artificial Soul Optimization (IAASO)
12) Transactions on Artificial Soul Optimization (TASO)
13) International Journal of Artificial Soul Optimization (IJASO)
14) International Conference on Artificial Soul Optimization (ICASO)
15) www.ArtificialSoulOptimization.com
16) B.Tech in Artificial Soul Optimization
17) M.Tech in Artificial Soul Optimization
18) PhD in Artificial Soul Optimization
19) PostDoc in Artificial Soul Optimization
20) Artificial Soul Optimization Labs
21) To become “Father of Artificial Soul Optimization” field

6 Conclusions

A new field titled “Artificial Soul Optimization (ASO)” is invented in this work. A new algorithm titled Soul Particle Swarm Optimization (SoPSO) is designed and results show that proposed SoPSO performed well on all benchmark functions like PSO. In this work, a list of opportunities in ASO Field is shown for Computational Intelligence Field Experts. Not much work was done in Soul Computing and Artificial Soul Computing Fields till date. The new ASO field invented in this work comes under Artificial Soul Computing Field. There is scope for other innovative algorithms like Soul Ant Colony Optimization (SoACO) similar to SoPSO.

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Field 7

Twenty Second Century Artificial Intelligence (TSCAI)

PREFACE

In 20th and 21st Centuries the global optimization algorithms were created by taking inspiration from birds (Particle Swarm Optimization), ants (Ant Colony Optimization), chromosomes (Genetic Algorithms) etc. In “Twenty Second Century Artificial Intelligence” book global optimization algorithms are created by taking inspiration from Humans, Souls, Gods, Satisfied Beings, Mothers, Children, Particular Human Beings and Stories.

In 20th and 21st Centuries research scientists focused mainly on Brain Inspired Computing. In “Twenty Second Century Artificial Intelligence” book a new path is shown where algorithms are created by taking inspiration from both heart and brain.

In 20th and 21st Centuries the path of “Artificial Intelligence” is the main focus of research. In “Twenty Second Century Artificial Intelligence” book we defined “Artificial Satisfaction”.

In 20th and 21st Centuries researchers created many algorithms by taking inspiration from Nature (Nature Inspired Computing). In “Twenty Second Century Artificial Intelligence” book we created “Nature Plus Plus Inspired Computing”.

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Twenty Second Century Artificial Intelligence

Satish Gajawada[1*] and Hassan M. H. Mustafa[2]

DOI:

ABSTRACT

The book defines various new paths as nine different chapters. First, second and third chapters deal with “Artificial Human Optimization”, “Artificial Soul Optimization” and “Artificial God Optimization” respectively.
Three new branches titled “Artificial Satisfaction”, “Deep Loving” and “Nature Plus Plus Inspired Computing” are shown in fourth, fifth and sixth chapters respectively.
The seventh chapter describes “Artificial Heart Neural Networks” where algorithms are created by taking inspiration from both Heart and Brain.
Two new branches “Artificial Excellence” and “Stories Inspired Optimization Algorithms” are created in last two chapters of this book.

Keywords: Artificial intelligence; twenty second century; global optimization techniques; artificial satisfaction; nature plus plus inspired computing; heart and brain inspired computing.

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Field 8

Deep Loving (DL)

Deep Loving - The Friend of Deep Learning

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Abstract: Artificial Intelligence and Deep Learning are good fields of research. Recently, the brother of Artificial Intelligence titled "Artificial Satisfaction" was introduced in literature [10]. In this article, we coin the term “Deep Loving”. After the publication of this article, "Deep Loving" will be considered as the friend of Deep Learning. Proposing a new field is different from proposing a new algorithm. In this paper, we strongly focus on defining and introducing "Deep Loving Field" to Research Scientists across the globe. The future of the "Deep Loving" field is predicted by showing few future opportunities in this new field. The definition of Deep Learning is shown followed by a literature review of the "Deep Loving" field. The World's First Deep Loving Algorithm (WFDLA) is designed and implemented in this work by adding Deep Loving concepts to Particle Swarm Optimization Algorithm. Results obtained by WFDLA are compared with the PSO algorithm.

Keywords: Deep Learning, Deep Loving, Artificial Intelligence, Artificial Satisfaction, Artificial Mothers, Swarm Intelligence, Artificial Mother Optimization, Artificial Human Optimization, Artificial Soul Optimization, Artificial God Optimization

Section A. DEFINITION OF DEEP LOVING FIELD

Just like Mothers in real-world solve real problems, Artificial Mothers (in Deep Loving Field) move in the search space for solving optimization problems. In Deep Loving, we imitate mothers in the real space. In the Artificial Human Optimization field [6-7], Artificial Soul Optimization field [8], and Artificial God Optimization field [9], the basic entities in search space are Artificial Humans, Artificial Souls, and Artificial Gods respectively. Similarly, the basic entities in the Deep Loving Field are Artificial Mothers. Whenever we think of the term "Mother," the Deep Love that each mother shows towards their family, children, etc. comes to mind. Hence the name "Deep Loving Field" is given to the field when Artificial Mothers in search space are imitating Mothers in real-world to solve optimization problems. Instead of naming the field as "Artificial Mother Optimization," a better name "Deep Loving" is chosen by us.

Section B. INFINITE OPPORTUNITIES IN THE NEW DEEP LOVING FIELD

There are INFINITE OPPORTUNITIES for Artificial Intelligence field Research Scientists in Deep Loving Field. Some of them are shown below:

1) International Conference on Deep Loving (ICDL 2020)

2) IEEE TRANSACTIONS on Deep Loving (IEEE TDL 2025)

3) International Workshop on Deep Loving, Harvard University, 2050

4) B.Tech Thesis on Deep Loving, IIT Roorkee, the Year 2075

5) IBM Deep Loving Research Labs, IBM Italy

6) Applied Deep Loving - A New Course

7) Advanced Deep Loving Course, IIT Mumbai

8) M.Tech in Deep Loving Field

9) International Institute of Deep Loving, Greece

10) Ph.D. Thesis on Deep Loving, Stanford University

11) Invited Talk on Deep Loving at Google R&D Conference, USA

12) Foundation of Deep Loving, Germany

13) International Association of Deep Loving, China

14) Deep Loving team at Microsoft Research and Development

15) YouTube videos on Deep Loving by Samsung R&D Team

16) Springer Journals on Deep Loving Field

17) Elsevier Book on Deep Loving Field

18) A Course by Deep Loving Experts on Coursera

19) Presentation on Deep Loving Field at Technical Festivals in Singapore Colleges

20) IBMSUR Award for Deep Loving Field Professor at IIT Hyderabad

21) To become a Scientist in Deep Loving Field

Section C. DEEP LEARNING

According to Wikipedia, the definition of Deep Learning is shown below in double-quotes as it is:

"Deep Learning is part of a broader family of machine learning methods based on Artificial Neural Networks with representation learning. Deep Learning architectures such as deep neural networks, Deep belief networks, recurrent neural networks, and convolutional neural networks have been applied to many fields including computer vision, machine vision, etc" [1].

