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Garra Rufa-inspired optimization technique

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Abstract

Natural selection has inspired researchers to develop and apply several intelligent optimization techniques in the past few decades. Generally, in artificial intelligence optimization, the particles follow a local or global best particle until finding an acceptable solution. In well-developed optimization techniques, such as swarm optimization (PSO) and the firefly algorithm (FA), getting around the initial optimal value of the group and randomly checking the effect of the surrounding points may lead to a better solution than the initial optimal value. The present work was inspired by the fascinating movement of Garra Rufa fish between two immersed legs during a regular "fish massage session." A new optimization approach is proposed and modeled based on the movements of Garra Rufa fish, in which the particles are separated into groups, and the best optimal value leads each group for the group. Also, some of these particles are allowed to change groups depending on the fitness of the leaders of the groups. The suggested strategy is then compared with PSO and FA using multiple test optimization functions, such as the Ackley, Hartmann, Michalewicz, Shubert, Easom, Bohachevsky, and Rastrigin functions. Also, a multiobjective real issue in power system is tested using the proposed methods where the objectives were cumulative voltage deviation and power losses of three weight sets during the selection allocation of distribution generators. The results show that the proposed method provides good data and

