

Letter No. 4 - ISVHAAI AI Society Letters

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ABSTRACT

The purpose of International Society for Very highly Advanced Artificial Intelligence (ISVHAAI) is to solve the problems with Very Highly Advanced Artificial Intelligence (VHAAI). This is the Letter No. 4 of ISVHAAI AI Society Letters and in this letter a new algorithm titled Love Particle Swarm Optimization (LovePSO) has been designed.

Keywords: AI; VHAAI; ISVHAAI; Particle swarm optimization; PSO; Love; LovePSO

Introduction

Particle Swarm Optimization (PSO) algorithm is effective and widely used optimization algorithm as shown in articles¹⁻¹⁸. A unique and novel algorithm titled Love Particle Swarm Optimization (LovePSO) is designed in this article. Section 2 and Section 3 shows PSO and LovePSO respectively. Conclusions and References are shown at the end.

Particle Swarm Optimization

Line no. 1 shows Velocity update equation. This has three components. In first component, Velocity is multiplied by inertia weight. In second component particle moves towards local best and in third component particle moves towards global best. Velocity is added to position to obtain new position in line no. 2.

Procedure: Particle Swarm Optimization (PSO)

- $V = W*V + c1*r1*(l_{pb}-pos) + c2*r2*(g_{lb}-pos)$
- $pos = pos + V$

Love Particle Swarm Optimization

In line no. 1 Love_Matrix is initialized. Love_Matrix[i][j]

represents Love value between particle i and particle j. Love_Matrix[i][i] represents Self-Love value of particle i. In line no. 2, Local_Direction which is the direction of particle towards local best is obtained. The Local_Direction is divided by the Magnitude of Local_Direction in line no.3. This gives a unit vector of magnitude 1. Hence Local_Direction gives the direction of particle towards local best and has magnitude 1. In line no. 4 Global_Direction is obtained. Global_Direction is divided by its Magnitude in line no. 5. Hence Global_Direction gives the direction of particle towards global best and has magnitude 1. Line no. 6 shows Velocity update equation. This Velocity update equation has three components. In the first component, Velocity is multiplied by inertia weight just like normal PSO algorithm. The second component is Local_Direction component. In this component, the particle moves along Local_Direction and magnitude of this movement is Self-Love value multiplied by Step value. The particle moves along the Global_Direction in third component. The magnitude of this movement is Love value between particle and global best particle multiplied by Step value. In line no. 7, Velocity is added to position to obtain new position.

Procedure: Love Particle Swarm Optimization (LovePSO)

- Initialize Love_Matrix
- Local_Direction = (lpb-pos)
- Local_Direction=[Local_Direction / Magnitude (Local_Direction)]
- Global_Direction = (glb - pos)
- Global_Direction=[Global_Direction / Magnitude(Global_Direction)]
- 6)Velocity=W*Velocity+Local_Direction*Love_Matrix[i][i]*Step+Global_Direction*Love_Matrix[i][gbest]*Step
- pos = pos + Velocity

Conclusions

The unique algorithm titled “Love Particle Swarm Optimization (LovePSO)” has been designed in this Letter No. 4 of ISVHAAI Artificial Intelligence Society Letters. The purpose of this letter is to incorporate the concept of Love into PSO algorithm.

References

1. Kennedy J, Eberhart R. Particle swarm optimization. Proceedings of ICNN'95 - Int Conf on Neural Networks 1995;4:1942-1948.
2. Xu HQ, Gu S, Fan YC, et al. A strategy learning framework for particle swarm optimization algorithm. Information Sci 2023;619:126-152.
3. Varna FT, Husbands P. Two New Bio-Inspired Particle Swarm Optimisation Algorithms for Single-Objective Continuous Variable Problems Based on Eavesdropping and Altruistic Animal Behaviours. Biomimetics 2024;9(9):538.
4. Li W, Jing J, Chen Y, Chen Y. A cooperative particle swarm optimization with difference learning. Information Sci 2023;643:119238.
5. Shami TM, Mirjalili S, Al-Eryani Y, et al. Velocity pausing particle swarm optimization: a novel variant for global optimization. Neural Comput, Applic 2023;35:9193-9223.
6. Freitas D, Lopes LG, Morgado-Dias F. Particle Swarm Optimisation: A Historical Review Up to the Current Developments. Entropy 2020;22(3):362.
7. Shao J, Lu Y, Sun Y, et al. An improved multi-objective particle swarm optimization algorithm for the design of foundation pit of rail transit upper cover project. Sci Rep 2025;15:10403.
8. Shaikh MS, Lin H, Xie S, et al. An intelligent hybrid grey wolf-particle swarm optimizer for optimization in complex engineering design problem. Sci Rep 2025;15:18313.
9. Singh A, Thajudeen T. A Hybrid Particle Swarm Optimization-Tuning Algorithm for the Prediction of Nanoparticle Morphology from Microscopic Images. Aerosol Air Qual Res 2023;23:220453.
10. Yudong Z, Shuihua W, Genlin J. A Comprehensive Survey on Particle Swarm Optimization Algorithm and Its Applications. Mathematical Problems Eng 2015;931256:38.
11. Zhang H, Wang JY. Particle Swarm Optimization for Construction Site Unequal-Area Layout. J Construction Eng Manag 2008;134(9):739-748.
12. Mahdavi-Meymand A, Sulisz W. Development of particle swarm clustered optimization method for applications in applied sciences. Prog Earth Planet Sci 2023;10:17.
13. Zhang S. Innovative application of particle swarm algorithm in the improvement of digital enterprise management efficiency, Systems and Soft Computing 2024;6:200151.
14. Qin Z, Pan D. Improved Dual-Center Particle Swarm Optimization Algorithm. Mathematics 2024;12(11):1698.
15. Huang C. Particle swarm optimization in image processing of power flow learning distribution. Discov Internet Things 2021;1:12.
16. Kazerani R. Improving Breast Cancer Diagnosis Accuracy by Particle Swarm Optimization Feature Selection. Int J Comput Intell Syst 2024;17:44.
17. Jiang S, Deng W, Wang Z, et al. Ka-Band metalens antenna empowered by physics-assisted particle swarm optimization (PA-PSO) algorithm. Opto-Electronic Sci 2024;3(10):240014.
18. Yan J, Hu G, Jia H, et al. GPSOM: group-based particle swarm optimization with multiple strategies for engineering applications. J Big Data 2025;12:114.