



MATLAB Expo 2018

Künstliche Intelligenz für Intelligente Technische Systeme

Oliver Niggemann

Die Vision

Kontext



Unser Fokus: Die Autonome Fabrik

Zwei technische Herausforderungen

Datenerfassung

Maschinelles Lernen für Cyber-physische Systeme

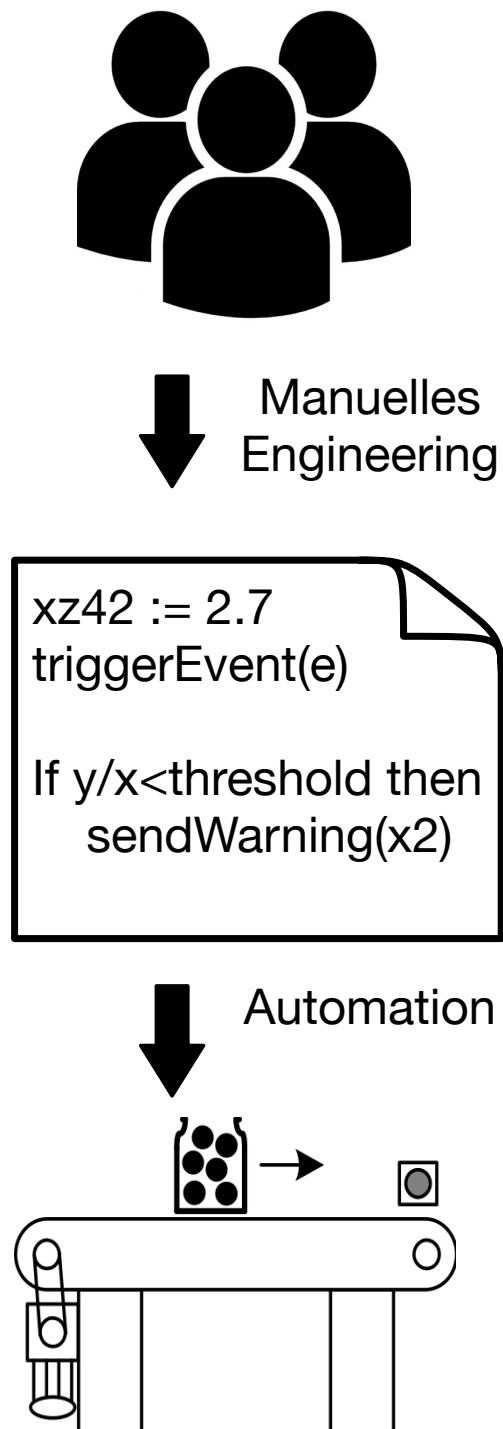
Zwei technische Herausforderungen

Datenerfassung

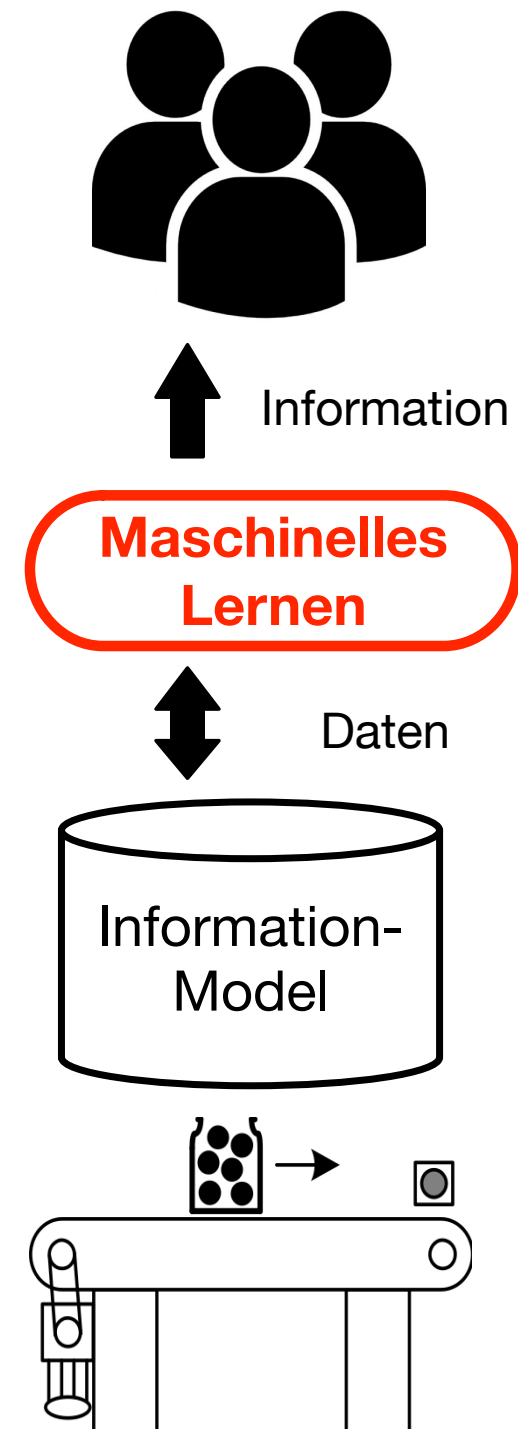
Maschinelles Lernen für Cyber-physische Systeme

Neuer Ansatz für die Automation

Heute: Engineering



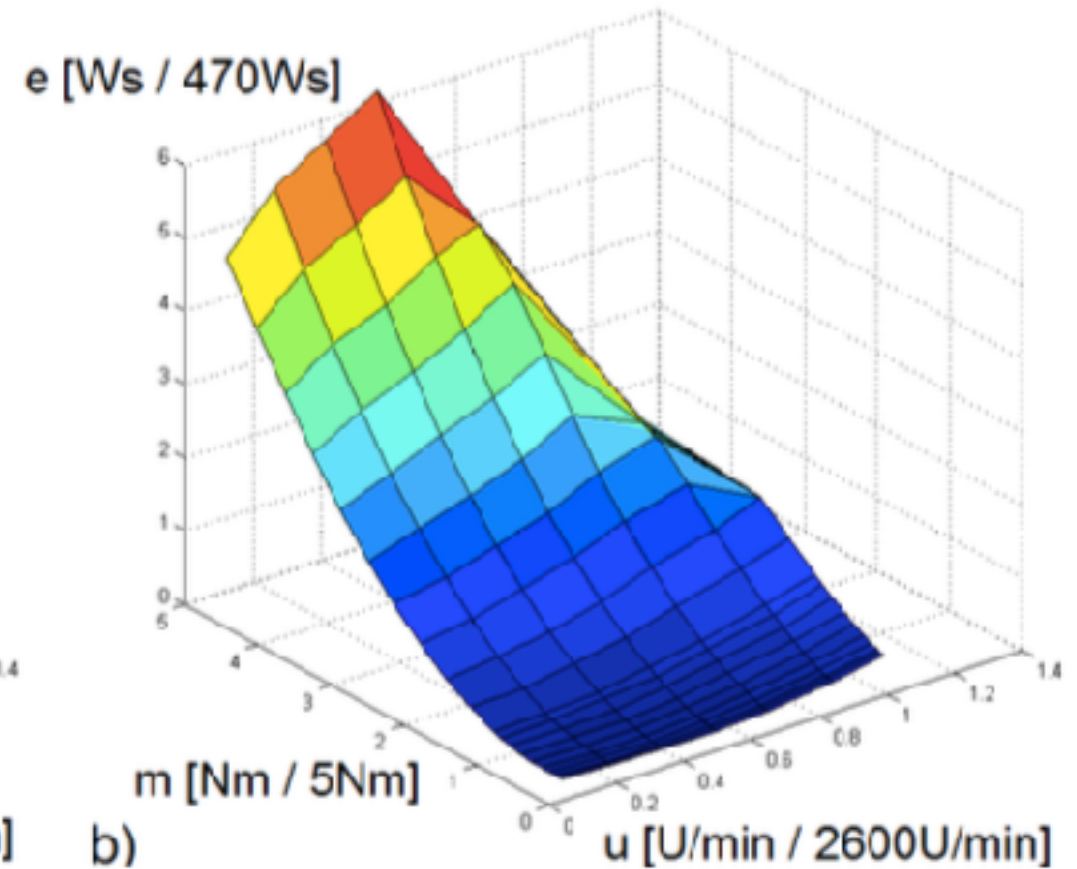
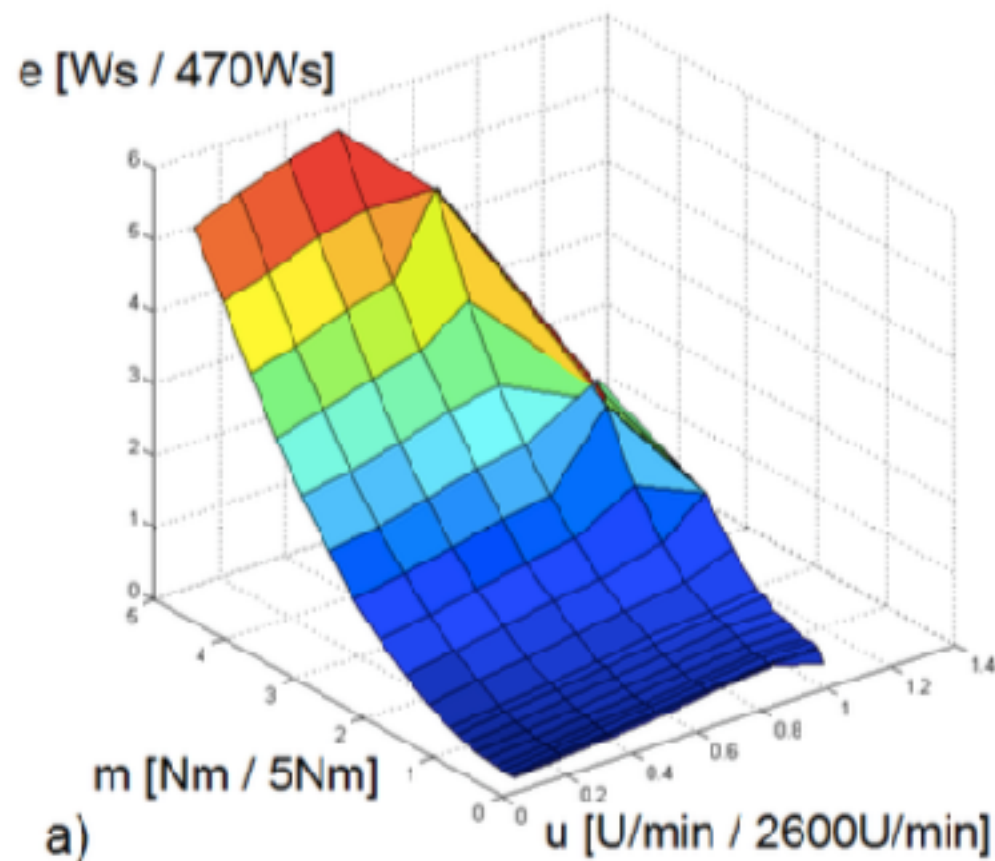
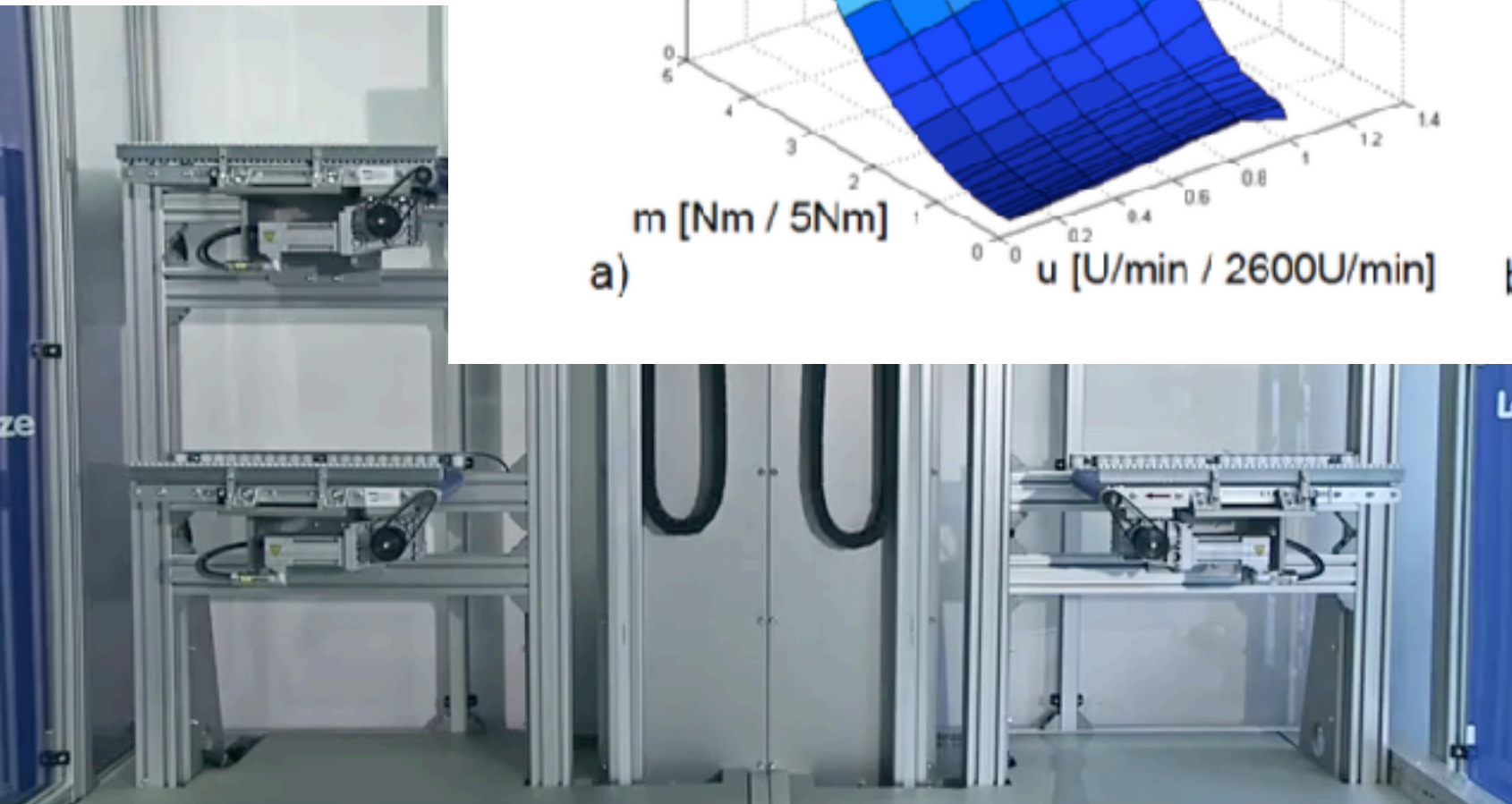
Vision: Self-X



