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- [1] Jin Wu, Shapour Azarm, "Metrics for Quality Assessment of a Multi-objective Design Optimization Solution Set", *Transactions of the ASME*, Vol. 123, 2001, pp. x-x.
- [2] Kalyanmoy Deb Kanpur Genetic Algorithms Laboratory, Indian Institute of Technology Kanpur, PIN 208 016, India ([deb@iitk.ac.in](mailto:deb@iitk.ac.in)), "Scalable Test Problems for Evolutionary Multi-Objective Optimization", TIK-Technical Report No. 112, July 17, 2001.
- [3] Dr. R. V Dharaskar, Dr. V. M. Thakare, Mrs.P.M.Chaudhari, G. H. Raisoni College of Engineering, Nagpur, India "Computing the Most Significant Solution from Pareto Front obtained in Multi-objective Evolutionary", (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 1, No. 4, 2010, pp. xx-xx.
- [4] Ran Cheng, Miqing Li, Ye Tian, Xingyi Zhang, Shengxiang Yang, Yao Chu Jin and Xin Yao, "A Benchmark Test Suite for Evolutionary Many Objective Optimization", *Complex Intelligent System*, Springer, 2017.
- [5] Kalyanmoy Deb, Amrit Pratap, Sameer Agrawal, T. Meyarivan, "A Fast and Elitist Multi-Objective Genetic Algorithms: NSGA-II", *IEEE Transactions on Evolutionary Computation*, Vol. 6, no. 2, 2002, pp. 182-197.
- [6] Eckart Zitzler, "Evolutionary Algorithms for Multi Objective Optimization: Methods and Applications", Ph.D. Dissertations, Swiss Federal Institute of Technology Zurich, 1999.
- [7] Margarita Reyes – Sierra and Carlos A. Coello Coello, "Multi Objective Particle Swarm Optimizers: A Survey of the State-of-the-Art", *International J. of Computational Intelligence Research*, Vol. 2, no. 3, 2006, pp. 287-308.
- [8] Miqing Li, Shengxiang Yang and Xiaohui Liu, "Diversity Comparison of Pareto Front Approximations in Many-Objective Optimization", *Engineering and Physical Sciences Research Council (EPSRC) of U.K, under Grant EP/K001310/1*.
- [9] Siewei Jiang, Yew-Soon Ong, Jie Zhang, Liang Feng, "Consistencies and Contradictions of Performance Metrics in Multi Objective Optimization", *IEEE Transactions on Cybernetics*, 2014, pp. 1-14.
- [10] Dan A. Iancu, Nikolaos Trichakis, "Pareto Efficiency in Robust Optimization", *Management Science*, Vol. 60, no. 1, 2014, pp. 130-147.
- [11] Test problems on Wikipedia web site, "[https://en.wikipedia.org/wiki/Test\\_functions\\_for\\_optimization](https://en.wikipedia.org/wiki/Test_functions_for_optimization)".
- [12] Castro Jr., Olacir Rodrigues, "BioInspired Optimization Algorithms for Multiobjective Problems", Ph.D. Thesis, Department of Exact Sciences of the Federal University of Parana, Brasil, 2017.
- [13] Nafiseh Naji, "A Review of the Metaheuristic Algorithms and their Capabilities (Particle Swarm Optimization, Firefly and Genetic Algorithms)", *International J. of Current Engineering & Technology*, Vol. 7, no. 3, 2017, pp. 921-925.
- [14] Bernd Bischl, Jakob Richter, Jakob Bossek, Daniel Horn, Janek Thomas, Michel Lang, "mlrMBO: A Modular Framework for Model Based Optimization of Expensive Black Box Functions", Preprint submitted to *Computational Statistics and Data Analysis*, 2017.
- [15] Ahmed M.E. Khalil, Seif Eddeen K. Fateen, Adrian Bonilla Petriciolet, "MAKHA – A New Hybrid Swarm Intelligence Global Optimization Algorithm", *Algorithms*, 2015, Vol. 8, pp. 336-365.
- [16] Zixing, Cai, Yong, Wang, "A Multi Objective Optimization Based Evolutionary Algorithm for Constrained Optimization", *IEEE Transactions on Evolutionary Computation*, Vol. 10, no. 6, 2006, pp. 658-675.
- [17] Tan, Liu, Xianwen, Gao, Qingyun, Yuan, "An Improved Gradient Based NSGA II Algorithm by a New Chaotic Map Model", *Soft Computing*, 2016, Springer.
- [18] Kalyanmoy Deb, "Multi-Objective Optimization using Evolutionary Algorithms", John Wiley & Sons, Inc. New York, NY, USA ©2001, ISBN: 047187339X.
- [19] Abdel Rahman, Mohamed H. Gadallah, Hesham A. Hegazi "Multi-objective Optimization Indices: A comparative analysis", *AJBAS (Australian Journal of Basic and Applied Sciences)*, Vol. 10(15), 2016, pp. 10-25.
- [20] Sh. Lotfi and F. Karimi, "A Hybrid MOEA/D-TS for solving multi-objective problems" Department of Computer Science, University of Tabriz, Tabriz, Iran.

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