MDPI

Article

EOFA: an extended version of the optimal foraging algorithm for global optimization problems

Glykeria Kyrou[1], Vasileios Charilogis[2] and Ioannis G. Tsoulos[3,*]

[1] Department of Informatics and Telecommunications, University of Ioannina, 47150 Kostaki Artas, Greece; g.kyrou@uoi.gr
[2] Department of Informatics and Telecommunications, University of Ioannina, 47150 Kostaki Artas, Greece; v.charilog@uoi.gr
[3] Department of Informatics and Telecommunications, University of Ioannina, 47150 Kostaki Artas, Greece;itsoulos@uoi.gr
* Correspondence: itsoulos@uoi.gr

Abstract: The problem of finding the global minimum of a function is applicable to a multitude of real-world problems, and for this reason a variety of computational techniques have been developed to efficiently locate it. Among these techniques, evolutionary techniques play a central role, which seek, through the imitation of natural processes, to efficiently obtain the global minimum of multidimensional functions. An evolutionary technique that has recently been introduced is the optimal foraging algorithm, which is a swarm - based algorithm, and it is notable for its reliability in locating the global minimum. In this work, a series of modifications are proposed that aim to improve the reliability and speed of the above technique, such as a termination technique based on stochastic observations, an innovative sampling method and a technique to improve the generation of offspring. The new method was tested on a series of problems from the relevant literature and a comparative study was made against other global optimization techniques with promising results.

Keywords: Global optimization; Stochastic techniques; Evolutionary methods; Swarm based methods

Citation: Kyrou, G.; Charilogis, V.; Tsoulos, I.G. EOFA: an extended version of the optimal foraging algorithm for global optimization problems. *Journal Not Specified* **2024**, *1*, 0. https://doi.org/

Received:
Revised:
Accepted:
Published:

Author Contributions: G.K., V.C. and I.G.T. conceived of the idea and the methodology, and G.K. and V.C. implemented the corresponding software. G.K. conducted the experiments, employing objective functions as test cases, and provided the comparative experiments. I.G.T. performed the necessary statistical tests. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Acknowledgments: This research has been financed by the European Union: Next Generation EU through the Program Greece 2.0 National Recovery and Resilience Plan, under the call RESEARCH–CREATE–INNOVATE, project name “iCREW: Intelligent small craft simulator for advanced crew training using Virtual Reality techniques” (project code: TAEDK-06195).

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Author 1,