Warum ist ML für die Produktion anders?

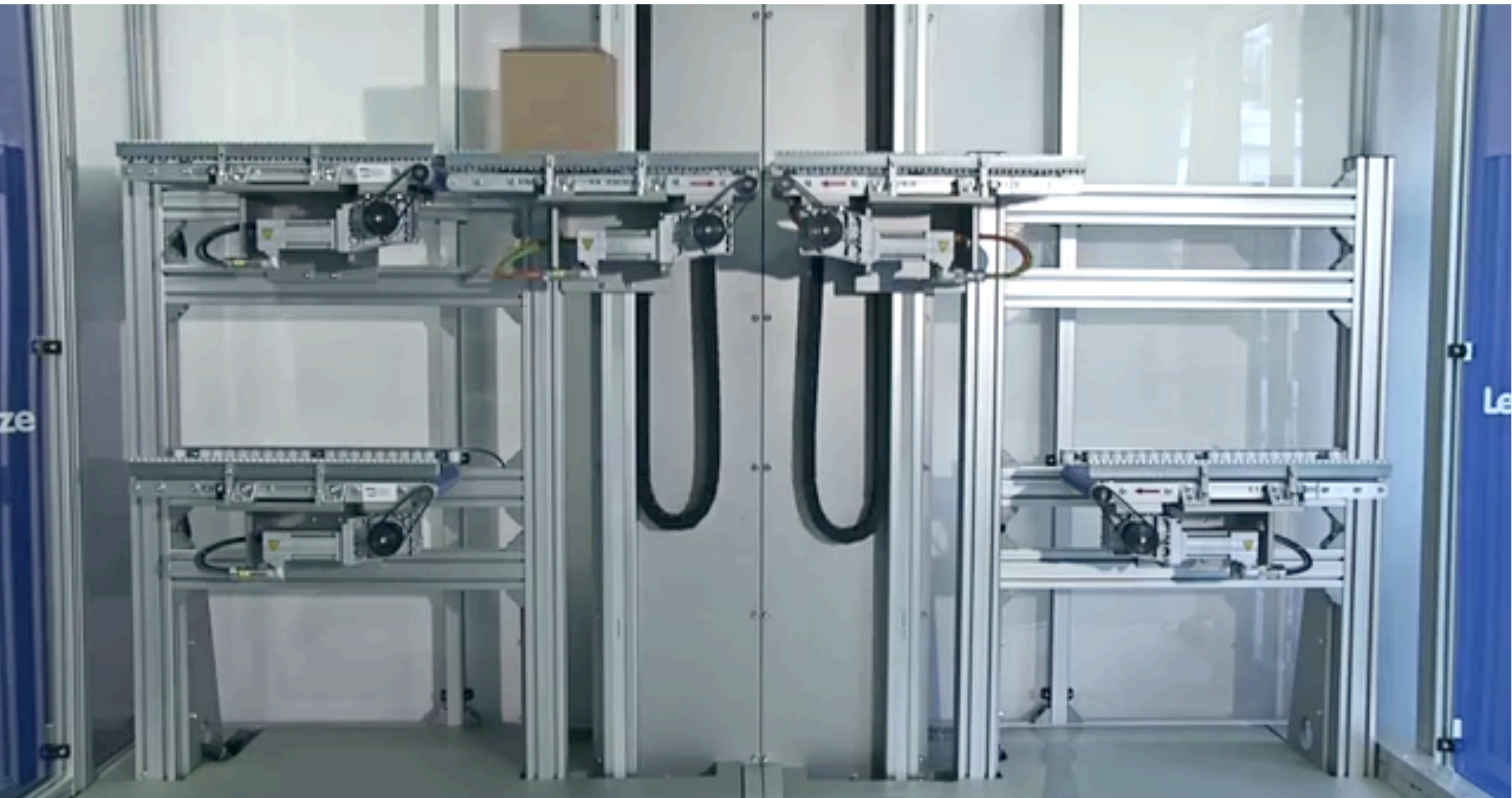
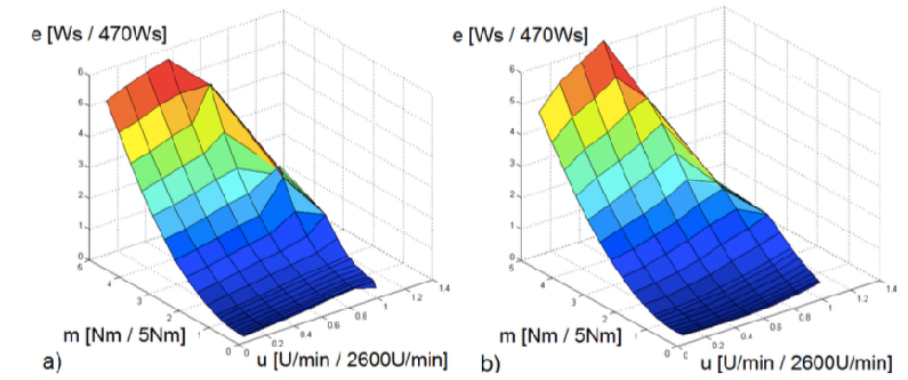
Warum ist ML für die Produktion anders?

Physik und Vorwissen



Warum ist ML für die Produktion anders?

