

54th CIRP Conference on Manufacturing Systems

Regularization-based Continual Learning for Anomaly Detection in Discrete Manufacturing

Benjamin Maschler ^{a,*}, Thi Thu Huong Pham ^a, Michael Weyrich ^a

^a *University of Stuttgart, Institute of Industrial Automation and Software Engineering, Pfaffenwaldring 47, 70569 Stuttgart, Germany*

* Corresponding author. Tel.: +49 711 685 67295; Fax: +49 711 685 67302. *E-mail address:* benjamin.maschler@ias.uni-stuttgart.de

Abstract

The early and robust detection of anomalies occurring in discrete manufacturing processes allows operators to prevent harm, e.g. defects in production machinery or products. While current approaches for data-driven anomaly detection provide good results on the exact processes they were trained on, they often lack the ability to flexibly adapt to changes, e.g. in products. Continual learning promises such flexibility, allowing for an automatic adaption of previously learnt knowledge to new tasks. Therefore, this article discusses different continual learning approaches from the group of regularization strategies, which are implemented, evaluated and compared based on a real industrial metal forming dataset.

© 2021 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Peer-review under responsibility of the scientific committee of the 54th CIRP Conference on Manufacturing System

Keywords: Anomaly Detection; Continual Learning; Deep Learning; Discrete Manufacturing; Elastic Weight Consolidation; Industrial Transfer Learning; Learning Without Forgetting; Regularization Strategies; Synaptic Intelligence