Hence from the definition, it is clear that Deep Learning is related to Brain-Inspired Computing.

Section D. LITERATURE REVIEW

There are many Deep Learning papers published in the literature. But there is not even a single paper which is based on Deep Loving. The World's First Deep Loving method is created in this article.

For the sake of completeness, references [2] to [5] show Deep Learning articles. You can easily find references for Deep Learning on websites like deeplearning.net. We just showed four references for Deep Learning for completeness.

Section E. WORLD'S FIRST DEEP LOVING ALGORITHM (WFDLA)

Figure 1 shows the World's First Deep Loving Algorithm (WFDLA). This section explains WFDLA. All Artificial Mothers are initialized, and the iteration count is set to zero in the beginning. Lines 2-5 find local best, global best, local worst, and global worst of all Artificial Mothers. If Artificial Mother is affected by coronavirus, then there are two possibilities. Either Artificial Mother receives help from others or not. If Artificial Mother is affected by a coronavirus and receives help from others, then she can move in search space and updates Velocity and Position. If Artificial Mother is affected by a coronavirus and doesn't receive help from others, then she is halted and cannot move in search space. Hence, Velocity and Position are not updated. If Artificial Mother is not affected by coronavirus, then she can move in search space and updates Velocity and Position. Figure 1 is shown below:

```
1) Initialize all Artificial Mothers. Set Iteration Counter to 0.

2) Find local best of all Artificial Mothers

3) Find global best of all Artificial Mothers

4) Find local worst of all Artificial Mothers

5) Find global worst of all Artificial Mothers

6) for each Artificial Mother do

 7)      if (Random_Number_Generated < CoronavirusProbability) then

8)               if ( Random_Number_Generated < HelpProbability) then

9)                       Update Velocity of Artificial Mother

10)                      Update Position of Artificial Mother

11)              else

12)                      // Mothers affected by coronavirus without help does nothing

13)              end if

14)       else

15)              Update Velocity of Artificial Mother

16)              Update Position of Artificial Mother

17)      end if

18) end for
```

19) Update Iteration Counter

20) if (termination_condition_reached is not true) then

21) go to line number 2

22) end if

Figure 1. World's First Deep Loving Algorithm (WFDLA)

Section F. RESULTS

The ASA algorithm in [10], and WFDLA designed in this paper are MATHEMATICALLY equal. In [10] it was shown that both ASA and PSO algorithms performed well on all benchmark functions. Hence due to MATHEMATICAL EQUALITY, both WFDLA and PSO performed well on all benchmark functions.

Section G. CONCLUSIONS

A new field titled "Deep Loving" is invented in this work. A new algorithm titled "World's First Deep Loving Algorithm (WFDLA) is designed, and results show that both PSO and WFDLA methods performed well on all benchmark functions. There are INFINITE OPPORTUNITIES in Deep Loving Field. Some interesting opportunities in Deep Loving Field are shown for Deep Learning and Artificial Intelligence Research Scientists and Students. As our focus in this paper is very strong on defining and introducing Deep Loving Field, we just added Deep Loving concepts to the PSO algorithm and created WFDLA for the sake of simplicity. We request Deep Learning and Artificial Intelligence field Experts to invent new Deep Loving algorithms from scratch rather than modifying existing algorithms like PSO.

ACKNOWLEDGMENTS

Thanks to everyone (and everything) who directly or indirectly helped us to reach the stage where we are now today.

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Field 9

Nature Plus Plus Inspired Computing (N++IC)

Nature Plus Plus Inspired Computing - The Superset of Nature Inspired Computing

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Abstract: The term "Nature Plus Plus Inspired Computing" is coined by us in this article. The abbreviation for this new term is "N++IC." Just like the C++ programming language is a superset of C programming language, Nature Plus Plus Inspired Computing (N++IC) field is a superset of the Nature Inspired Computing (NIC) field. We defined and introduced "Nature Plus Plus Inspired Computing Field" in this work. Several interesting opportunities in N++IC Field are shown for Artificial Intelligence Field Scientists and Students. We show a literature review of the N++IC Field after showing the definition of Nature Inspired Computing (NIC) Field. The primary purpose of publishing this innovative article is to show a new path to NIC Field Scientists so that they can come up with various innovative algorithms from scratch. As the focus of this article is to introduce N++IC to researchers across the globe, we added N++IC Field concepts to the Particle Swarm Optimization algorithm and created the "Children Cycle Riding Algorithm (CCR Algorithm)." Finally, results obtained by CCR Algorithm are shown, followed by Conclusions.

Keywords: Nature Inspired Computing, Nature Plus Plus Inspired Computing, Artificial Intelligence, Children, Evolutionary Computing, Computational Intelligence, New Area, Interesting Opportunities, Children Cycle Riding, Children Swarm.

Section A. DEFINITION OF NEW NATURE PLUS PLUS INSPIRED COMPUTING FIELD

Nature Inspired Computing (NIC) Algorithms take inspiration from Mother Nature. Nature Inspired Computing Algorithms are a subset of Nature Plus Plus Inspired Computing (N++IC) Field Algorithms. Hence an algorithm belonging to the NIC field also belongs to the N++IC field. If an algorithm takes inspiration from Artificial things in addition to inspiration taken from nature, then such algorithms belong to both NIC and N++IC fields. Also, there can be algorithms that can take inspiration completely from Artificial things, and there is no inspiration taken from nature, then such algorithms belong only to the N++IC field and not the NIC field. There are three types of algorithms. Algorithms that take inspiration from nature only. The second type of algorithms are such that they take inspiration only from artificial things. The third type of algorithms takes inspiration from both nature as well as artificial things. The first category of algorithms belongs to NIC. The second category of algorithms belongs only to the N++IC field and not the NIC field. The third category of algorithms belongs to both NIC and N++IC fields. All three types of algorithms belong to the N++IC field. In the N++IC field, we added one more type of algorithms in addition to NIC field algorithms. Hence NIC field is a subset of the N++IC field.