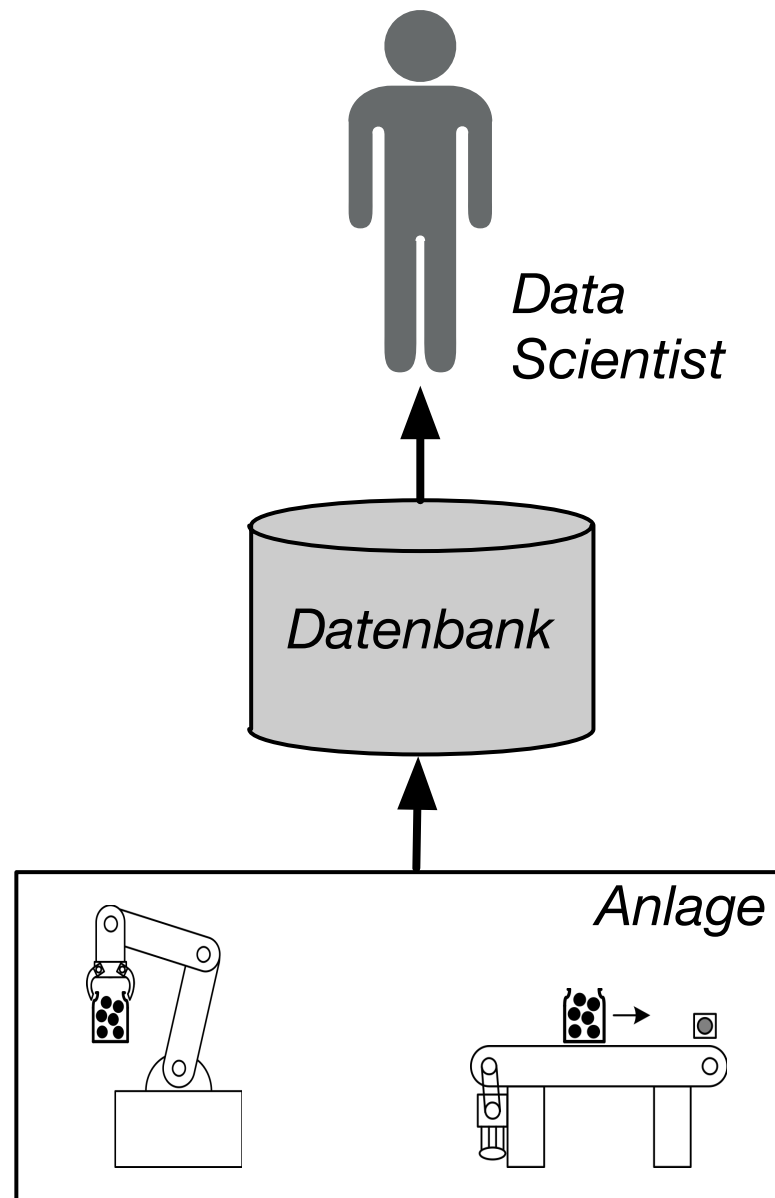
Physik und Vorwissen



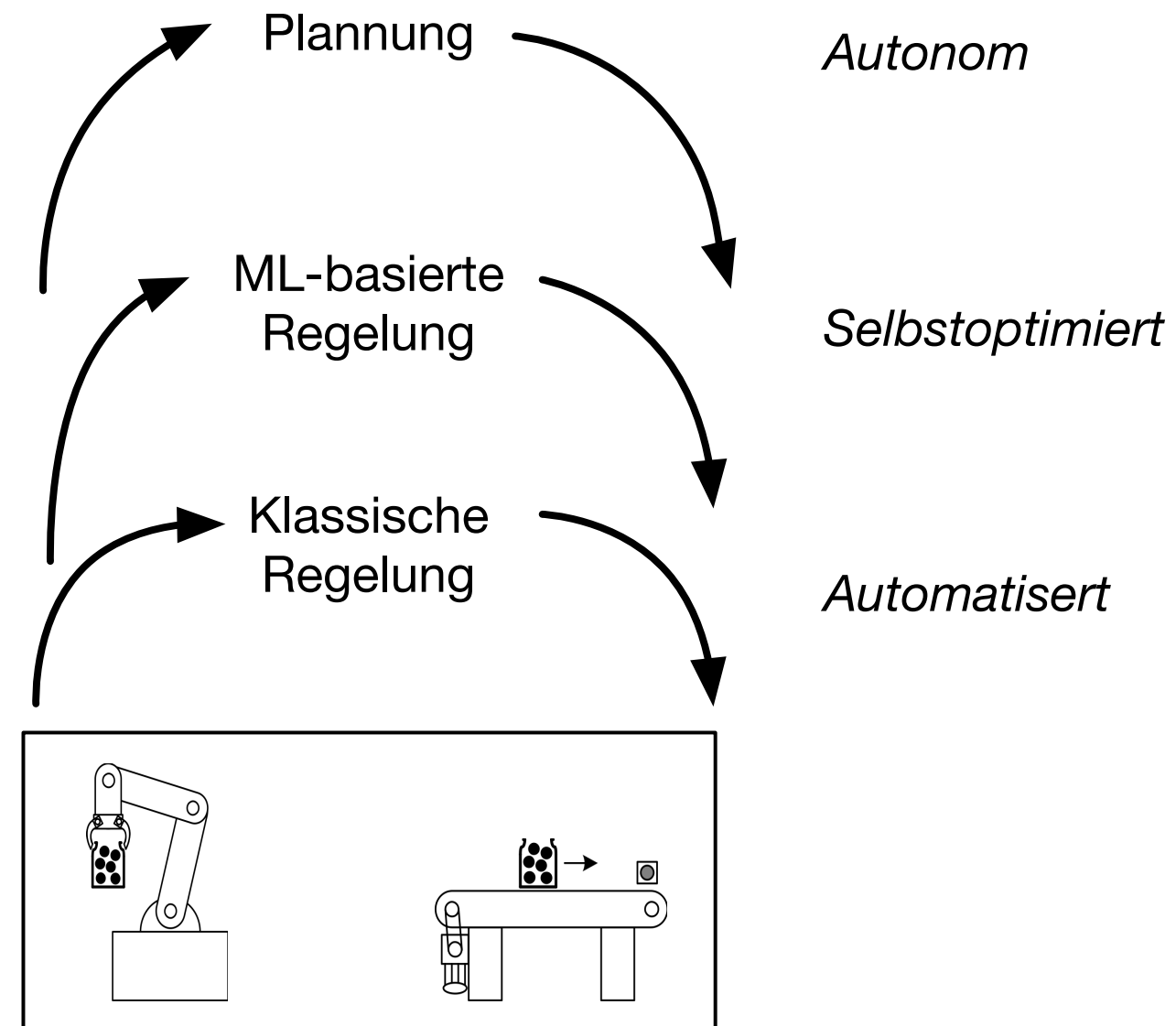
Warum ist ML für die Produktion anders?

Geschlossene Regelkreise!

