Transforming Coal-fired Power Plant with Deep Reinforcement Learning using Operational Data: An Optimization Technique

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The coal-fired circulating fluidized bed (CFB) boiler has several ancillary units which make power production a challenging task for traditional methods to optimize. Meanwhile, enormous data are generated by process units which can be utilized to ameliorate CFB boiler performance thereby addressing issues such as increase in power demand, high cost of operations, and increase in environmental pollutions faced by the coal power industry. In view of this, several deep reinforcement learning techniques were explored in this study on a commercial CFB power plant to optimize its operating parameters for better performance. The indicators of interest used to assess the techniques' effectiveness were a computational burden, optimization customizability, and adaptability which were essential for online implementation in a real application. The findings in this study are applicable not only to CFB but can be expanded to other chemical processes and industry for the design of both online and offline multi-objective optimization that require a quick response time.