Section B. INTERESTING OPPORTUNITIES IN NATURE PLUS PLUS INSPIRED COMPUTING FIELD

There are INTERESTING OPPORTUNITIES for NATURE INSPIRED COMPUTING (NIC) field Research Scientists in NATURE PLUS PLUS INSPIRED COMPUTING (N++IC) field. Some of them are shown below:

1) B.Tech Project in N++IC field, IIT Roorkee

2) M.Tech Project in N++IC field, Harvard University

3) Ph.D. in N++IC field, IIT Hyderabad

4) Postdoc in N++IC field, Stanford University

5) International Association of N++IC field, Singapore

6) International Conference on N++IC field, Dubai

7) Transactions on NIC and N++IC, United Kingdom

8) International Journal on N++IC field, Australia

9) International Workshop on N++IC field, Hong Kong

10) The foundation on N++IC, New York

11) Seminar on N++IC field at Technical Festival in Pakistan colleges

12) Microsoft R&D team on N++IC field

13) IBM R&D N++IC field Research Labs, IBM Hyderabad

14) YouTube videos on N++IC and NIC fields by Google R&D team, Google Delhi

15) Springer Journal on N++IC

16) Elsevier book on N++IC

17) IEEE N++IC Society, Japan

18) To become a Scientist in the N++IC field

19) A Course on N++IC by Coursera

20) Advanced N++IC - A New subject

21) IBMSUR Award for a Professor in N++IC FIELD at IIT Hyderabad

Section C. NATURE INSPIRED COMPUTING

According to [1], the definition of NATURE INSPIRED COMPUTING is shown below in double-quotes as it is:

"The field of nature-inspired computing (NIC) is interdisciplinary in nature combining computing science with knowledge from different branches of sciences, e.g. physics, chemistry, biology, mathematics and engineering, that allows development of new computational tools such as algorithms, hardware, or wetware for problem-solving, synthesis of patterns, behaviours and organisms."

Section D. LITERATURE REVIEW

There are many Research Scientists and Students who are working in the field of Nature Inspired Computing. You will easily find thousands of references for Nature Inspired Computing when you search on Google. In this paper, our focus is to define a new field titled Nature Plus Plus Inspired Computing (N++IC) and how it is related to Nature Inspired Computing (NIC). Hence for the sake of completeness, we just show [1] - [10] articles that come under NIC. As defined, NIC is a subset of N++IC, and hence all [1] - [10] articles also belong to the N++IC field.

Section E. CHILDREN CYCLE RIDING ALGORITHM

Figure 1 shows the Children Cycle Riding Algorithm (CCRA). In this section, we explain CCRA. In the beginning, the iteration counter is set to zero, and all Artificial Children are initialized. The search space is full of Artificial sharp stones, which may result in damaging the tyre of the Artificial Child's Cycle. Hence we have CycleTyreDamageProbability. After the damage of the cycle tyre, the child repairs his cycle tyre with probability CycleTyreRepairedProbability.

If a cycle tyre is damaged, then there are two possibilities. Either Artificial Child repairs his cycle tyre or not. If the cycle tyre is damaged and Artificial Child gets his cycle repaired, then Artificial Child can move in search space and hence updates Velocity and Position. If the cycle tyre is damaged and Artificial Child cannot repair his cycle tyre then Artificial Child is halted and does not update his Velocity and Position. On the other hand, if Artificial Child's Cycle tyre is not damaged, then he can move in search space and hence updates Velocity and Position. At the end of the iteration, the iteration counter is incremented. Now the control goes to line number 2. This process is continued until the termination condition is reached. Figure 1 is shown below:

```
1) All Artificial Children are initialized, and the iteration counter is set to zero.

2) Artificial Children identifies their local best

3) Artificial Children identifies their global best

4) Artificial Children identifies their local worst

5) Artificial Children identifies their global worst

6) for each Artificial Child do

 7)     if ( random(0,1) < CycleTyreDamageProbability) then

8)              if ( random(0,1) < CycleTyreRepairedProbability) then

9)                      Artificial Child updates Velocity
```

```
10)                 Artificial Child updates Position
11)          else
12)                 // If Cycle tyre is damaged and it is not repaired then Artificial Child is
                    // halted and does nothing
13)          end if
14)      else
15)          Artificial Child updates Velocity
16)          Artificial Child updates Position
17)      end if
18) end for
19) Update Iteration Counter
20) if (termination_condition_reached is not true) then
21)      jump to line number 2
22) end if
```

Figure 1. Children Cycle Riding Algorithm (CCRA)

Section F. RESULTS

The Human Poverty Particle Swarm Optimization (HPPSO) proposed in [11], and Children Cycle Riding Algorithm (CCRA) proposed in this article are MATHEMATICALLY EQUAL. In [11], it was shown that both HPPSO and PSO performed well on all benchmark functions. Hence due to Mathematical EQUALITY, both CCRA and PSO Algorithms performed well on all benchmark functions.

Section G. CONCLUSIONS

"Nature Plus Plus Inspired Computing (N++IC)" field is designed and introduced in this work. The difference between the two fields NIC and the N++IC is clearly explained. Children Cycle Riding Algorithm (CCRA) is designed, and results show that CCRA performed as good as the Particle Swarm Optimization algorithm. Some interesting opportunities in the N++IC field are shown for NIC field Students and Research Scientists. Research Scientists and Students did a lot of research in the NIC field. There is a lot of scope in the direction where Algorithms are inspired by both nature and Artificial things. Also, there exists a lot of scope in the direction where Algorithms are inspired by Artificial things only. Children are natural, and cycle riding is Artificial. Hence CCRA is designed by taking inspiration from both nature and Artificial things. This paper is mainly published to introduce N++IC Field to the world. Hence we just added N++IC concepts to the Particle Swarm Optimization algorithm and created CCRA. As the new field is proposed in this article, the next step for Researchers is to create new N++IC field Algorithms from scratch.

ACKNOWLEDGMENTS

Thanks to everyone (and everything) who directly or indirectly helped us to reach the stage where we are now today.

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Field 10

Artificial Satisfaction (AS)

Artificial Satisfaction - The Brother of Artificial Intelligence

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Abstract

John McCarthy (September 4, 1927 – October 24, 2011) was an American computer scientist and cognitive scientist. The term "Artificial Intelligence" was coined by him (Wikipedia, 2020). Satish Gajawada (March 12, 1988 – Present) is an Indian Independent Inventor and Scientist. He coined the term "Artificial Satisfaction" in this article (Gajawada, S., and Hassan Mustafa, 2019a). A new field titled "Artificial Satisfaction" is introduced in this article. "Artificial Satisfaction" will be referred to as "The Brother of Artificial Intelligence" after the publication of this article. A new algorithm titled "Artificial Satisfaction Algorithm (ASA)" is designed and implemented in this work. For the sake of simplicity, Particle Swarm Optimization (PSO) Algorithm is modified with Artificial Satisfaction Concepts to create the "Artificial Satisfaction Algorithm (ASA)." PSO and ASA algorithms are applied on five benchmark functions. A comparision is made between the results obtained. The focus of this paper is more on defining and introducing "Artificial Satisfaction Field" to the rest of the world rather than on implementing complex algorithms from scratch.