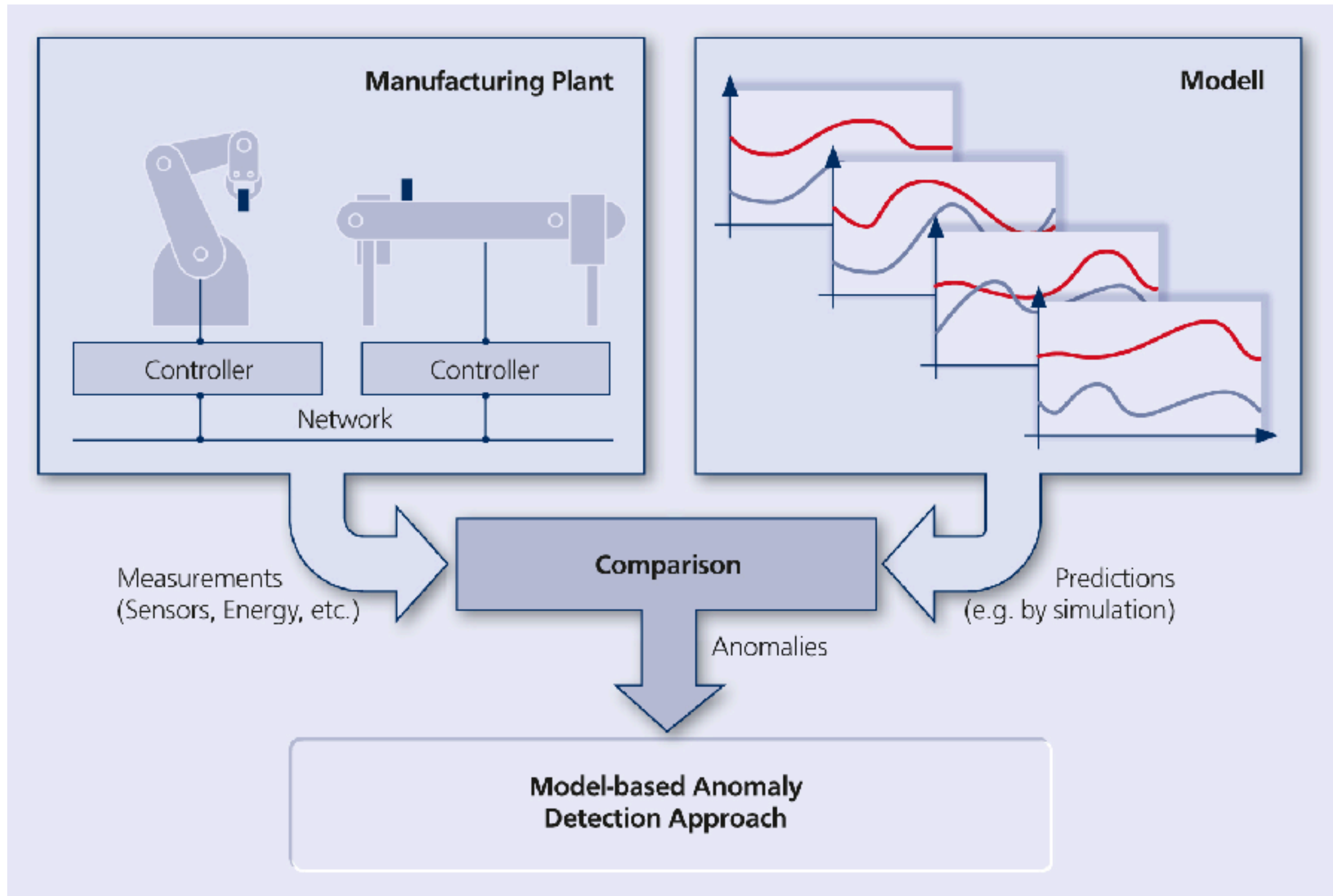
Klassisches ML



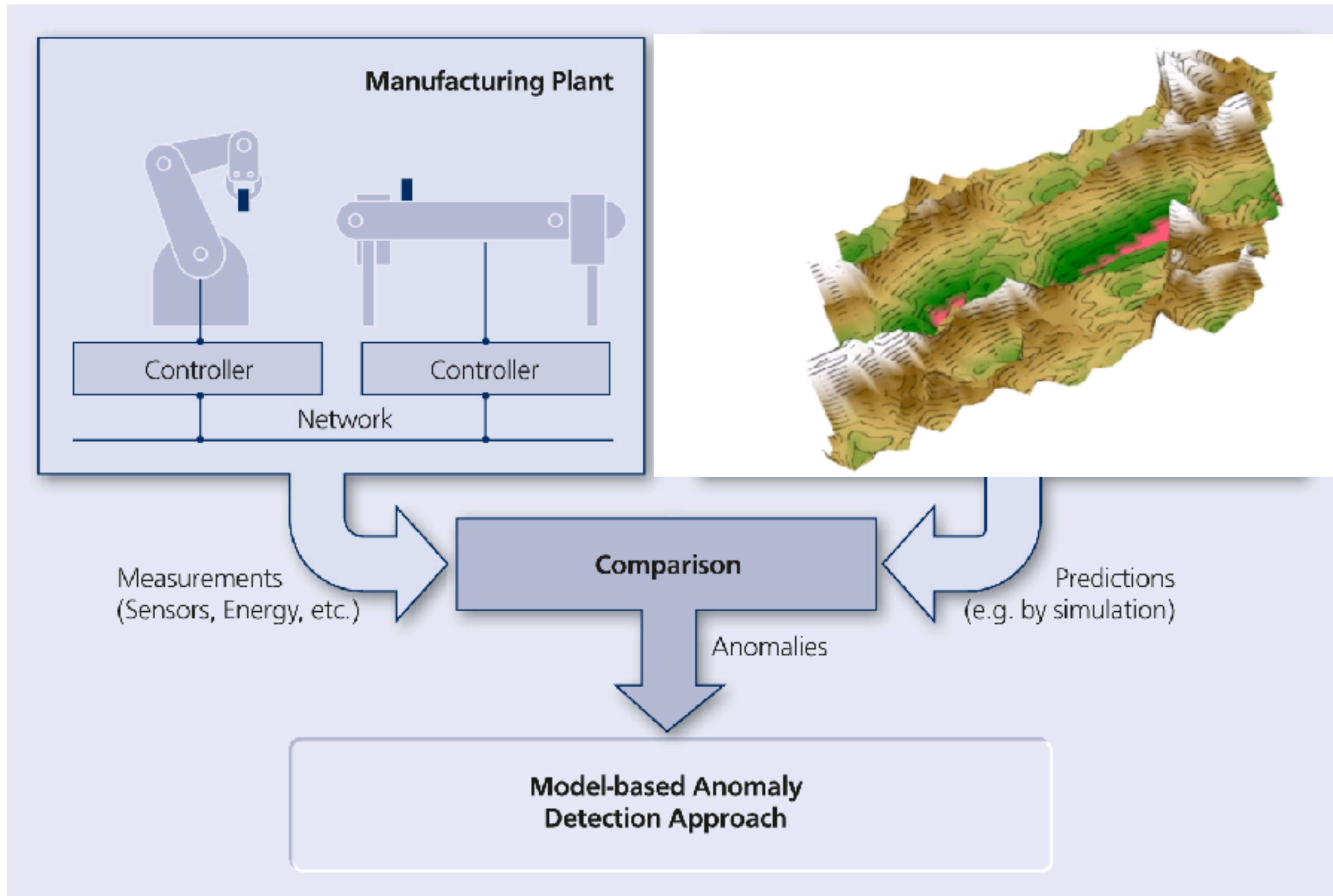
Produktion



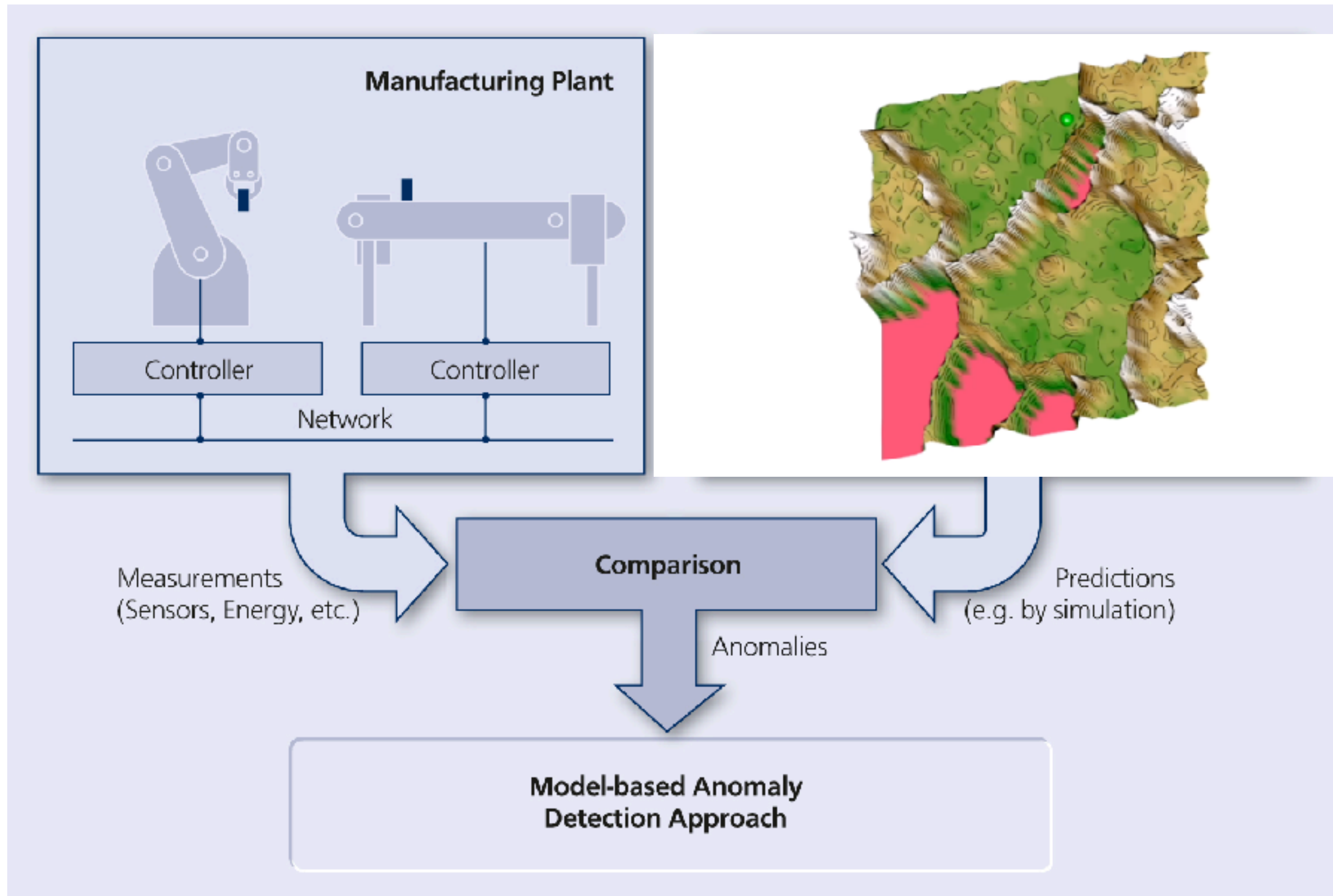
Anomalieerkennung in geschlossenen Regelkreisen



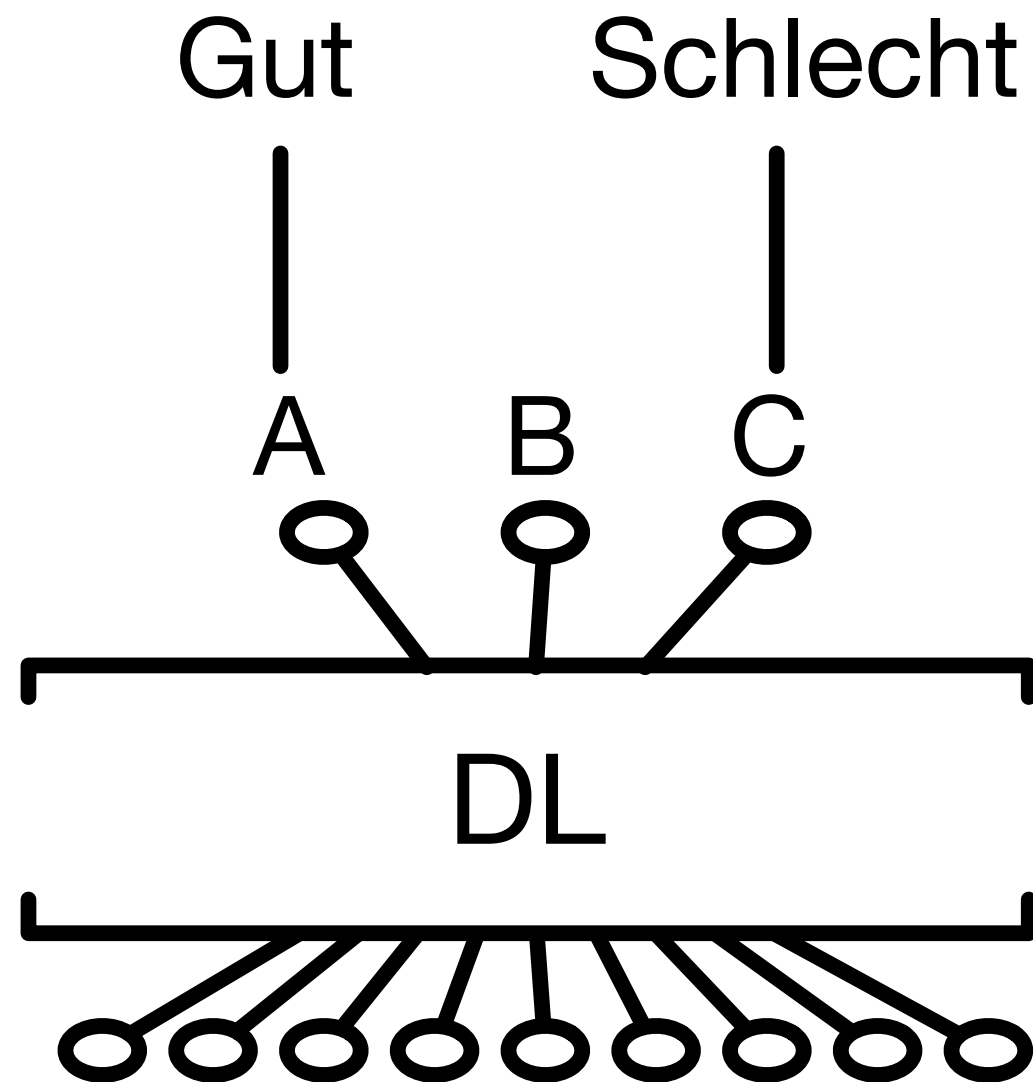
Anomalieerkennung in geschlossenen Regelkreisen



