Rise of Evolutionary Multi-Criterion Optimization

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Abstract: Most practical optimization tasks involve multiple conflicting criteria, leading to not one, but multiple, Pareto-optimal solutions. While these problems can be solved by scalarizing multiple criteria through a hyper-parameterization into a single criterion and using a point-based optimization algorithm, such a technique often faces a number of challenges, including the need for repeated application with a change of hyper-parameters. In this keynote lecture, we shall briefly introduce the principle of the growing field of evolutionary multi-criterion optimization (EMO) which attempts to find multiple trade-oE solutions in a single application. We will present a chronological account of the rise of the EMO field by highlighting the key algorithms and advancements, introduce key researchers, and discuss EMO's potential in future research and application domains.

Bio-sketch: Kalyanmoy Deb is University Distinguished Professor and Koenig Endowed Chair Professor at Department of Electrical and Computer Engineering in Michigan State University, USA. Prof. Deb's research interests are in evolutionary optimization and their application in multi-criterion optimization, modeling, and machine learning. He has been a visiting professor at various universities across the world including University of Skövde in Sweden, Aalto University in Finland, Nanyang Technological University in Singapore, and IITs in India. He was awarded IEEE Evolutionary Computation Pioneer Award for his sustained work in EMO, Infosys Prize, TWAS Prize in Engineering Sciences, CajAstur Mamdani Prize, Distinguished Alumni Award from IIT Kharagpur, Edgeworth-Pareto award, Bhatnagar Prize in Engineering Sciences, and Bessel Research award from Germany. He is fellow of ACM, IEEE, ASME, and three Indian science and engineering academies. He has published over 620 research papers with Google Scholar citation of over 210,000 with h- index 142. He is in the editorial board on 10 major international journals. More information about his research contribution can be found from https://www.coin-lab.org.