Keywords: Intelligence, Artificial Intelligence, Satisfaction, Artificial Satisfaction, New Invention, New Creation, New Area of Research, Computer Science, Algorithm, Nature Inspired Computing, Bio-Inspired Computing, John McCarthy, Lotfi Zadeh

1. Definition of Artificial Satisfaction Field

According to the Cambridge English Dictionary, "Satisfaction" is a pleasant feeling that you get when you receive something you wanted or when you have done something you wanted to do (Cambridge, 2020). Artificial Satisfaction (AS) field algorithms are designed by taking "Satisfaction" as inspiration. Research Scientists develop AS field algorithms by imitating "Satisfaction." The simulation of satisfaction of humans to design and develop algorithms will be a part of the "Artificial Human Satisfaction" field. Artificial Satisfaction Field algorithms are created by mimicking the "Satisfaction" of all living beings. Hence "Artificial Human Satisfaction" is a sub-field of the "Artificial Satisfaction" field. Unlike Artificial Intelligence, the focus of this work is on the "Artificial Satisfaction" where consideration is given to the "Satisfaction" of all living beings and not just the satisfaction of humans.

2. Billions and Trillions of Opportunities in the new Artificial Satisfaction Field

There is an Excellent Future for Artificial Satisfaction (AS) Field Research Scientists. There are billions and trillions of opportunities in the Artificial Satisfaction field. Some of them are shown below:

1) International Institute of Artificial Satisfaction, Hyderabad, INDIA

2) Indian Institute of Technology Roorkee Artificial Satisfaction Labs, IIT Roorkee

3) Foundation of Artificial Satisfaction, New York, USA.

4) IEEE Artificial Satisfaction Society

5) ELSEVIER journals in Artificial Satisfaction

6) Applied Artificial Satisfaction – A New Subject

7) Advanced Artificial Satisfaction – A New Course

8) Invited Speech on "Artificial Satisfaction" in world-class Artificial Intelligence Conferences

9) A Special Issue on "Artificial Satisfaction" in a Springer published Journal

10) A Seminar on "Recent Advances in Artificial Satisfaction" at Technical Festivals in colleges

11) International Association of Artificial Satisfaction

12) Transactions on Artificial Satisfaction

13) International Journal of Artificial Satisfaction

14) International Conference on Artificial Satisfaction

15) www.ArtificialSatisfaction.com

16) B.Tech in Artificial Satisfaction

17) M.Tech in Artificial Satisfaction

18) Ph.D. in Artificial Satisfaction

19) PostDoc in Artificial Satisfaction

20) IBM the Artificial Satisfaction Labs

21) To become "Father of Artificial Satisfaction" field

3. Artificial Intelligence

The following is the definition of Artificial Intelligence according to Investopedia shown in double quotes as it is:

"Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving" (Investopedia, 2020).

4. Literature Review

There are lakhs of researchers who are working in Artificial Intelligence. But there is no single researcher who worked in Artificial Satisfaction field to date. This work shows the World's First Artificial Satisfaction method. For the sake of completeness, articles (Al-Awami, A.T.; Zerguine, A.; Cheded, L.; Zidouri, A.; Saif, W., 2011), (Al-Shaikhi, A.A., Khan, A.H., Al-Awami, A.T. et al, 2019), (Anita, Yadav A., Kumar N., 2020), (C. Ciliberto, M. Herbster, A.D. Ialongo, M. Pontil, A. Rocchetto, S. Severini, L. Wossnig, 2018), (Deep, Kusum; Mebrahtu, Hadush, 2011), (Dileep, M. V., & Kamath, S., 2015), (Gajawada, S., 2016), (Gajawada, S., and Hassan Mustafa, 2019a), (Gajawada, S., & Hassan Mustafa., 2019b), (Gajawada, S., & Hassan Mustafa., 2020), (H Singh, MM Gupta, T Meitzler, ZG Hou, KK Garg, AMG Solo, LA Zadeh, 2013), (Imma Ribas, Ramon Companys, Xavier Tort-Martorell, 2015), (Kumar, S., Durga Toshniwal, 2016), (Martínek, J., Lenc, L. & Král, P, 2020), (M. Mitchell, 1998), (P Kumar, A Mittal, P Kumar, 2006), (S Chopra, R Mitra, V Kumar, 2007), (S Das, A Abraham, UK Chakraborty, A Konar, 2009), (S Dey, S Bhattacharyya, U Maulik, 2014), (Whitley, D, 1994), (W. Hong, K. Tang, A. Zhou, H. Ishibuchi, X. Yao, 2018) and (Zhang, L., Pang, Y., Su, Y. et al, 2008) show research articles under Artificial Intelligence field.

5. The Artificial Satisfaction Algorithm

This section explains Artificial Satisfaction Algorithm (ASA). Figure 1 shows ASA. Line number 1 initializes all the particles. Second line sets iterations to zero. In lines 4 to 11, the local best of each particle and global best of all particles are updated. The random numbers generated and SatisfactionProbability are used to group particles into either "Satisfied Beings" or "UnSatisfied Beings". Satisfied Beings have the potential to move in search space because of their satisfaction. Hence in lines, 14 to 17 position and velocity of Satisfied Particle are updated. On the other hand, UnSatisfied Beings cannot move in the search space themselves because of their

dissatisfaction. The random numbers generated and HelpOfSatisfiedPeopleProbability are used to classify UnSatisfied Beings into two groups. Either they will receive support from Satisfied Beings or not. Hence in lines 20 to 23, UnSatisfied Beings update position and velocity because they receive help from Satisfied Beings. As shown in line number 25, UnSatisfied Beings without receiving any help from Satisified Beings cannot move in search space. Line number 29 increments iterations variable by 1. The execution reaches back to line number 4 if the termination condition is false. The next iteration starts, and execution continues similar to the current iteration. If the termination condition is reached in line number 30, then execution stops, and the optimal value is returned.

```
1) All particles are initialized
2) generations (or iterations) = 0
3) do
4)    for each particle i do
5)          If ( fitness_x_particle < particle_x_best_fitness ) then
6)                particle_x_best  = input variable at fitness_x_particle
7)          end if
8)          if ( particle_x_best_fitness < global_best_all_particles_fitness ) then
9)                global_best_all_particles = input variable at particle_x_best_fitness
10)         end if
11)   end for
12)   for each particle i do
13)         if ( generate_random_number (0,1) < SatisfactionProbability ) then // Satisfied Being
14)               for each dimension d do
15)                     velocity_{i,d} = weight*velocity_{i,d} +
                                 Constant_1*generate_random_number(0,1)*(local_best_{i,d} – position_{i,d})
                                 + Constant_2*generate_random_number(0,1)*(global_best_d – position_{i,d})
16)                     position_{i,d} = position_{,d} + velocity_{i,d}
17)               end for
18)         else // UnSatisfied Being
19)               if ( random(0,1) < HelpOfSatisfiedPeopleProbability) then // UnSatisfied Being with Help
20)                     for each dimension d do
21)                           velocity_{i,d} = weight*velocity_{i,d} +
                                     Constant_1*generate_random_number(0,1)*(local_best_{i,d} – position_{i,d})
                                    + Constant_2*generate_random_number(0,1)*(global_best_d – position_{i,d})
22)                           position_{i,d} = position_{i,d} + velocity_{i,d}
23)                     end for
24)               else // Unsatisfied Being without help does nothing
25)
26)               end if
27)         end if
28)   end for
29)   generations (iterations) = generations (iterations) + 1
30) while ( termination_condition not reached is true)
```

Figure 1: Artificial Satisfaction Algorithm (ASA)

6. Results

The benchmark functions are taken from article (Gajawada, S., and Hassan Mustafa, 2019a). The ASA and PSO are applied on 5 benchmark functions shown in figure 2 to figure 6.