Anomalieerkennung in geschlossenen Regelkreisen

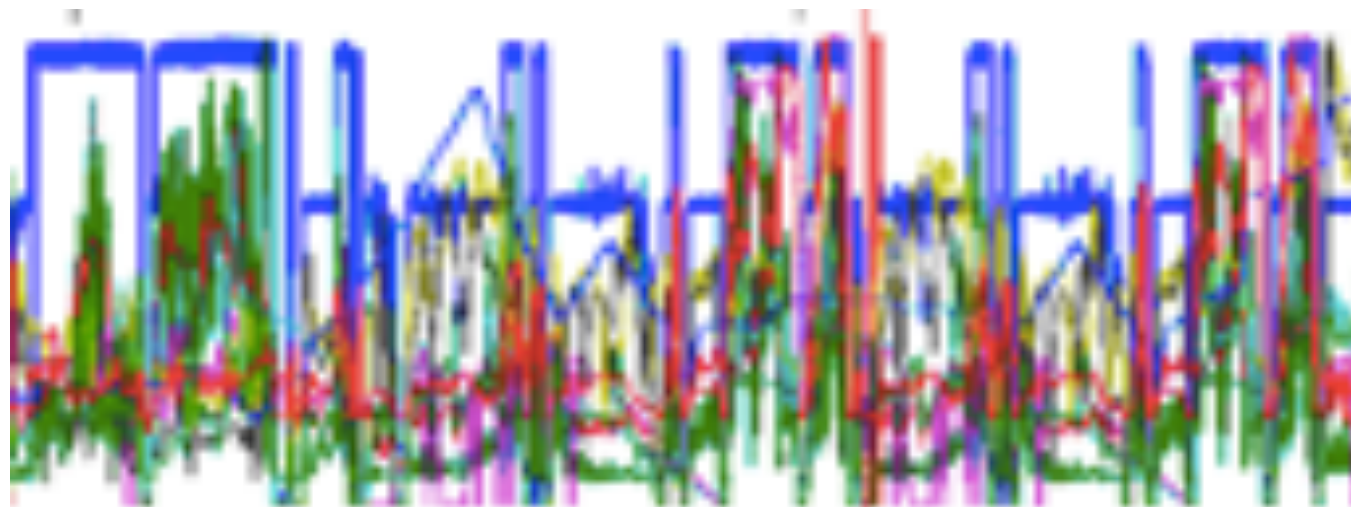


Diskretisierung mittels Deep Neural Networks



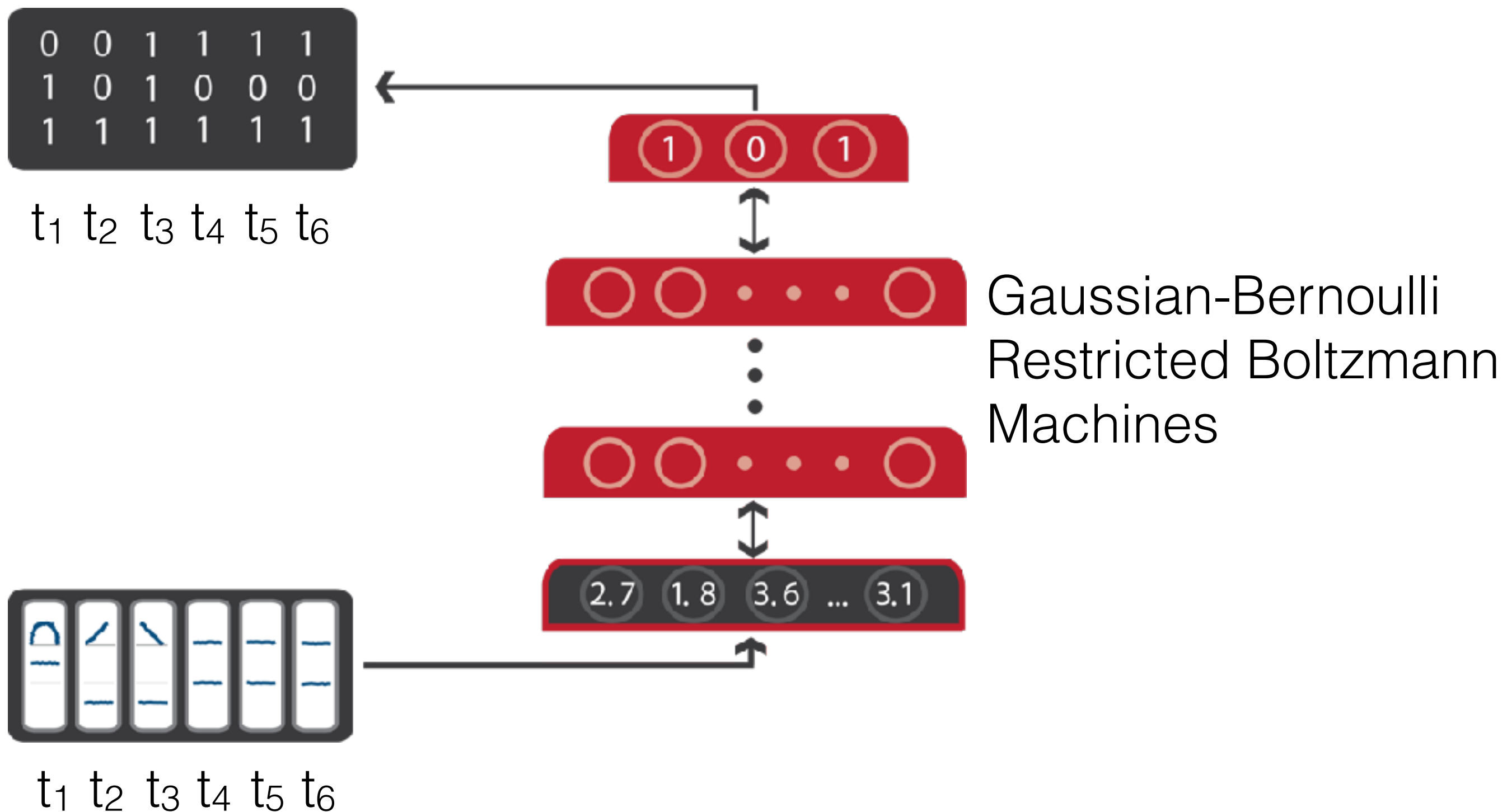
Diskretisierung

Gaussian-Bernoulli
Restricted Boltzmann
Machines

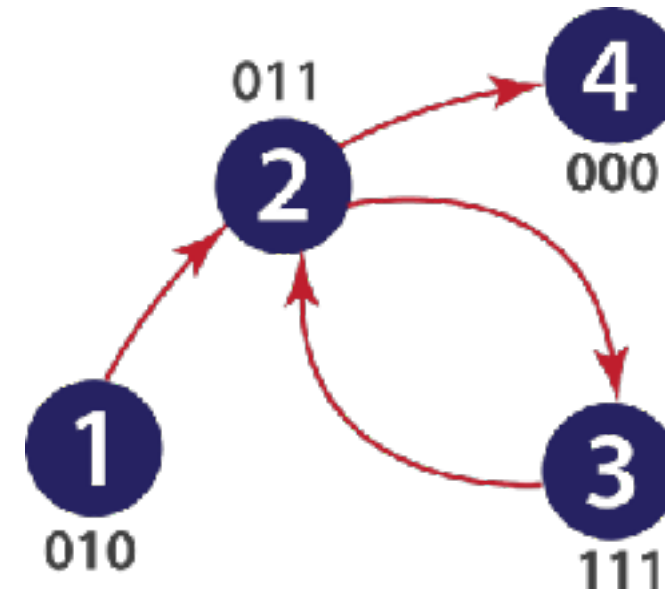
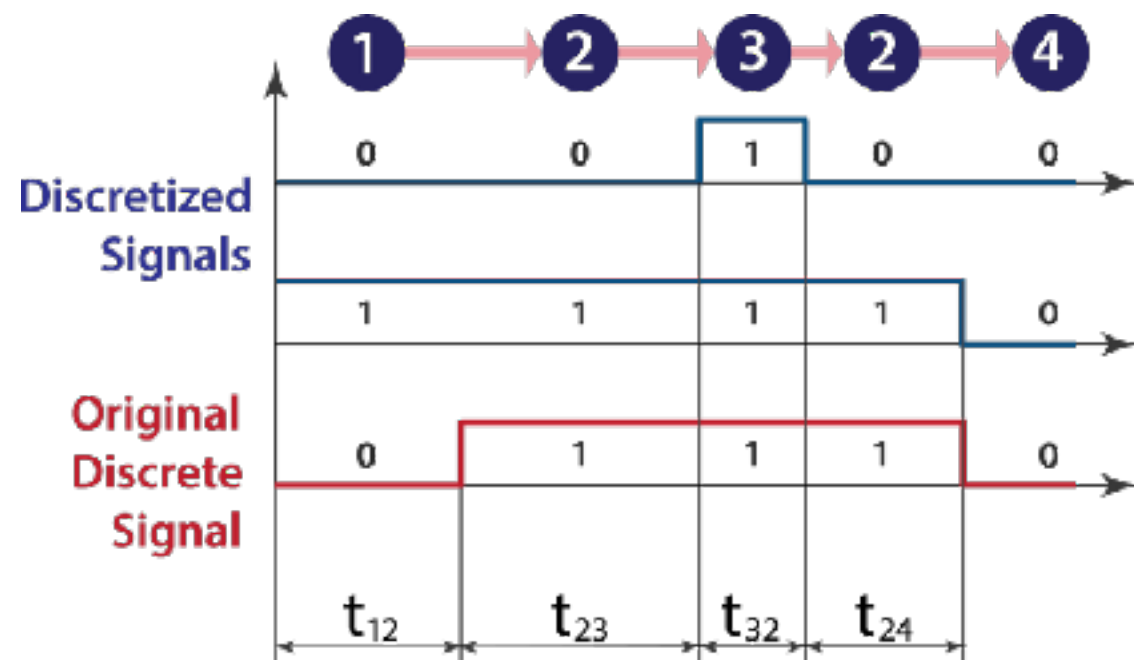


