**On the effect of dynamic reference point mechanism in hypervolume-based EMOAs**

extension of project 4

In this project, you need to investigate the effect of the dynamic reference point mechanism in hypervolume-based EMOAs.

**Examined hypervolume-based EMOAs**: SMS-EMOA[1], FV-MOEA[2] and HypE[3]. (In project 4, only SMS-EMOA is considered)

**Examined dynamic referece point mechanism**: The one proposed in [4], the one proposed by yourself (you can try to propose more than one mechanism).

**Instructions**:

1. Compare the hypervolume-based EMOAs with dynamic reference point mechanism and the hypervolume-based EMOAs without dynamic reference point mechanism. For example, denote SMS-EMOA-DR as SMS-EMOA with dynamic mechanism and SMS-EMOA as the original algorithm, then you need to compare the performance of the two algorithms on many-objective optimization problems (MaOPs).
2. For MaOPs, 5,8,10 objectives are considered. You can choose DTLZ, WFG and their minus versions (Minus-DTLZ, Minus-WFG) for testing.
3. The performance metric is hypervolume.

**References:**

[1] N. Beume, B. Naujoks, and M. Emmerich, “SMS-EMOA: Multiobjec- tive selection based on dominated hypervolume,” European Journal of Operational Research, vol. 181, no. 3, pp. 1653–1669, 2007.

[2] S. Jiang, J. Zhang, Y.-S. Ong, A. N. Zhang, and P. S. Tan, “A simple and fast hypervolume indicator-based multiobjective evolutionary algorithm,” IEEE Transactions on Cybernetics, vol. 45, no. 10, pp. 2202– 2213, 2015.

[3] J. Bader and E. Zitzler, “HypE: An algorithm for fast hypervolume- based many-objective optimization,” Evolutionary computation, vol. 19, no. 1, pp. 45–76, 2011.

[4] H. Ishibuchi, R. Imada, N. Masuyama, and Y. Nojima, “Dynamic specification of a reference point for hypervolume calculation in sms- emoa,” in 2018 IEEE Congress on Evolutionary Computation (CEC). IEEE, 2018, pp. 1–8.