CCA
The Control Conference Africa
2021

SACAC and
Stellenbosch University
Faculty of Engineering
presents

Machine Learning for Process Control
CCA 2021
Preconference workshop

Misty Hills Country Hotel and Conference Centre
Muldersdrift, South Africa
6 December 2021

SACAC

Scope

The South African Council for Automation and Control will be hosting a workshop showcasing industrial applications of machine learning in process monitoring and control (details below) as well as providing hands-on experience in the application of basic ML techniques. Participants will be guided through examples illustrating fundamental concepts of ML, including the bias-variance trade-off, linear regression, classification, resampling techniques, regularization and feature extraction. The examples are designed to clearly illustrate ideas that are relevant to all ML applications, providing exposure and resources to enable participants to engage with the field more effectively. The workshop will culminate in participants applying what they have learnt to develop a soft sensor for a well-studied penicillin fermentation reactor.

The workshop is aimed at newcomers to the field of ML, but some basic programming knowledge is required.

Format

The workshop will take place in a hybrid format: participants will have the option of joining the workshop in person or remotely.

The workshop will make use of MATLAB for all examples. A trial MATLAB license will be made available; all participants will be required to install MATLAB on their personal devices prior to the event.

Costs, registration and enquiries

Please register online at cca2021.org/workshops

General enquiries: info@cca2021.org

The workshop will be free to all CCA2021 attendees.

For workshop participants not attending CCA2021:
    In person, SACAC member: R550
    In person, non-SACAC member: R800
    Remote workshop attendance: Free

Speakers

Roelof Coetzer obtained his PhD in Mathematical Statistics from the University of the Witwatersrand in 2004. With 30 years' worth of industry experience (including a term as President of the South African Statistical Association). He has been successful in driving Data Science projects and Big Data Analytics solutions, leading highly technical multidisciplinary teams and developing technology packages. He has co-authored 47 peer-reviewed articles in national and international scientific journals and conference proceedings. Prof Coetzer joined the North-West University as Associate-Professor in the Department of Statistics in June 2021. His industrial case study is titled *Specifying process health indices for multivariate process monitoring and diagnostics using machine learning models*.

Jacques Strydom graduated with distinction from Stellenbosch University with a B.Sc. Hon in Computer Science. In 1998 he started his extended career at Sasol and played a key role in the progression of an Advanced Process Control and Optimisation footprint. He was promoted to Chief Engineer: Control and Instrumentation in 2012 and soon after joined Sasol Group Technology's Centre of Expertise as Principal Specialist: Process Control and Optimisation. He is currently appointed as Principal Specialist: Digitalisation in the Secunda Operations division of Sasol's Energy Operations. His industrial case study is titled *Continuous control of an industrial separation process using an empirically derived virtual analyser*.

John Atherfold holds a BScEng in Mechanical Engineering, and an MSc in Computer Science, both from the University of Witwatersrand, and is currently employed as a specialist at Opti-Num solutions. His final research report was in the Predictive Maintenance of Power Transformers, which involved using machine learning techniques for the purpose of forecasting. He is especially interested in bridging the gap between engineering and computer science through the design and implementation of intelligent systems in industry. His industrial case study is titled *Soft-sensing boiler health through machine learning*.

Stone Three is an Industrial Internet-of-Things company that develops AI-augmented solutions within the digital productivity, workplace safety and employee healthcare sectors. They offer smart sensors that leverage machine vision technology, as well as offering process monitoring services: generating actionable advisories for improved process performance. In this talk, titled *Industrial machine vision with deep learning: Challenges and best practices* Stone Three will share their insights on the challenges and best practices for scalable machine vision smart sensors: including what is required for industrial image data collection, image labelling, label review, model training and review, model deployment and model updates.

Workshop sponsored by Stellenbosch University
Faculty of Engineering

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