Hybrid Data

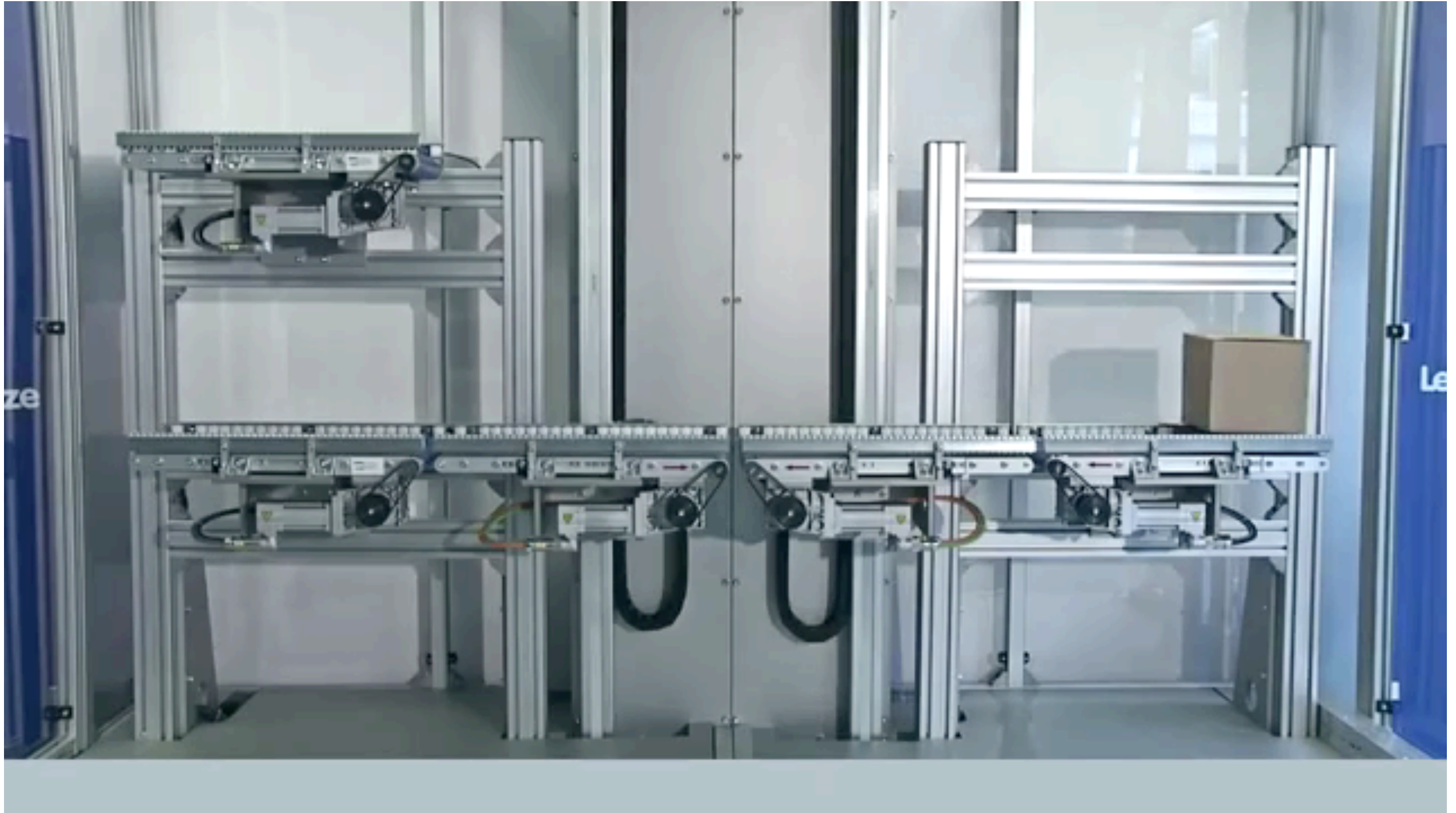
Diskretisierung mittels Deep Neural Networks



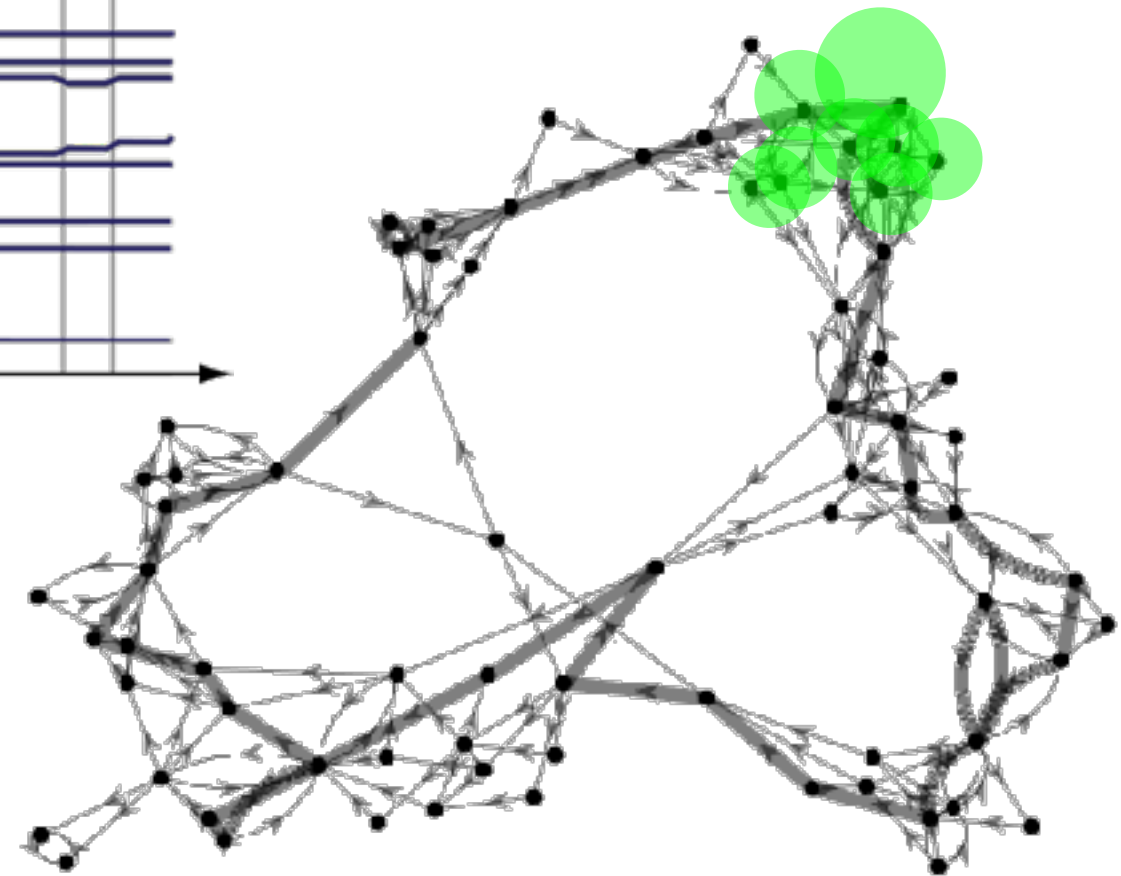
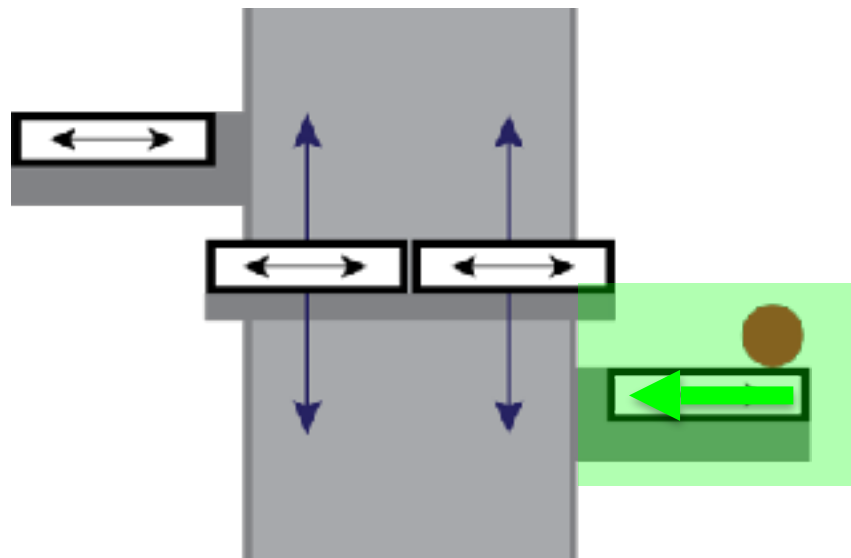
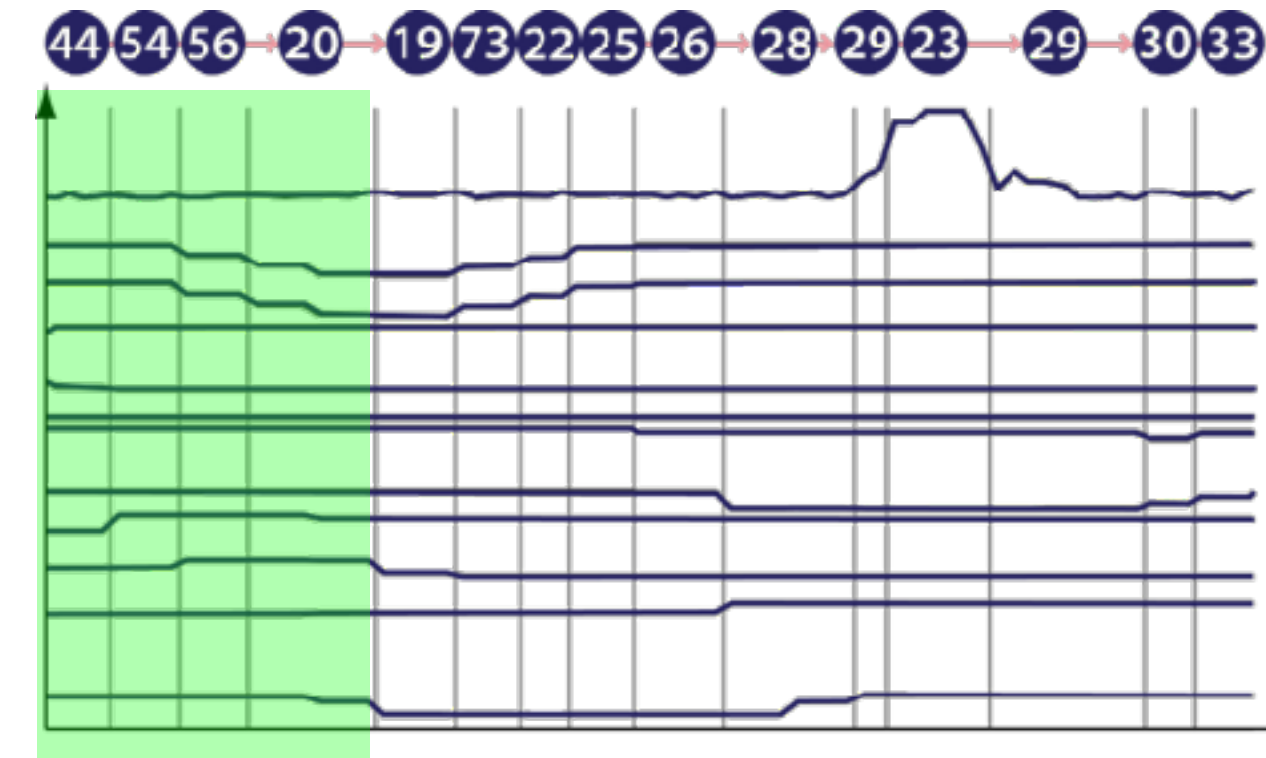
Diskretisierung mittels Deep Neural Networks



