IDS 2019

Conference Guide

Industrial Data Science Conference
March 13th, 2019

BAuA
Friedrich-Henkel-Weg 1-25
44149 Dortmund, Germany

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http://ids2019.industrial-data-science.com/

Institute of Production Systems

rapidminer

technische universität dortmund

SFB 876 Verfügbarkeit von Information durch Analyse unter Ressourcenbeschränkung

Artificial Intelligence Group

Agenda

IDS 2019 – Industrial Data Science Conference

March 13th, 2019

09.00 – 09.45	Welcome & Prefaces
09.45 – 10.30	What is the Impact of AI for Industrial Systems? Prof. Dr. Katharina Morik, Artificial Intelligence Unit, TU Dortmund University
10.30 – 11.00	Industry Applications of Machine Learning & Data Science Ralf Klinkenberg, RapidMiner GmbH
11.00 – 11.30	Coffee Break
11.30 – 12.15	Success Factors for Industrial Data Science Projects Prof. Dr.-Ing. Jochen Deuse, Institute of Production Systems
12.15 – 12.45	Predictive Quality in Electronics Manufacturing Dr.-Ing. Jochen Bönig, Siemens AG
12.45 – 13.00	Panel Discussion & Outlook Session 2 Session Chair & Referees of Session 1
13.00 – 13.45	Lunch Break
13.30 – 14.30	Project Marketplace & Workshops Workshop 1: Getting started with RapidMiner Workshop 2: How to define IDS Use Cases in SME
14.30 – 15.00	Data Science Enablement in Automotive Industry Michael Harms, Jaguar Land Rover
15.00 – 15.30	Integrating Freight Flow Predictions for Shift Planning into an Enterprise-Ready Setup Dr. Max Pillong, Lufthansa Industry Solutions
15.30 – 16.15	Coffee Break
16.15 – 16.45	Cognitive Diagnosis – Automation of Field Data Analysis Martina Ringeln, Miele & Cie. KG
16.45 – 17.15	Data-driven Process Optimization in Beverage Industry Dominik Polster, Bitburger Braugruppe GmbH
17.15 – 17.30	Panel Discussion & Closing Remarks Session Chair & Referees of Session 2
From 17.30	Networking Reception

Organizers

Ralf Klinkenberg
Founder & Head of Data Science Research
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Prof. Dr. Katharina Morik
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Presenters

9:45-10.30

Prof. Dr. Katharina Morik, Artificial Intelligence Unit, TU Dortmund

Prof. Dr. Katharina Morik obtained her PhD from University of Hamburg in 1981 and her habilitation from Technical University of Berlin in 1988. Since 1991 she is professor at TU Dortmund University, where she heads the Artificial Intelligence Unit with a focus on Machine Learning and Data Mining. The broad range of methods includes statistical learning algorithms like Support Vector Machines (SVM) and graphical models. The analysis of very large data sets and high-dimensional data under resource constraints is investigated for data streams and distributed data. She participated in numerous European research projects and coordinated the European project MiningMart (2000 – 2003).

Katharina Morik authored more than 200 publication in recognized journals and conferences. She supports open source software development. Examples of which are the first efficient implementation of a Support Vector Machine, namely SVM_light by Thorsten Joachims, which was started at her AI unit, as well as the predictive analytics platform RapidMiner initiated by Ralf Klinkenberg, Ingo Mierswa, and Simon Fischer.

In November 2015, Katharina Morik was awarded membership in the National German Academy for the Technical Science, acatech. In March 2016, she was also awarded membership in the North-Rhine-Westphalian Academy of Sciences and Arts.

In 2011, Katharina Morik established the Collaborative Research Center SFB 876 on Machine Learning under Resource Constraints, which she leads since then. Within the 12 projects of SFB 876, 20 professors and 50 PhD students conduct research on resource-constrained data analysis and embedded systems. In 2018, the Competence Center for Machine Learning Rhein-Ruhr (ML2R) was accepted as one of the four competence centers in Germany. She is the speaker of ML2R together with Prof. Dr. Stefan Wrobel and the coordinator of all the machine learning competence centers.

