

Final report of the STSM at University of Malaga Under COST Action CA15140

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Purpose of the STSM

The collaboration with the host started in 2013 during his lecturing visit at Vilnius University. Our collaboration is focused on the development of strategies for random search optimization algorithms. The first results were published in 2015 in *Informatica*.

The STSM aims to keep in touch with the host research group, discuss results obtained in separate research work since our last meeting and to plan further joint research work. The STSM was organized as follows:

- Presentation the results obtained in separate research work on development of strategies for benchmarking random search optimization algorithms.
- Discussion about ideas for improvement of the strategy developed in our previous collaboration.
- Design of an improved strategy, which gives more information about the performance of the algorithms under investigation.
- Realization and experimental investigation of the proposed strategy by investigating well-known random search algorithms.
- Discussion about results obtained during the STSM and plan tasks for further joint research work.

Description of the work carried out during the STSM

Several working sessions with the researchers from the host institution have been organized to exchange and discuss research results obtained in separate work and to plan further research tasks. The sessions have been focused on analysis of the existing research results, designing the new strategy for benchmarking random search optimization algorithms, its theoretical justification, and experimental investigation. The plan for further collaboration has been also discussed.

Description of the main results obtained

The new strategy to compare the performance of random search optimization algorithms has been designed and experimentally applied to several well-known heuristic algorithms. The

proposed strategy is based on the previously developed strategy, where the Cumulative Distribution Function of the best function value found is compared among several algorithms in order to find a better algorithm. The extended version of the strategy includes Pareto optimality considering the trade-off between the accuracy of the approximation of the optimal solution and probability to achieve this accuracy.

The numerical value, which indicates how a given algorithm dominates another algorithm under investigation, has been also proposed.

Future collaboration with the host institution

The collaboration with the host institution will be continued on further development and investigation of the benchmarking strategy and development of an application for the end-user, which, besides the proposed metric also includes standard quality metrics used to measure the performance of random search optimization algorithms. It is expected to organize further meetings and work sessions with the researchers from the University of Malaga in order to discuss the results and stimulate collaboration.

Foreseen publications/articles resulting from the STSM

It is expected that further collaboration will issue relevant results which will be presented in scientific conferences and will be published in a scientific publication.