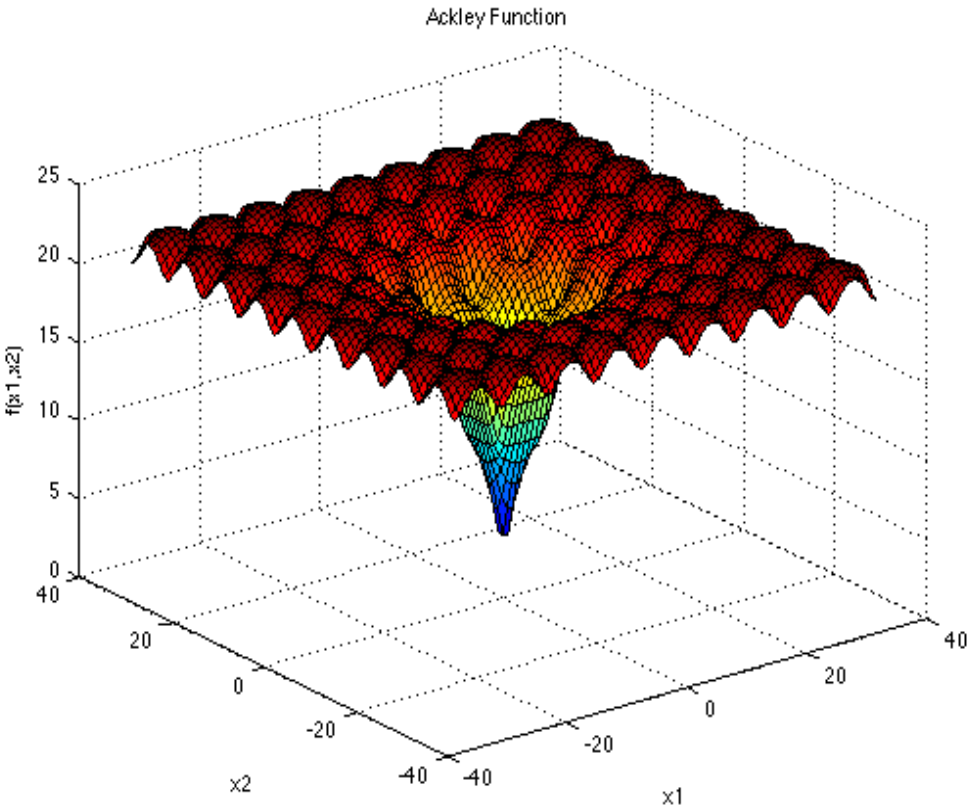

Figure 2. Ackley Function

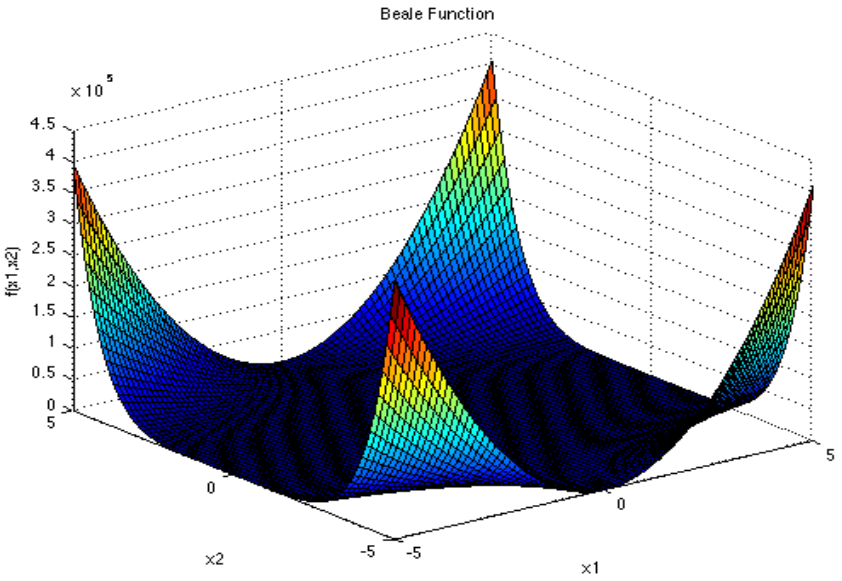

Figure 3. Beale Function

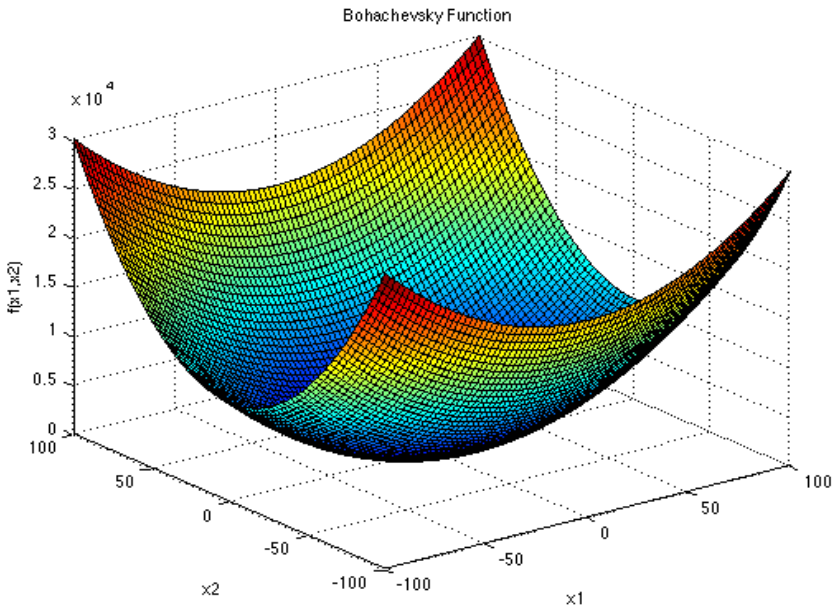

Figure 4. Bohachevsky Function

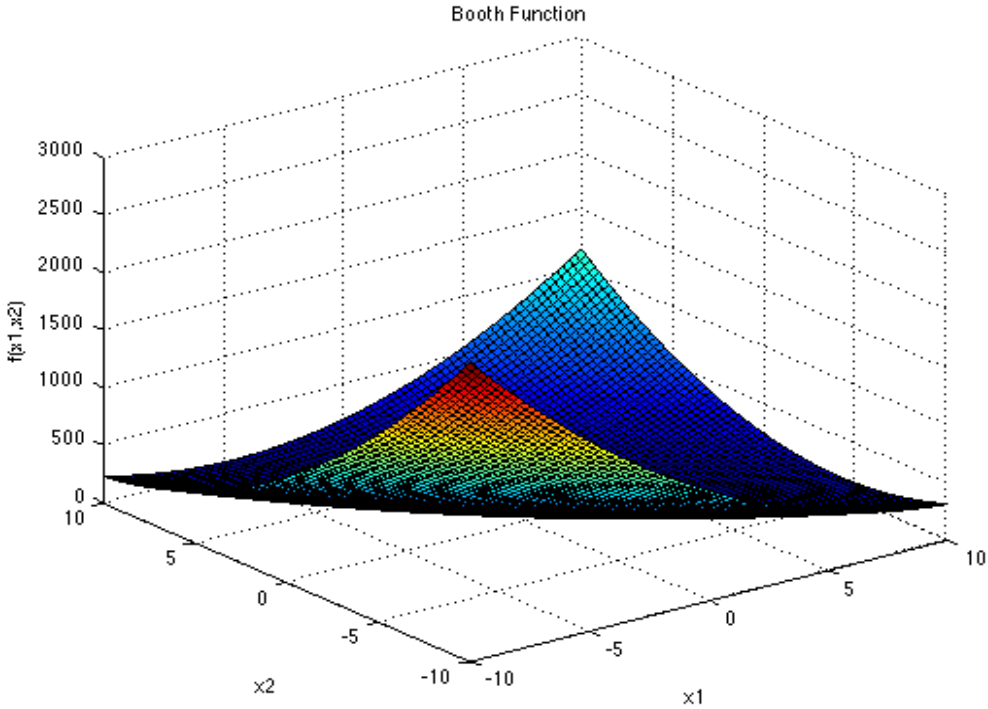

Figure 5. Booth Function

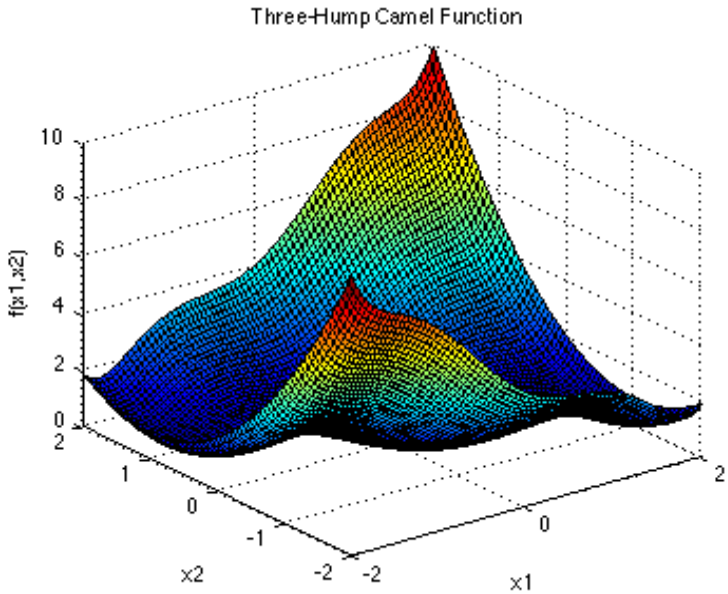

Figure 6. Three-Hump Camel Function

Table 1 shows the results obtained. Green represents performed well. Red represents not performed well. Blue represents performed between well and not well. From Table 1, we can see that all cells are green in color which means the PSO algorithm and developed ASA performed well on all benchmark functions.

Table 1. Obtained Result

Benchmark Function / Algorithm	Artificial Satisfaction Algorithm (ASA)	PSO Algorithm
Ackley Function		
Beale Function		
Bohachevsky Function		
Booth Function		
Three-Hump Camel Function		

7. Conclusions

A new field titled "Artificial Satisfaction" is defined and introduced in this article. The World's First algorithm under the Artificial Satisfaction field is designed and developed in this article. Results show that proposed ASA and PSO algorithms performed well on all benchmark functions. There is a difference between three recently introduced new research fields titled "Artificial Human Optimization (AHO)" (Gajawada, S., 2016), "Artificial Soul Optimization (ASO)"(Gajawada, S., & Hassan Mustafa., 2019b), "Artificial God Optimization (AGO)"(Gajawada, S., & Hassan Mustafa, 2020) and "Artificial Satisfaction". AHO, ASO, and AGO are three new fields under Artificial Intelligence. But the "Artificial Satisfaction" field is a separate field like "Artificial Intelligence" and not a sub-field of Artificial Intelligence. There are billions and trillions of opportunities under the Artificial Satisfaction field. The FUTURE will be very bright for Artificial Satisfaction Field Research Scientists and Students.