What is the impact of AI for industrial systems?

AI has raised some interest, recently. The driving force behind this hype is machine learning, in particular deep learning. This talk sketches the current hot topics and then focuses on what is relevant for applications in industrial processes.

Ralf Klinkenberg, RapidMiner GmbH

Ralf Klinkenberg, co-founder of and head of data science research at RapidMiner and initiator and co-organizer of the Industrial Data Science Conference, is a data-driven entrepreneur with more than 20 years of experience in machine learning and advanced data analytics research, software development, consulting, and applications in the automotive, aviation, chemical, finance, healthcare, insurance, internet, manufacturing, pharmaceutical, retail, software, and telecom industries. In 2001 he initiated the open source data mining software project RapidMiner with Dr. Ingo Mierswa and Dr. Simon Fischer and in 2007 he founded the predictive analytics software company RapidMiner with Dr. Ingo Mierswa. In 2008 he won the European Open Source Business Award and in 2016 he was awarded the European Data Innovator Award. Since May 2017, Ralf Klinkenberg is member of the steering committee of the platform for Learning Systems of the national German department for research and education (Bundesministerium für Bildung und Forschung (BMBF)), an innovation initiative of the German government via which the German government intents to promote the use of Machine Learning in industry and society. Ralf Klinkenberg is passionate about learning in humans and machines as well as about how to leverage data with machine learning and predictive analytics to make organizations more data-driven, more agile, more efficient and effective, both from a business and a technical perspective.

Industry Applications of Machine Learning & Data Science

This presentation provides an overview of industry applications of machine learning and predictive analytics in the automotive, aviation, chemical, manufacturing, pharmaceutical, steel, and other industries covering the following use cases:

- Predictive Maintenance: Predicting and Preventing Machine Failures before they happen.
- Prediction, Prevention, Resolution of Critical Situations in Continuous Production Processes.
- Product Quality Prediction in early stages of the production process.
- Optimization of Production Processes and of Mixture of Materials or Ingredients.
- Prediction of Assembly Times and Assembly Plans for New Product Designs.

These use cases cover both, industry deployments as well as new application use cases from the RapidMiner Research Lab.

Presenters

11.30-12.15

Prof. Dr.-Ing. Jochen Deuse, Head of Institute of Production Systems

Prof. Dr.-Ing. Jochen Deuse, born in 1967, studied Mechanical Engineering at Dortmund University, Germany, and Manufacturing Technology at the University of Limerick, Ireland. Afterwards he gained his doctorate in engineering (Dr.-Ing.) at the Laboratory for Machine Tools and Production Engineering (WZL) at RWTH Aachen University, Germany. Throughout his career, he held senior management positions in the Bosch Group in Germany and Australia, before joining the Technical University of Dortmund, Germany, to become head of the chair of Industrial Engineering in 2005. In 2012 the chair of Industrial Engineering and the chair of Industrial Rorch associations and a member of the board at the industry network Robotics and Production Automation merged to form the Institute of Production Systems (IPS) under the direction of Prof. Deuse. Prof. Deuse is also a member of several scientific networks and research associations and a member of the board at the industry network NIRO e.V.

Success Factors for Industrial Data Science Projects

The modern industrial production environment receives strong impulses through an ever increasing use of data science methods for optimization purposes. In particular, the consideration of three essential success factors is of great importance for the efficient implementation of such industrial data science projects. Firstly, the project-internal procedure must be aligned with a structured procedure model, such as the CRISP-DM. Secondly, the project team has to be sufficiently interdisciplinary, for example ensuring sufficient domain knowledge. Thirdly, it is necessary to ensure sufficient data quality and quantity for the purposes of analysis, with the support, for example, of using so-called maturity models.

