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Deep Multistage Multi-Task Learning for Quality Prediction and Diagnostics of Multistage Manufacturing Systems

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In multistage manufacturing systems, modeling multiple quality indices based on the process sensing variables is important. However, the classic modeling technique predicts each quality variable one at a time, which fails to consider the correlation within or between stages. We propose a deep multistage multi-task learning framework to jointly predict all output sensing variables in a unified end-to-end learning framework according to the sequential system architecture in the MMS. Our numerical studies and real case study have shown that the new model has a superior performance compared to many benchmark methods as well as great interpretability through developed variable selection techniques.

Keywords

Deep Multitask Learning, Multi-stage Manufacturing, quality prediction

Special/invited session

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