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Thanks to everyone (and everything) who directly or indirectly helped us to reach the stage where we are now today.

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Field 11

The Interesting and Complete Artificial Intelligence (ICAI)

The Interesting and Complete Artificial Intelligence (ICAI) – Version 1

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Abstract: A new field titled "The Interesting and Complete Artificial Intelligence (ICAI)" is invented in this work. In this article, we define this new ICAI field. Four new ICAI algorithms are designed in this work. This paper titled "The Interesting and Complete Artificial Intelligence (ICAI) – Version 1" is just the starting point of this new field. We request Research Scientists across the globe to work in this new direction of Artificial Intelligence and publish their work with titles such as "The Interesting and Complete Artificial Intelligence (ICAI) – Version 1.1", "The Interesting and Complete Artificial Intelligence (ICAI) – Version 2" or "The Interesting and Complete Artificial Intelligence (ICAI) – Final Version".

Keywords: Interesting, Complete, Interesting and Complete Artificial Intelligence, Artificial Intelligence, AI, ICAI

Section A. DEFINITION OF THE INTERESTING AND COMPLETE ARTIFICIAL INTELLIGENCE FIELD

In this work we took inspiration from "Friendship", "Brotherhood", "Mother and Son" and "Husband and Wife" and designed four new algorithms. The goal of this project is that the concepts like "Friendship", "Brotherhood", "Mother and Son" and "Husband and Wife" would make the current Artificial Intelligence Interesting and Complete. Hence we have defined this new field with title "The Interesting and Complete Artificial Intelligence (ICAI)" as below:

All the Artificial Intelligence Algorithms (AI Algorithms) which are inspired from "Friendship", "Brotherhood", "Mother and Son" and "Husband and Wife" will become part of new field titled "The Interesting and Complete Artificial Intelligence (ICAI)".

