Title:	Operational Cost Minimization of Electrical Distribution Network during Switching for Sustainable Operation
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Abstract:

Continuous increases in electrical energy demand and the deregulation of power systems have forced utility companies to provide high-quality and reliable services to maintain a sustainable operation and reduce electricity price. One way to continue providing the required services while simultaneously reducing operational costs is through minimizing power losses and voltage deviation in the distribution network. For this purpose, Network Reconfiguration (NR) is commonly adopted by employing the switching operation to enhance overall system performance. In the past, work proposed by researchers to attain switching sequence operation was based on hamming distance approach. This approach caused the search space to grow with the increase in total Hamming distance between the initial and the final configuration. Therefore, a method is proposed in this paper utilizing a Mixed Integer Second Order Cone Programming (MISOCP) to attain optimal NR to address this issue. The Hamming dataset approach is opted to reduce search space by considering only radial configuration solutions to achieve an optimal switching sequence. In addition, a detailed economic analysis has been performed to determine the saving after the implementation of the proposed switching sequence. The effectiveness of the proposed technique is validated through simulations on IEEE 33-bus distribution network and a practical 71-bus network in Malaysia. The result shows that the proposed method determined the optimal network configuration by minimizing the power losses for the 33 bus and 71-bus system by 34.14% and 25.5% from their initial configuration, respectively to maintain sustainable operation.