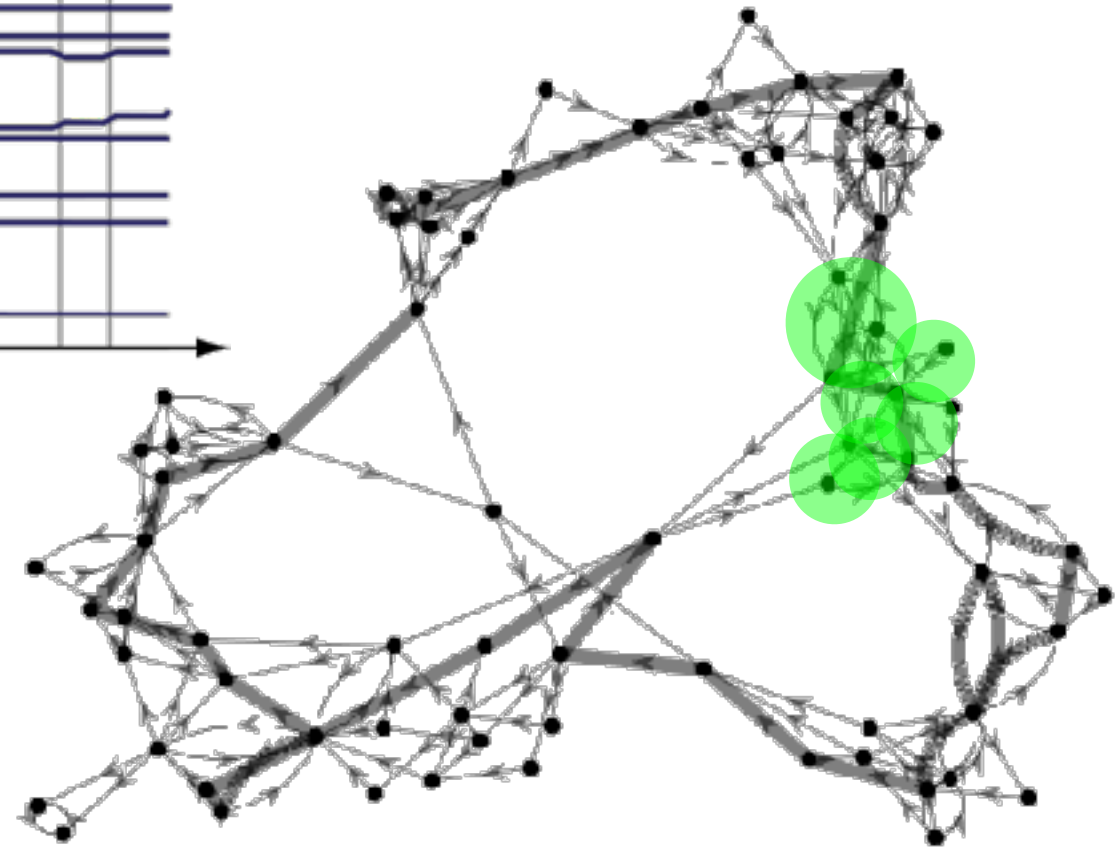
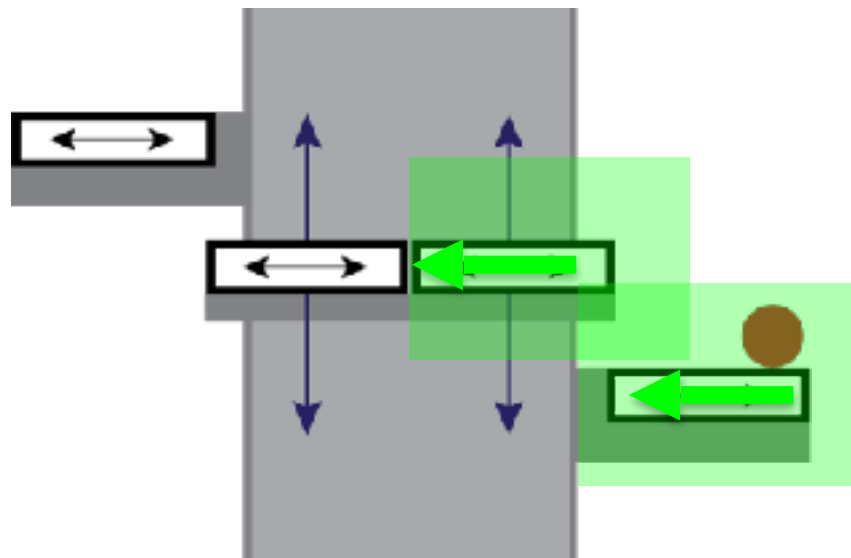
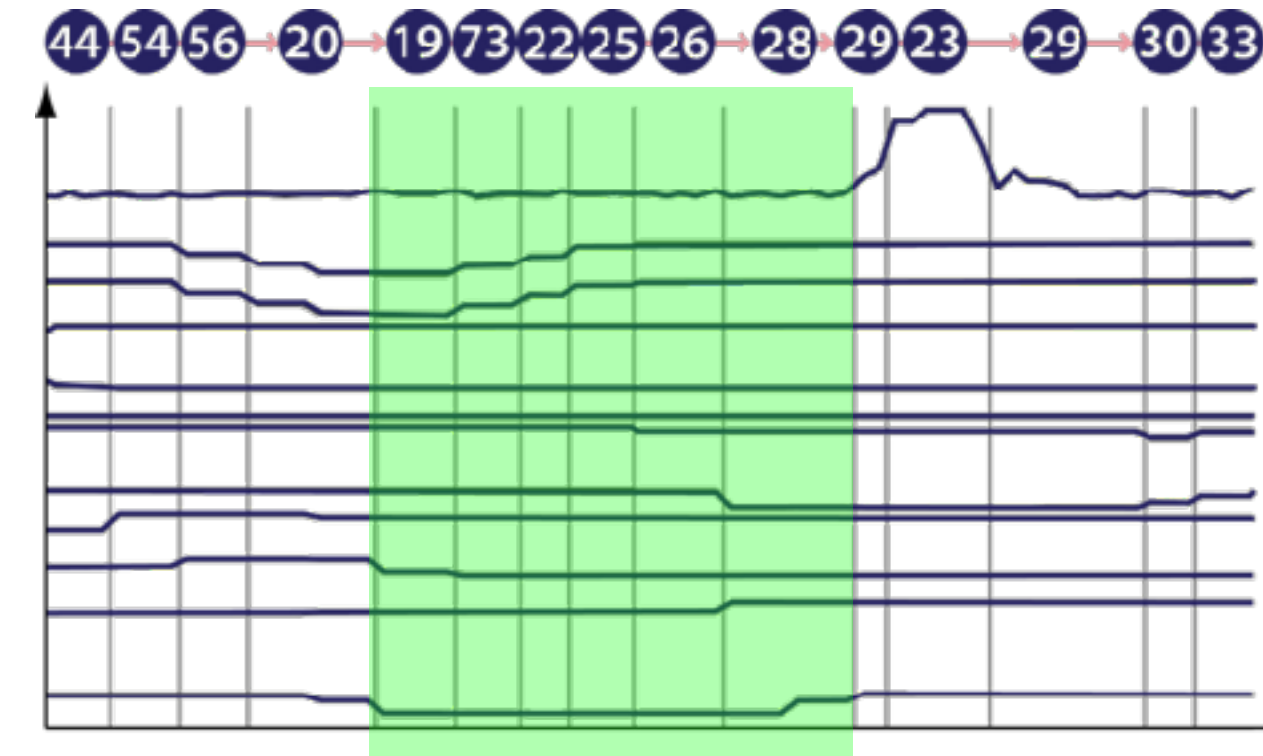
Diskretisierung mittels Deep Neural Networks