Dr.-Ing. Jochen Bönig, Siemens AG

Dr. Jochen Bönig studied mechanical engineering at the Technical University of Nuremberg and graduated with distinction in 2011 as Master of Science. During his studies he was a scholarship holder of the Faculty of Applied Mathematics and Physics in the field of numerical solution methods and supported research projects on laser beam source development and thermal long-term storage.

With his dissertation "Integration of the system behavior of automotive high-voltage cables into the virtual validation by structural-mechanical simulation", he received his doctorate degree Dr.-Ing. at the Friedrich-Alexander-University Erlangen-Nuremberg in 2016.

From 2011 to 2015 he worked as a research assistant at the Chair of Manufacturing Automation and Production Systems in the field of System Engineering, researching virtual validation in assembly.

From 2015 to 2018, Dr. Bönig worked at Siemens AG in Erlangen in production engineering at the equipment plant. Here he was responsible for Lean Virtual Engineering and acted as a project manager for flexible automation technology. Since mid-2018, Dr. Bönig has been a Manufacturing Consultant in the Factory Automation business unit of Siemens AG, where he is responsible for the transformation to a digital factory and heads the Customer Experience group.

Predictive Quality in Electronics Manufacturing

The use of data mining in production offers great potential for the development and integration of strategies for the optimization of products and production processes. By applying statistical methods to structured and unstructured data, previously unknown patterns and laws can be extracted and new knowledge can be generated. This enables the creation of forecast models for data-based and computer-aided prediction of future events.

This presentation will show how the use of data mining in electronics production can relieve X-ray inspection by predicting quality. On the basis of collected process data, prognosis models are trained, which allow a prediction of the expected X-ray result of the printed circuit boards. Early knowledge of the product quality to be expected enables early control interventions, so that on the one hand the inspection scope is reduced and on the other hand additional added value of defective products is prevented.

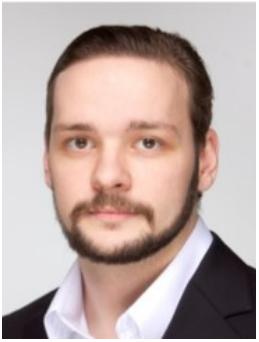
Michael Harms, Analytics Technical Lead, Jaguar Land Rover

Michael Harms works in the Data & Analytics CoE at Jaguar Land Rover driving data science across the business. He has also worked in Product Engineering Finance and Advanced Manufacturing Engineering. Before JLR, Michael worked for a parametric cost-estimating company working primarily in aerospace and defence.

Data Science Enablement in Automotive Industry

In order to leverage the power of data science, it has been necessary to ensure the technology stack meets the needs of our analyst community and that the correct technical skills are in place to compliment the domain-knowledge across the functions. This presentation explains some of the challenges faced on the journey to becoming a more analytical organisation and the success stories that data science has brought.

Dr. Max Pillong, Lufthansa Industry Solutions



Dr. Max Pillong studied Bioinformatics at the Johann-Wolfgang-Goethe University in Frankfurt am Main, Germany, graduating in 2011. In 2014 he obtained a doctorate in Chemistry & Applied Biosciences (Dr. sc ETH) from the Swiss Federal Institute of Technology in Zurich (ETH Zurich), Switzerland, working in the field of computer-assisted drug design. Afterwards, he took on a research position in Basel, working for the Novartis Institute of Biomedical Research (NIBR) before joining Lufthansa Industry Solutions in 2018, where he has been mainly working as a technology consultant in the field of air cargo and logistics.

Integrating Freight Flow Predictions for Shift Planning into an Enterprise-Ready Setup

Accurate freight flow predictions allow better shift planning and resource allocation. This presentation describes how RapidMiner can be used to integrate predictive analytics into an existing IT architecture built on diverse platforms and including third-party providers. The generated forecasts allow for precise freight flow predictions based on location, day of the week, and even down to a shift level, enabling Lufthansa Industry Solutions' customers to precisely schedule shifts and their required manpower. This presentation gives an overview of the software architecture, the integration of RapidMiner into the productive environment with Hadoop, the concept of the predictive model built, as well as an excursion into test automation with RapidMiner.

