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Big data mining, modeling and monitoring for Manufacturing 4.0: opportunities and challenges

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Fostered by Industry 4.0, complex and massive data sets are currently available in many industrial settings and manufacturing is facing a new renaissance, due to the widespread of emerging process technologies (e.g., additive manufacturing, micro-manufacturing) combined to a paradigm shift in sensing and computing.
On the one hand, the product quality is characterized by free-form complex shapes, measured via non-contact sensors and resulting in large unstructured 3D point clouds. On the other hand, in-situ and in-line data are available as multi-stream signals, image and video-images.
In this scenario, traditional approaches for intelligent data analysis (i.e., statistical data modeling, monitoring and control) need to be revised considering functional data monitoring, manifold learning, spatio-temporal modelling, multi-fidelity data analysis. Starting from real industrial settings, opportunities and challenges to be faced in the current framework are discussed.

Keywords

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