



ML4CPS

MACHINE LEARNING FOR
CYBER PHYSICAL SYSTEMS



October 1st and 2nd 2015

>>Machine Learning for Cyber Physical Systems<<

Oliver Niggemann, Jürgen Beyerer (ed.)

Preface

Data is the coming resource of the 21st century, e.g. the market capitalization of Google has already achieved almost the value of Exxon Mobil. In the future, this trend will continue for Cyber Physical Systems: E.g. globally connected production systems optimize automatically their energy consumption (keyword: Industrie 4.0), cars react dynamically to the driving behavior of other road users and trains detect wear effects beforehand.

This huge amount of generated data leads to completely new and unresolved challenges for data analysis and machine learning: McKinsey estimates that almost 2 Exabyte of new data were generated in the manufacturing industry in 2010. The amount of data prohibits any manual analysis, e.g. by classical data scientists.

The solution can only be the use of highly automated machine learning methods. But most of these methods do not consider peculiarities of technical systems: The dynamic time behavior is not modeled, control signals and the resulting behavior changes of hybrid systems are not captures and physical knowledge is not used.

Therefore the conference ML4CPS aims at bringing experts from science and industry together to discuss current demands on machine learning for Cyber Physical Systems and match them with recent results from the scientific community.



Prof. Dr. rer. nat. Oliver Niggemann



Prof. Dr.-Ing. habil. Jürgen Beyerer

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Program

October, 1st

12 am Exhibition Opening

12:30 am Welcome

1 a.m. Keynote: Awraam Zapounidis,
General Electric

>> **Industrial Internet: The power of 1%**
How much could we save with connected
machines? <<



1:30 pm

Session 1

- **Development of a Cyber-Physical System based on selective dynamic Gaussian naïve Bayes model for a self-predict laser surface heat treatment process control.**

J. Diaz, C. Bielza, J. L. Ocaña, P. Larrañaga (University of Madrid, Spain)

- **Evidence Grid Based Information Fusion for Semantic Classifiers in Dynamic Sensor Networks.**

T. Korthals, T. Krause, U. Rückert (CITEC, University of Bielefeld, Germany)

- **Forecasting Cellular Connectivity for Cyber-Physical Systems: A Machine Learning Approach**

C. Ide, M. Nick, D. Kaulbars, C. Wietfeld (TU Dortmund, Germany)

- **Optimierter Maschinenbetrieb durch Auflösung von Modellunsicherheiten**

C. Brecher, M. Obdenbusch, W. Herfs (RWTH Aachen, Germany)

3:30 pm

Coffee Break and Exhibition

4 pm

Session 2

- **Prognostics Health Management system based on Physics-based models to predict failures of a planetary gear transmission**

A. Cubillo, S. Perinpanayagam, M. de la Pena, I. Collantes, J. Vermeulen (Cranfield University UK, ATOS Spain, Spain)

- **System anomaly detection with recurrent neural networks**

J. Bayer, P. van der Smagt (TUM, fortiss, Germany)

- **Evaluation of Model-Based Condition Monitoring Systems in Industrial Application Cases**

S. Windmann, J. Eickmeyer, J. Badinger, O. Niggemann (Fraunhofer IOSB-INA, inIT, Germany)

- **Toward an novel learning assistant for the networked automation systems**

Y. Wang, M. Weyrich (University of Stuttgart, Germany)

6 pm

Best Paper Award and Discussion of the first Conference Day at Castle Sternberg



Quelle: Hans-Ulrich Rüngener

October, 2nd

8:30 am

Session 3

- **Efficient Image Processing System for an Industrial Machine Learning Task**

K. Vukovic, H. Dörksen, V. Lohweg (inIT, Germany)

- **Effizientes Engineering im Sondermaschinenbau durch automatische Steuerungscode-Synthese auf Basis einer funktionalen Kategorisierung.**

T. Helbig, S. Henning, J. Hoos (GSaME, inIT, Festo, Germany)

- **Geo-Distributed Analytics**

A. Ribbrock (Teradata, Germany)

- **Implementation and Comparison of Clustering-based PSO Extensions in Hybrid Settings with Efficient Approximation.**

A. Mueß, R.-E. Reisch, J. Weber, B. Jurke (DMG Mori Seiki, Germany)

10:30 am

Coffee Break and Exhibition

11 am

Session 4

- **Machine-specific Approach for Automatic Classification of Cutting Process Efficiency.**

C. Walther, F. Beneke, L. Merbach, H. Siebald, O. Hensel, J. Huster (University of Schmalkalden, Claas, Fraunhofer IOSB, University of Kassel, Germany)

- **Online F-Measure Optimization**

R. Busa-Fekete, E. Hüllermeier (University of Paderborn, Germany)

- **Meta-analysis of Maintenance Knowledge Assets for Predictive Cost Controlling of Cyber Physical Production Systems**

F. Ansari, M. Fathi (University of Siegen, Germany)

- **Towards Autonomously Navigating and Cooperating Vehicles in Cyber-Physical Production Systems**

A. Böckenkamp, F. Weichert (TU Dortmund, Germany)

1 pm

Closing Word

Get-together and Exhibition

Imprint

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