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Socio Evolution & Learning Optimization Algorithm: A Socio-inspired Optimization Methodology

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Abstract: The paper proposes a novel metaheuristic Socio Evolution & Learning Optimization Algorithm (SELO) inspired by the social learning behaviour of humans organized as families in a societal setup. This population based stochastic methodology can be categorized under the very recent and upcoming class of optimization algorithms- the socio-inspired algorithms. It is the social tendency of humans to adapt to mannerisms and behaviors of other individuals through observation. SELO mimics the socio-evolution and learning of parents and children constituting a family. Individuals organized as family groups (parents and children) interact with one another and other distinct families to attain some individual goals. In the process, these family individuals learn from one another as well as from individuals from other families in the society. This helps them to evolve, improve their intelligence and collectively achieve shared goals. The proposed optimization algorithm models this de-centralized learning which may result in the overall improvement of each individual's behavior and associated goals and ultimately the entire societal system. SELO shows good performance on finding the global optimum solution for the unconstrained optimization problems. The problem solving success of SELO is evaluated using 50 well-known boundary-constrained benchmark test problems. The paper compares the results of SELO with few other population based evolutionary algorithms which are popular across scientific and real-world applications. SELO's performance is also compared to another very recent socio-inspired methodology-the Ideology algorithm. Results indicate that SELO demonstrates comparable performance to other comparison algorithms. This gives ground to the authors to further establish the effectiveness of this metaheuristic by solving purposeful and real world problems.

Keywords: cultural evolution; evolutionary algorithm; metaheuristic; nature-inspired computing; socio-inspired optimization; unconstrained optimization.