Section B. LITERATURE REVIEW

There are no "The Interesting and Complete Artificial Intelligence (ICAI)" field algorithms designed in literature till date. The World's First ICAI algorithm is designed in this project. For the sake of completeness, we are showing Artificial Intelligence Literature [1] to [25] from previous article of Satish Gajawada et al titled "Ten Artificial Human Optimization Algorithms" published at "Transactions on Machine Learning and Artificial Intelligence, United Kingdom".

Section C. ARTIFICIAL FRIENDSHIP ALGORITHM

Artificial Friendship Algorithm is based on two friends "Friend One" and "Friend Two". Based on random number generated in line number 6 and FriendOneProbabaility the person is identified as Friend One or Friend Two. Friend One is strong and hence always updates position and velocity irrespective of anything. Friend Two is weak. Based on random number generated and HelpOfFriendOneProbability in line number 10 the Friend Two either receives help from Friend One

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or not. Friend Two moves in search space and updates position and velocity when he receives help from Friend One. Friend Two without help from Friend One is halted and does nothing. Figure 1 shows Artificial Friendship Algorithm.

```
1) All Artificial Friend Ones and Artificial Friend Twos are initialized
2) Iterations count is set to zero
3) Identify local best of all Artificial Friend Ones and Artificial Friend Twos
4) Identify global best of all Artificial Friend Ones and Artificial Friend Twos
5)      for each particle i do
6)              if ( generate_random_number (0,1) < FriendOneProbability ) then // Friend One
7)                      Update Velocity of Artificial Friend One
8)                      Update Position of Artificial Friend One
9)              else // Friend Two
10)                     if ( random(0,1) < HelpOfFriendOneProbability) then // Friend Two with Help
11)                             Update Velocity of Friend Two
12)                             Update Position of Friend Two
13)                     else // Friend Two without help does nothing
14)
15)                     end if
16)             end if
17)     end for
18)     generations (iterations) = generations (iterations) + 1
19) while ( termination_condition not reached is true)
```

Figure 1. Artificial Friendship Algorithm

Section D. ARTIFICIAL BROTHERHOOD ALGORITHM

Artificial Brotherhood Algorithm is based on two brothers “Brother One” and “Brother Two”. Based on random number generated in line number 6 and BrotherOneProbabaility the person is identified as Brother One or Brother Two. Brother One is strong and hence always updates position and velocity irrespective of anything. Brother Two is weak. Based on random number generated and HelpOfBrotherOneProbability in line number 10 the Brother Two either receives help from Brother

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One or not. Brother Two moves in search space and updates position and velocity when he receives help from Brother One. Brother Two without help from Brother One is halted and does nothing. Figure 2 shows Artificial Brotherhood Algorithm.

```
1) All Artificial Brother Ones and Artificial Brother Twos are initialized
2) Iterations count is set to zero
3) Identify local best of all Artificial Brother Ones and Artificial Brother Twos
4) Identify global best of all Artificial Brother Ones and Artificial Brother Twos
5)      for each particle i do
6)              if ( generate_random_number (0,1) < BrotherOneProbability ) then // Brother One
7)                      Update Velocity of Artificial Brother One
8)                      Update Position of Artificial Brother One
9)              else // Brother Two
10)                     if ( random(0,1) < HelpOfBrotherOneProbability) then // Brother Two with Help
11)                             Update Velocity of Brother Two
12)                             Update Position of Brother Two
13)                     else // Brother Two without help does nothing
14)
15)                     end if
16)             end if
17)     end for
18)     generations (iterations) = generations (iterations) + 1
19) while ( termination_condition not reached is true)
```

Figure 2. Artificial Brotherhood Algorithm

Section E. ARTIFICIAL MOTHER AND SON ALGORITHM

Artificial Mother and Son Algorithm is based on “Mother” and “Son”. Based on random number generated in line number 6 and MotherProbability the person is identified as Mother or Son. Mother is strong and hence always updates position and velocity irrespective of anything. Son is weak. Based on random number generated and HelpOfMotherProbability in line number 10 the Son either receives help from Mother or not. Son moves in search space and updates position and velocity

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when he receives help from Mother. Son without help from Mother is halted and does nothing. Figure 3 shows Artificial Mother and Son Algorithm.

```
1) All Artificial Mothers and Artificial Sons are initialized
2) Iterations count is set to zero
3) Identify local best of all Artificial Mothers and Artificial Sons
4) Identify global best of all Artificial Mothers and Artificial Sons
5)      for each particle i do
6)              if ( generate_random_number (0,1) < MotherProbability ) then // Mother
7)                      Update Velocity of Artificial Mother
8)                      Update Position of Artificial Mother
9)              else // Son
10)                     if ( random(0,1) < HelpOfMotherProbability) then // Son with Help
11)                             Update Velocity of Son
12)                             Update Position of Son
13)                     else // Son without help does nothing
14)
15)                     end if
16)             end if
17)     end for
18)     generations (iterations) = generations (iterations) + 1
19) while ( termination_condition not reached is true)
```

Figure 3. Artificial Mother and Son Algorithm

Section F. ARTIFICIAL HUSBAND AND WIFE ALGORITHM

Artificial Husband and Wife Algorithm is based on “Wife” and “Husband”. Based on random number generated in line number 6 and WifeProbabaility the person is identified as Husband or Wife. Wife is strong and hence always updates position and velocity irrespective of anything. Husband is weak. Based on random number generated and HelpOfWifeProbability in line number 10 the Husband either receives help from Wife or not. Husband moves in search space and updates position and

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velocity when he receives help from Wife. Husband without help from Wife is halted and does nothing. Figure 4 shows Artificial Husband and Wife Algorithm.

```
1) All Artificial Wifes and Artificial Husbands are initialized
2) Iterations count is set to zero
3) Identify local best of all Artificial Wifes and Artificial Husbands
4) Identify global best of all Artificial Wifes and Artificial Husbands
5)      for each particle i do
6)              if ( generate_random_number (0,1) < WifeProbability ) then // Wife
7)                      Update Velocity of Artificial Wife
8)                      Update Position of Artificial Wife
9)              else // Husband
10)                     if ( random(0,1) < HelpOfWifeProbability) then // Husband with Help
11)                             Update Velocity of Husband
12)                             Update Position of Husband
13)                     else // Husband without help does nothing
14)
15)                     end if
16)             end if
17)     end for
18)     generations (iterations) = generations (iterations) + 1
19) while ( termination_condition not reached is true)
```

Figure 4. Artificial Husband and Wife Algorithm

Section G. CONCLUSIONS

A Revolutionary direction in Artificial Intelligence Research Industry History is opened in this work with title “The Interesting and Complete Artificial Intelligence (ICAI)”. Four new algorithms under the new ICAI field titled “Artificial Friendship Algorithm”, “Artificial Brotherhood Algorithm”, “Artificial Mother and Son Algorithm” and “Artificial Husband and Wife Algorithm” are designed in this work. As mentioned in abstract of this work, it is appreciated to work in this direction and publish your

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work with titles like “The Interesting and Complete Artificial Intelligence (ICAI) – Version 1.1” and so on.

