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VŠB-TECHNICAL UNIVERSITY OF OSTRAVA

Faculty of Electrical Engineering and Computer Science

Ostrava, Czech Republic, June 15, 2023

Habilitation thesis report

Author. Martin Pilat, Ph.D. Charles University**Thesis name:** Evolutionary Algorithms for Expensive Optimization**Reviewer:** prof. Ing. Ivan Zelinka, Ph.D. Prof. Ivan Zelinka, Ph.D., University of Technical University of Ostrava

Relevance of the topic, content and structure of the thesis

The habilitation thesis explores the utilisation of advanced evolutionary methods in expensive optimization topics. Comprising a total of 154 pages, the thesis consists of ten chapters, including an introductory text that sets the context and outlines the areas where the habitant presents its findings. These findings incorporate both the habitant's own contributions as well as previously published works. Additionally, the thesis includes relevant publication activities in the appendices. The described procedures and methodologies are well-supported not only by a satisfactory publication record but also by the habitant's extensive experience in the field.

Regarding its relevance, the thesis addresses a highly topical subject that exhibits potential practical applications. It emphasizes the necessity for novel, unconventional approaches not only in theory but also in practical applications. This work represents a significant advancement in this direction. Considering the habitant's publication activities, their original contribution to the given problem stands out.

Style

The level of processing can be examined from two perspectives: graphic processing and formal processing. In both aspects, the work is impeccable without any significant shortcomings. From a graphic standpoint, the work reaches an excellent standard with high-quality images and precise

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laser printing. In terms of formality, the work is highly commendable as it fulfills all the necessary requirements expected of a scientific paper.

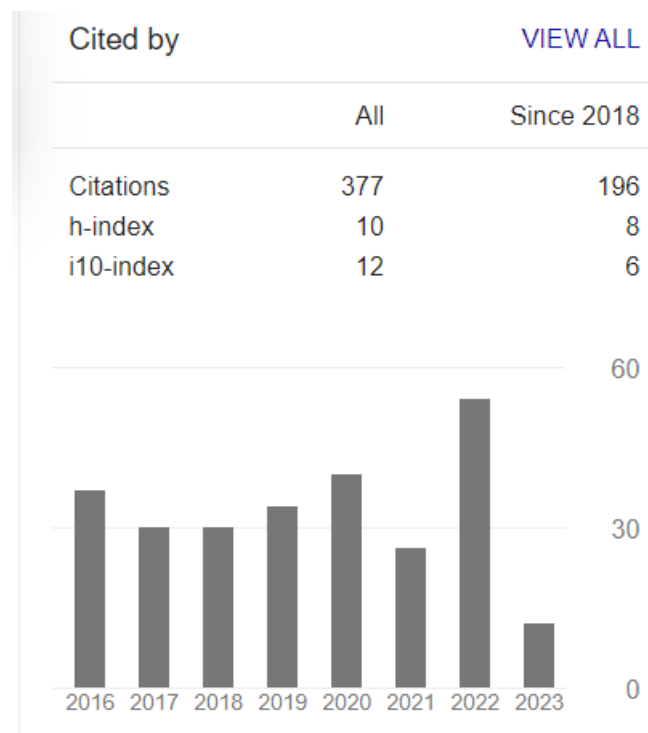
Selected methods and algorithms

The techniques and procedures employed and elucidated in the thesis align with contemporary trends prevailing in the field. These methods have been extensively documented through the presentation of their results at conferences and publications in reputable scientific journals, either by the habilitant or other researchers. This robust publication track record entirely justifies their utilization.

Therefore, adopting these selected methods can be deemed entirely warranted and satisfactory for the aims and objectives of the habilitation thesis.

The results of the habilitation thesis, the new knowledge it brings and the response

The thesis exemplifies combination of theoretical exploration and practical implementations, leading to a substantial positive contribution made by the habilitant. This contribution extends not only within the Czech Republic but also seems to start resonates on an international scale. The evidence supporting this assertion is readily apparent through the information accessible in prominent databases such as WOS, Scopus, and Google Scholar.

