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Editorial: Evolutionary multi-objective optimization algorithms in microgrid power dispatching

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Editorial on the Research Topic
Evolutionary multi-objective optimization algorithms in microgrid power dispatching

With the increase of the scale of the micro-grid system, the optimization of microgrid power dispatching becomes a challenging issue. From the perspective of algorithm design, traditional heuristic intelligent algorithms are difficult to solve these complex problems, since they are easy to be fallen into the local optima of the problem. Evolutionary intelligent algorithms and machine learning methods have shown merits in dealing with complex optimization problems. Therefore, this issue aims to provide a platform for such forum to focus our minds on the intelligent optimization methods and their application in microgrid systems.

Bo et al., use the Stackelberg game to develop a collaborative optimal dispatch model for microgrid and electric vehicles. This model is based on a two-level framework, which takes into account the state of charge. In the upper layer, the charging and discharging of electric vehicles are optimized *via* minimizing the operating cost of the microgrid. In the lower layer, the electric vehicle users adjust the charging and discharging strategies to maximize their individual interests. In this way, the peak–valley differences of the microgrid load and the charging and discharging time cost of electric vehicles can be reduced, at the same time their state of charge can be maintained at a high level.

Wang et al., present a review of the diaphragm coupling in energy equipment. They analyze and summarize the current research status on diaphragm couplings as well as the open issues to be solved in the field of diaphragm coupling, and propose a new direction for the subsequent research. Experimental results validate the effectiveness of the proposed methods.

Zhang et al., propose a robust control approach of affine maneuver formation for second-order multi-agent grid inspection systems. Fu et al. propose active power-frequency droop control (APFDC) and virtual inertia control (VIC) mechanisms for single-stage PV generation. Especially, the PV generation is able to participate in the grid frequency regulation *via* improving the control system of voltage source converter (VSC). Authors also analyze the effect of the control parameters on the inertia characteristic of PV generation. It is concluded that the PV generation can be controlled by setting the control strategy of the voltage source converter (VSC) to reduce or increase the active power.

Liu et al., propose a novel cooperation multi-objective optimization approach: multi-swarm multi-objective evolutionary algorithm based on decomposition (MSMOEA/D). The performance of MSMOEA/D is verified on 12 constraint two-objective and three-objective benchmark functions, and then it is applied to optimize the constructed RS porous structure. Comparison results show the effectiveness and efficiency of MSMOEA/D. Zhang et al., combine the particle swarm optimization and dense block to form a new intelligent approach to deal with infrared and visible image fusion.

Wang et al. devise a new bio-inspired optimization method, i.e., a pigeon group algorithm based on decomposition, to deal with Internet of Things optimization problems. Ma et al. propose a large-scale evolutionary optimization algorithm based on decision space decomposition to deal with complex optimization problems with many decision variables. Lei Wen and Xiaodan Liang propose an improved harris hawks optimization algorithm based on multistrategy. Then, an enhanced multi-strategy harris hawks optimization algorithm is developed based on chaotic method, cauchy mutation and elite individual guidance. The above novel intelligent optimization algorithms have been validated experimentally on a set of test functions and real-world applications.

Liu et al., construct a machine learning predictive model for electronic slurries of smart grid systems, which have been verified to be effective in the practical applications. Zhang et al., propose an improved convolutional neural network, while Liu et al., conduct a systemic investigation on the data and model hybrid-driven virtual reality operating system, and obtain satisfactory simulation results. Chen et al. propose a priority scheduling algorithm based on the hotness of message topics to address the problem of efficient distribution of messages with different topics in microgrids. The simulation results show that the priority design can well solve the power scheduling problem of multi-target data transmission and ensure the transmission efficiency of messages in the microgrid system. Ku et al., integrate particle swarm optimization and reinforcement learning to construct a new motion planning method for live working manipulator. Liu et al., investigate the route stability in the uncertain capacitated arc routing problem. Xu et al., conduct deep research on multi-algorithm model optimization.

To sum up, this research topic has published 15 papers, which include lasted findings from academicians and, industry personnel in the related domain. These findings are helpful to make the readers better to comprehend and learn the recent knowledge in the related domain.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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