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Field 12

Lord Rama Artificial Intelligence (LRAI)

Lord Rama Artificial Intelligence

Satish Gajawada

IIT Roorkee Alumnus

And

Lord Rama

GOD

Abstract: This book is authored under the guidance of Lord Rama (GOD). This book "Lord Rama Artificial Intelligence" is a collection of five different chapters. First chapter shows "Lord Rama Devotees Algorithm" which comes under Devotees-Inspired Metaheuristic Optimization Algorithms. Chapter 2 defines a new Artificial Intelligence field titled "Out of the Box Artificial Intelligence". Chapter 3 and Chapter 4 describes two new Artificial Intelligence fields "The Interesting and Complete Artificial Intelligence" and "Artificial Intelligence Plus Plus" respectively. Ten Human-Inspired Metaheuristic Optimization Algorithms are shown in the last chapter of this book. Lord Rama Devotees Algorithm, Artificial Cartoon Popeye Algorithm, Artificial Cartoon Chhota Bheem Algorithm, Artificial Cartoon Jerry Algorithm, Artificial Cartoon Happy Kid Algorithm, Artificial Friendship Algorithm, Artificial Brotherhood Algorithm, Artificial Mother and Son Algorithm, Artificial Husband and Wife Algorithm, Human Bhagavad Gita Particle Swarm Optimization (HBGPSO), Human Poverty Particle Swarm Optimization (HPPSO), Human Dedication Particle Swarm Optimization (HuDePSO), Human Selection Particle Swarm Optimization (HuSePSO), Human Safety Particle Swarm Optimization (HuSaPSO), Human Kindness Particle Swarm Optimization (HKPSO), Human Relaxation Particle Swarm Optimization (HRPSO), Multiple Strategy Human Particle Swarm Optimization (MSHPSO), Human Thinking Particle Swarm Optimization (HTPSO), Human Disease Particle Swarm Optimization (HDPSO) are Hybrid PSO algorithms that are shown in this book. For the sake of simplicity, PSO algorithm is modified in this book to create several new Hybrid algorithms. An ideal method is to create all algorithms from scratch rather than modifying PSO algorithm.

Field 13

Data Science Plus Plus (DS++)

Data Science Plus Plus (DS++): The Definition

Satish Gajawada
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Abstract: Data Science and Artificial Intelligence are popular fields of research. A significant contribution was made to Artificial Intelligence in the recent past by defining branches like "Artificial Intelligence Plus Plus (AI++)", "The Interesting and Complete Artificial Intelligence (ICAI)", "Out of the Box Artificial Intelligence (OBAI)", "Twenty Second Century Artificial Intelligence (TSCAI)". A similar significant contribution can be made to Data Science by defining branches like "Data Science Plus Plus (DS++)", "The Interesting and Complete Data Science (ICDS)", "Out of the Box Data Science (OBDS)", "Twenty Second Century Data Science (TSCDS)". This article is based on these research gaps. The primary focus of this work is to coin, define and invent a new Data Science field titled "Data Science Plus Plus (DS++)".

Keywords: Data Science, DS, Data Science Plus Plus, DS++

1 Introduction

Articles [1] to [10] show the contribution of scientists and researchers to the field of Data Science. Recently "Artificial Intelligence Plus Plus (AI++)" was defined in literature. However, there is nothing like this in the field of Data Science. Hence in this article, the focus is to define a new area of research titled "Data Science Plus Plus (DS++)". Section two defines Data Science Plus Plus (DS++) field. Conclusions are made in Section 3.

2 Definition of Data Science Plus Plus (DS++) Field

1) Definition of Super Data Science (SDS): All the Data Science algorithms which are designed by taking inspiration from Mothers, Fathers and other family members will belong to new field titled Super Data Science (SDS).

2) Definition of Outstanding Data Science (ODS): All the Data Science algorithms which are designed by taking inspiration from Friends, Teachers and Scientists will belong to new field titled Outstanding Data Science (ODS).

3) Definition of Data Science Plus Plus (DS++): Just like C++ programming language is the superset of C programming language. Similarly, Data Science Plus Plus (DS++) is the superset of Data Science(DS). DS++ contains Super Data Science (SDS) and Outstanding Data Science (ODS) in addition to Data Science. The new fields Super Data Science (SDS) and Outstanding Data Science (ODS) belong only to DS++ and not DS. Hence all Data Science algorithms belong to new field DS++. DS++ contains SDS and ODS in addition to Data Science.

3 Conclusions

A new field titled “Data Science Plus Plus (DS++)” is coined, invented and defined in this work by taking inspiration from recent progress in Artificial Intelligence field titled “Artificial Intelligence Plus Plus (AI++)”. The main point to be noted from this article is that there is something beyond Data Science and one part of that something is Data Science Plus Plus (DS++) which is defined in this article.

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Field 14

Stories Inspired Optimization Algorithms (SIOA)

Stories Inspired Optimization Algorithms - The Breakthrough in Artificial Intelligence

Satish Gajawada, IIT Roorkee Alumnus

The primary purpose of writing this letter is to invent and define a new area called "Stories Inspired Optimization Algorithms (SIOA)".

Recently in [1] - [7], optimization algorithms were created by taking inspiration from Mothers, Children, Satisfied beings, Humans, Souls, Gods and Particular Humans. In this letter, a new path is defined where Optimization Algorithms are created by taking Inspiration from Stories.

Definition of "Stories Inspired Optimization Algorithms (SIOA)": All the Optimization Algorithms which are created by taking Inspiration from Stories will come under "Stories Inspired Optimization Algorithms (SIOA)".

Example Story: There are people in a city who can fly. On every festival they used to imitate birds for searching food.

Example Algorithm: One can take Inspiration from above example Story and design "Festival People Flying Algorithm (FPFA)". The search space consists of Artificial humans who can fly. As Artificial flying humans are imitating birds, the FPFA Algorithm is mathematically equivalent to Particle Swarm Optimization Algorithm (PSO Algorithm).

Conclusions: A new field titled "Stories Inspired Optimization Algorithms (SIOA)" is invented and defined in this letter. An example Story and a sample "Festival People Flying Algorithm (FPFA)" are shown in this letter. The advantage of "SIOA" field is that the Inspiration from which one can create Optimization Algorithms need not be real. If we believe one can get more accurate results by making Artificial humans fly then we can create a story where Humans can fly and we can take Inspiration from that story. In this letter it is not said that "SIOA" Algorithms perform better than other existing Optimization Algorithms.

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