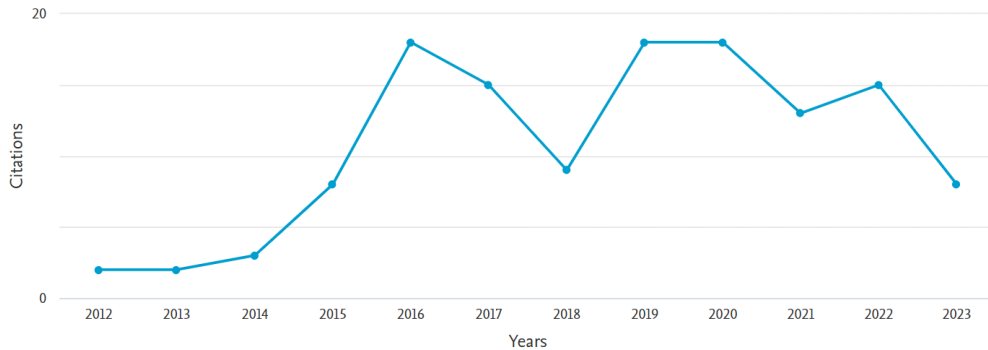


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Publications

41

Total

From 2010 to 2023

Citing Articles [i](#)

102 [Analyze](#)

Total

81 [Analyze](#)

Without self-citations

Times Cited [i](#)

126

Total

98

Without self-citations

3.07

Average per item

6

H-Index

WOS

Analyzing the results, it is evident that the habilitant's publishing activities exhibit a progressive trend, indicating a growing body of scholarly work. The ratio between the H index and citations,

including an assessment of self-citations and the impact of "publications behind it," is deemed acceptable and unequivocally signifies the habilitant's encouraging research advancement. Nevertheless, it is worth noting that an increased number of journal publications would be even more advantageous, enhancing the overall evaluation of the habilitant's achievements.

Originality and uniqueness

The plagiarism check conducted using the Turnitin system did not detect any instances of scientific error associated with copying, affirming the originality of the work.

Comments and questions

The work encompasses a compilation of previously published publications that have undergone scrutiny and review within the professional community. Consequently, there have been no comments regarding these publications. My focus has been primarily on the formal aspects and technical aspects of the subject matter. In this regard, I have a few comments and questions:

1. The title of "associate professor" carries a pedagogical component, meaning that the habilitant must demonstrate their proficiency in educational activities. I would appreciate clarification on the extent, nature, and duration of the habilitant's teaching experience in relation to the topics covered in the habilitation thesis. Additionally, has the habilitant been involved in the guidance and instruction of doctoral students?
2. What are the main advantages of the parallel evolutionary algorithm with interleaving generations, compared to the traditional generational evolutionary algorithm? Regarding computational resource utilization and avoidance of evaluation time bias in asynchronous evolutionary algorithms?
3. How does the utilization of surrogate models in different methods of symbolic regression, not only of genetic programming, affect the exploration, convergence, and efficiency of the algorithm by reducing the number of fitness evaluations required?
4. How effectively can these surrogate models predict the fitness of new individuals without the need for actual evaluations based on a set of extracted features from each tree?
5. Is there any sensitivity of those models regarding to extracted features?
6. There are different methods of symbolic regression. Have you ever tried them instead of GP?

However, it is essential to note that these inquiries do not diminish the quality of the habilitant's work.

Conclusion of the opinion

The habilitant's thesis showcases a comprehensive exploration of advanced techniques in the in expensive optimization topics. Together with their colleagues, they have achieved numerous publications that directly relate to the topics addressed in the habilitation thesis. These publications provide robust support for the results and assertions presented within the thesis. Although I lack specific information to assess the habilitant's teaching activities, based on my own experience and knowledge of their endeavors, I firmly believe that their teaching contributions are abundantly substantial.

Moreover, the habilitant's professional competence has been verified through a thorough examination on WOS, affirming their satisfactory level for the habilitation process. The submitted habilitation thesis demonstrates the habilitant's ability for independent and innovative scientific work. Accordingly, it fulfils all the necessary criteria stipulated in Section 72 (5) of Act No. 111/1998 Coll. on Higher Education, making it highly recommended for the habilitation procedure.

prof. Ing. Ivan Zelinka, Ph.D.

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17 November 15

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