Martina Ringeln, Miele & Cie. KG

Martina Ringeln studied electrical engineering at the Technical University of Dortmund and graduated in 1992 as Dipl.-Ing. with a degree in communications engineering with focus on control and regulation technology. In 1992, Ms. Ringeln started to work for Miele & Cie. KG. Starting with the participation in a trainee program and following tasks in the technical purchasing department up to 1996, Ms. Ringeln changed in 1997 to the manufacturing department. She was responsible for projects within the field of continuous process improvement with a strong focus on product and process quality. Taking up her tasks, Ms. Ringeln completed the six - sigma black belt program and started working as a qualified master sigma black belt and internal mentor for Miele & Cie. KG. In 2006, she assumed the coordination of the "Miele value creation system" and was nominated as the head of the internal training-center in 2008.

Since mid-2012, Ms. Ringeln has been the head of series management in the quality department, where she is responsible for the quality assurance of the appliances in series production. This integrates the analysis of field data and feedback from production, sales and research by using methods of the six-sigma toolset to implement a continuous improvement and problem solving process. Ms. Ringeln works together closely with the Miele plant for dryers in Unicov and the new plant for washing machines in Ksawerow. In 2017 Ms. Ringeln took over the position as deputy director of quality management at Miele & Cie. KG.

Cognitive Diagnosis – Automation of Field Data Analysis

The analysis of field data as a basis for continuous optimization of products and processes is one core area of a sustainable quality management. In the field of consumer products especially the evaluation of customer and service data to identify defects is complicated by an unstructured and heterogeneous presence of data.

This presentation gives an insight how text mining and data mining are applied to field data at Miele and how Miele is going to improve the staff deployment for handling unstructured texts. The goal of Miele is to reduce the amount of screen work with a consistent high quality of analysis in the context of Industry 4.0 and Big Data in order to save time for other work activities.

Dominik Polster, Bitburger Braugruppe GmbH

Dominik Polster, born in 1972, studied at the TU Munich-Weihenstephan and graduated in 1997 as engineer for brewing and beverage technology. Afterwards he graduated as business engineer at the TU Munich in 2000. Throughout his career, he held management positions at Coca-Cola, Bitburger Braugruppe and Müller Milch, before rejoining the Bitburger Braugruppe GmbH, to become Head of Industrial Performance in 2017. Dominik Polster is initiator and consortium leader of the "DaPro – Data driven process optimization in the beverage industry based on machine learning"project.

Data-driven Process Optimization in Beverage Industry

Increased price and competitive pressure as well as initiatives to increase energy and resource efficiency present the beverage industry with major challenges for rationalization. In the presentation, the possibilities and limits of existing approaches to data-based process optimization will be presented and it will be shown that new approaches to data analysis are required for biochemical processes with complex combinations of different influencing variables. For this reason, the DaPro research consortium was established to explore data driven process optimization in the beverage industry based on machine learning.

Organizers

Institute of Production Systems, TU Dortmund University

The Institute of Production Systems (IPS) was founded in 2012 as a scientific institution of the department Mechanical Engineering at the TU Dortmund University. Under the leadership of Prof. Dr.-Ing. Jochen Deuse, the institute employs around 45 scientific and non-scientific employees from the disciplines of mechanical engineering, industrial engineering and management, logistics, mathematics and computer science.

The institute contributes in research and industrial application in the fields of Work System Design, Production System Dynamics, Digital Manufacturing and Smart Quality. The tools used to solve industrial problems in all fields thereby range from classical industrial engineering methods to industrial data science tools such as the application of advanced data analytics and machine learning.

