

## Instructions and License

This is version 1.0 of the MATLAB code of AMLP-RS-CMSA-ESII which is customized for participation in the CEC 2022 *Competition on Seeking Multiple Optima in Dynamic Environments* [1]. The main components of the algorithm are the adaptive multilevel prediction (AMNLP) method [2] and the improved variant of covariance matrix self-adaption evolution strategy with repelling subpopulations (RS-CMSA-ESII) [3].

This code has been verified with MATLAB R2020a. The code is provided as is. Please contact Ali Ahrari ([aliahrary1983@gmail.com](mailto:aliahrary1983@gmail.com)) for queries.

- The file `main.m` provides a simple example for performing dynamic multimodal optimization of test problems in [1] for a defined problem ID and random seed number. When the run finishes, the results are stored in a `.mat` file. The reported solutions for each time step are stored in `process.dynamics.endArchive`
- For measuring the performance, run the file `postprocess_result.m`. It calculates (Mean) Peak Ratio for different tolerances on the objective function.

The files in the folder `dmmops` have been provided by the competition organizers [1] and are included with permission to facilitate reproducing the reported results. This code, except for the files in `dmmops` folder, is provided by Ali Ahrari ([aliahrary1983@gmail.com](mailto:aliahrary1983@gmail.com)) under the CC BY-NC-SA license. The code can be used for non-commercial research and academic research (including funded academic research) as long as the use of this code is acknowledged and the publications introducing the main components of this code [2,3] are properly cited.

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The folder `dmmops` and the files in it are not a part of this license.

## References

- [1] CEC 2022 Competition on Seeking Multiple Optima in Dynamic Environments  
[http://mi.hitsz.edu.cn/activities/smode\\_cec2022/index.html](http://mi.hitsz.edu.cn/activities/smode_cec2022/index.html)
- [2] Ahrari, A., Elsayed, S., Sarker, R., Essam, D., & Coello, C. A. C. (2021). Adaptive multilevel prediction method for dynamic multimodal optimization. *IEEE Transactions on Evolutionary Computation*, 25(3), 463-477.
- [3] Ahrari, A., Elsayed, S., Sarker, R., Essam, D., & Coello, C. A. C. (2021). Static and Dynamic Multimodal Optimization by Improved Covariance Matrix Self-Adaptation Evolution Strategy with Repelling Subpopulations. *IEEE Transactions on Evolutionary Computation*, DOI: 10.1109/TEVC.2021.3117116