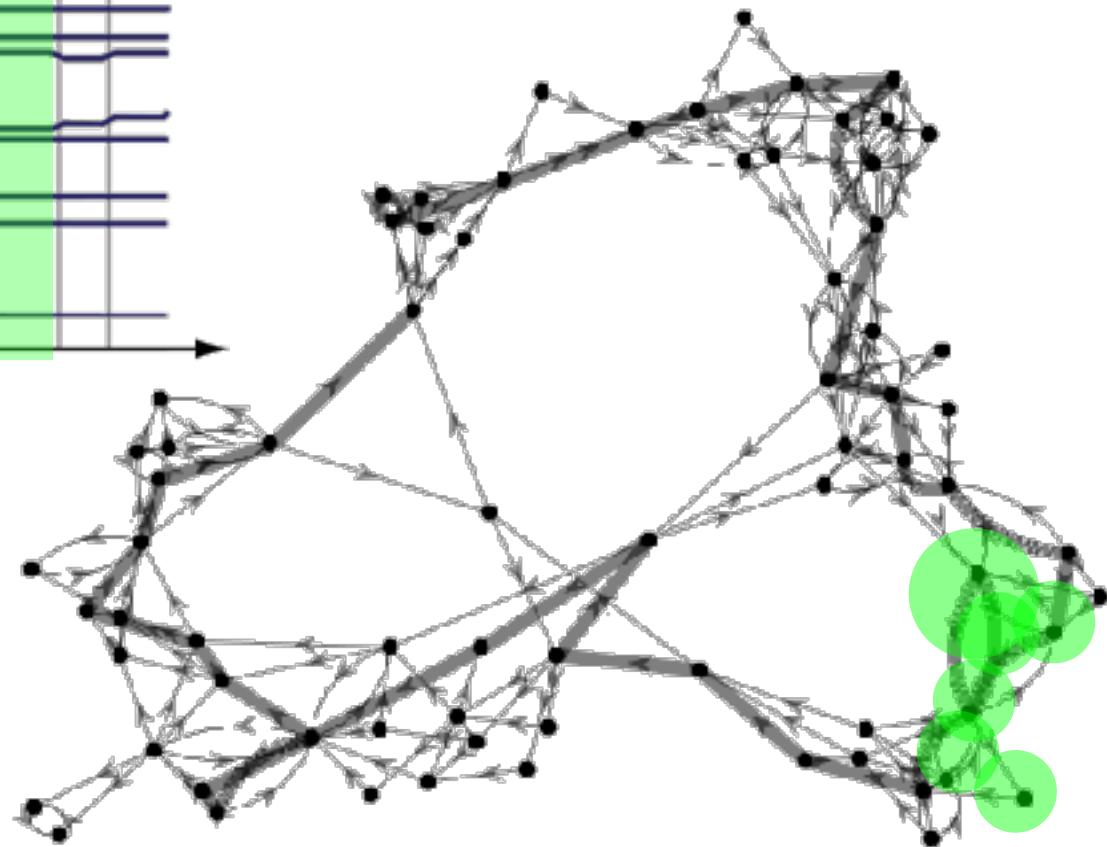
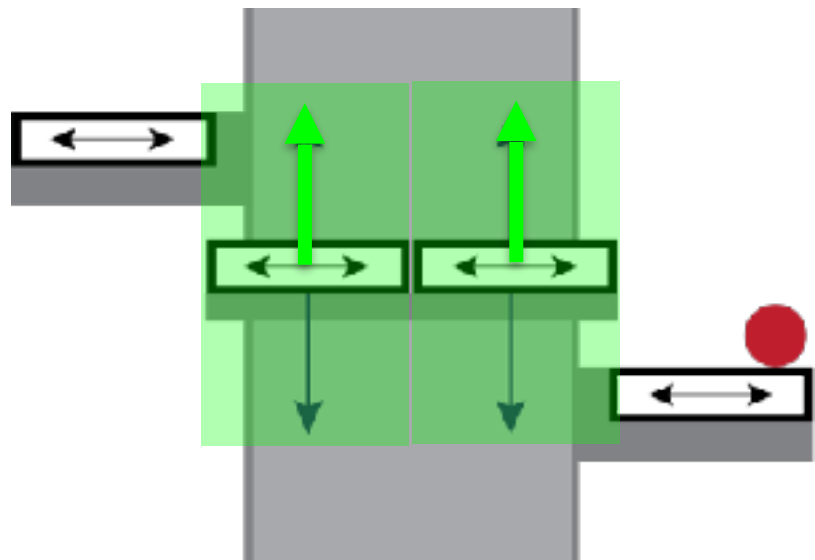
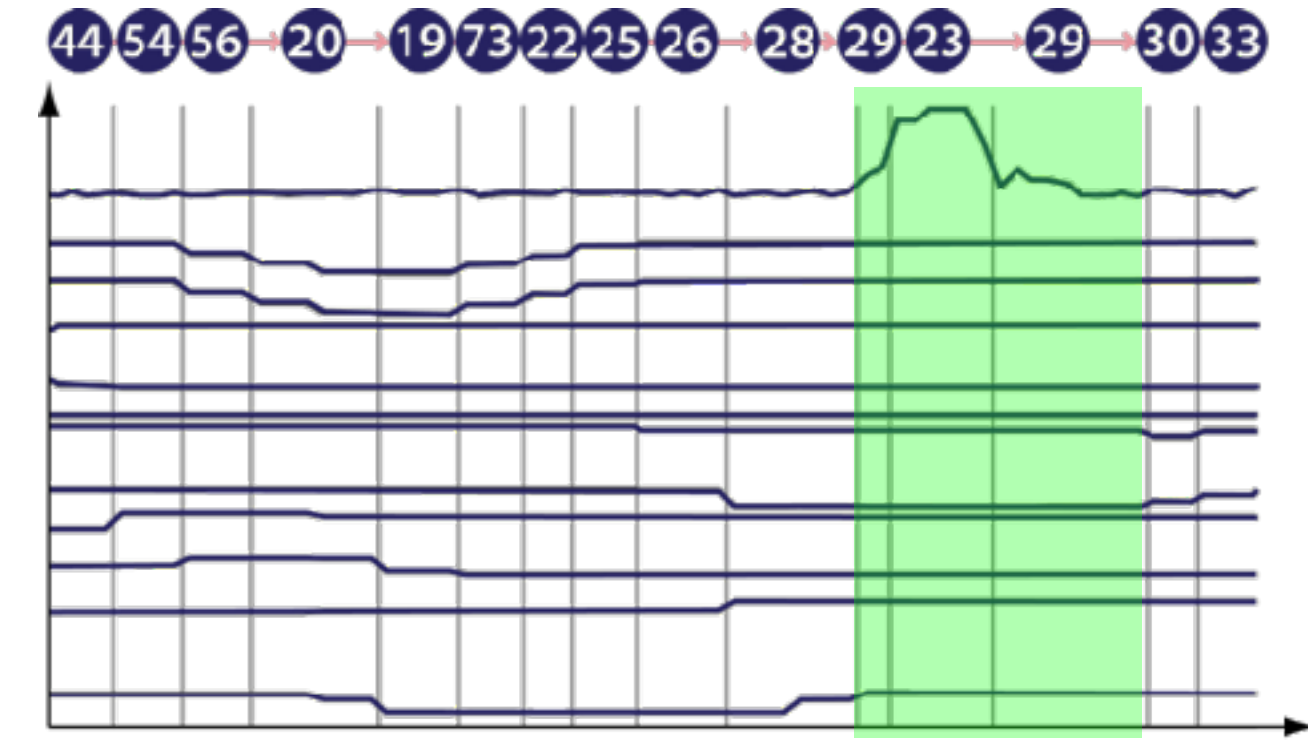
Diskretisierung mittels Deep Neural Networks



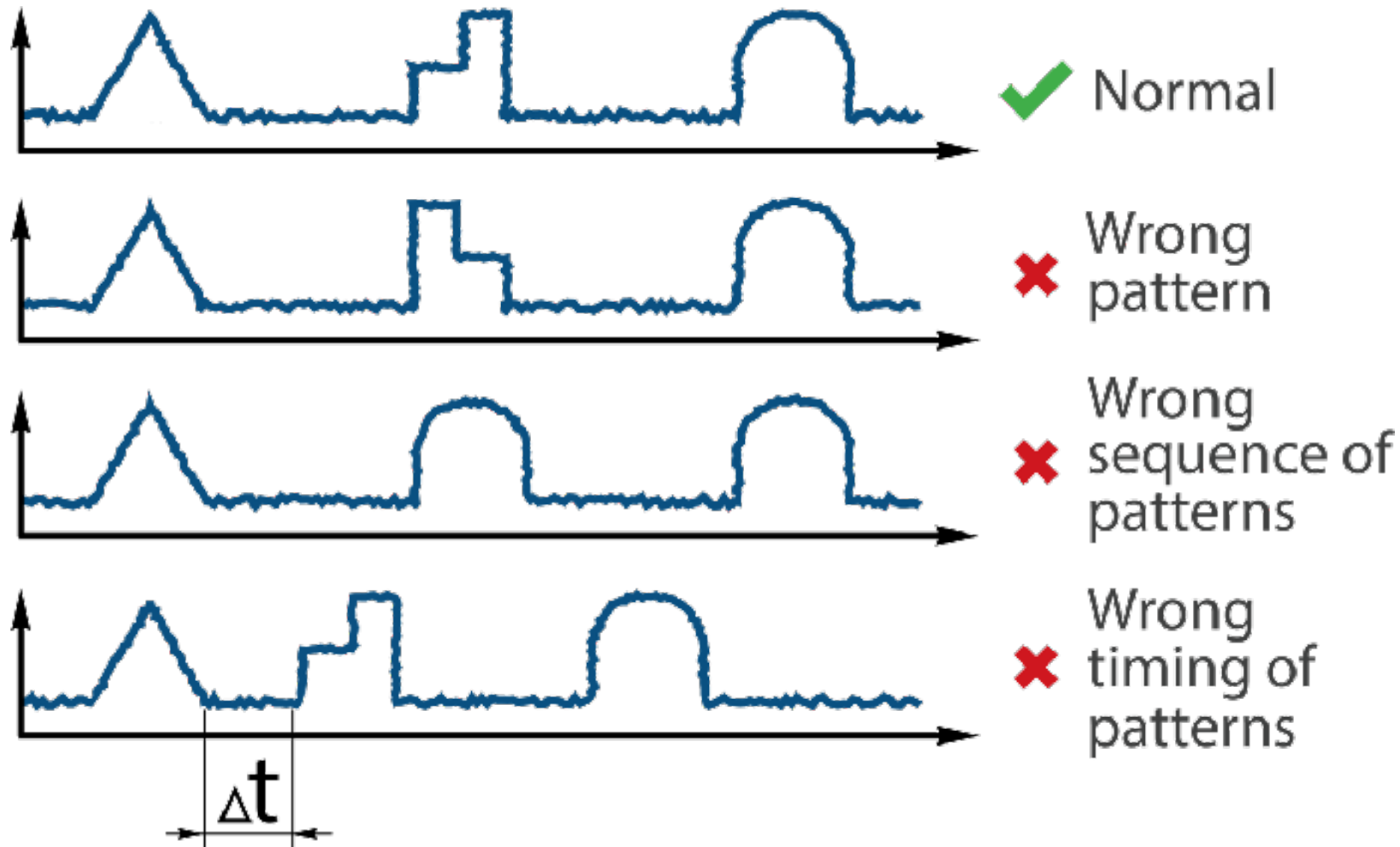
Diskretisierung mittels Deep Neural Networks



Diskretisierung mittels Deep Neural Networks



Diskretisierung mittels Deep Neural Networks



Zwei nicht-technische Herausforderungen

Ausbildung

Singularität



Danke

Prof. Dr. Oliver Niggemann
Fraunhofer IOSB
Institutsteil Industrial Automation (IOSB-INA)
Langenbruch 6
D-32657 Lemgo
Tel. +49 5261 9429042
oliver.niggemann@iosb-ina.fraunhofer.de