Institute of Production Systems

www.ips.do

RapidMiner

RapidMiner brings artificial intelligence, machine learning, and predictive analytics to the enterprise through an open and extensible data science platform. Built for analytics teams, RapidMiner unifies the entire data science lifecycle from data preparation to machine learning to predictive model deployment. More than 480,000 analytics professionals in over 150 countries world-wide use RapidMiner products to drive revenue, reduce costs, and avoid risks. RapidMiner is used in many industries including the automotive, aviation, chemical, finance, healthcare, insurance, internet, manufacturing, pharmaceutical, retail, software, and telecom industries.

www.RapidMiner.com

Collaborative Research Center SFB 876

SFB 876 Providing Information by Resource-Constrained Data Analysis

The collaborative research center SFB 876 brings together the research fields of data analysis (Big Data Analytics, Data Mining, Machine Learning, Statistics) and Cyber-Physical Systems (Embedded Systems) and enhances their methods such that information from distributed, dynamic masses of data becomes available anytime and anywhere.

Resource constraints arise from the need to handle large-volume, large-dimensional, or high-velocity data in an efficient way. The relation between the data size and the computing resources determines the necessary scalability of algorithms. For small, ubiquitous devices, the resource constraints are directly apparent, but they hold as well for large computing facilities in the case of extremely large, high-dimensional, dynamic data. Whereas runtime is a standard consideration, attention of the research community for further resources such as memory, energy, and communication has come to focus only recently. Data analysis algorithms are investigated for several programming paradigms (data streams, MapReduce) and execution platforms (FPGA, GPU), taking their resource requirements into account. Resource models are established for the correct evaluation of resources, namely energy consumption or communication. The SFB 876 is a pioneer in pushing a mutual benefit of machine learning and cyber-physical systems.

The SFB 876 consist of 13 projects and an integrated graduate school with 20 project leaders and about 50 Ph D students. The projects in SFB 876 are structured into three areas. The challenges in the B projects stem from local, mobile, ubiquitous systems such as respiratory air sensors or virus scanners. Resource constraints in the C projects arise from the high dimensionality, dynamics, and volume of the data, as are generated, for instance, by astro- and particle physics. The overarching projects in the A domain encompass both other pillars.

http://sfb876.tu-dortmund.de/

LS 8

Artificial Intelligence Group

Der Lehrstuhl 8 von Prof. Dr. Katharina Morik beschäftigt sich mit Maschinellem Lernen, Big Data Analytics. Skalierbare Algorithmen werden entwickelt, die den kompletten Analysezyklus umfassen: Datenexploration, Datenbereinigung, Auswahl und Extraktion von Merkmalen, die Wahl des Modells bis hin zur Echtzeitanwendung der trainierten Modelle. In der Forschung hat der LS 8 maßgeblich zu Support Vector Machines, Distributed Data Mining (peer to peer learning) und Probabilistic Graphical Models beigetragen. Bei den Konferenzen ICML, ECML PKDD, IEEE ICDM ist der LS 8 regelmäßig vertreten. In der Lehre ist die besondere Nähe zur Fakultät Statistik durch eine gemeinsame Vorlesung sichtbar. Ein besonderer Augenmerk ist stets auf beweisbare Garantien von Algorithmen gerichtet. Anwendungsnahe Projekte nutzen maschinelles Lernen für die Optimierung von Prozessen durch realzeitliche Prognose. Mit internationalen Partnern wird das Prognosegestützte Routing im städtischen Verkehr erprobt (Smart Cities). Mit Industriepartnern werden Qualitätsprognose und die adaptive Steuerung von Produktionsprozessen entwickelt (Industrie 4.0). Als Ausgründung aus dem LS 8 ist RapidMiner entstanden. Das Unternehmen nimmt unter den Firmengründungen zur Datenanalyse eine herausragende Stellung ein und ist kontinuierlich die international beliebteste Plattform für Maschinelles Lernen bei KDnuggets und im Leader-Quadranten von Gartner (Gartner Magic Quadrant for Data Science Platforms).

www-ai.cs.uni-dortmund.de

Associated Partners

KI-MAP

www.ki-map.net

CPS.HUB /NRW

Competence Center for Cyber Physical Systems

www.cps-hub-nrw.de

Lernende Systeme

DIE PLATTFORM FÜR KÜNSTLICHE INTELLIGENZ

www.plattform-lernende-systeme.de

Notes