CORE Skills

Delivering Data Science
In Resources & Energy

Machine Learning II

DAY 9

15-Day Data Science Springboard

Dr Thomas Stemler & Dr Débora Corrêa, University of Western Australia, UWA thomas.stemler@uwa.edu.au
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Program partners

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THE UNIVERSITY OF WESTERN AUSTRALIA

Curtin University

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Program Timeline

DAY 8: Machine Learning I: Fundamental concepts and supervised techniques

2-hour Leading Data Scientists Leader Support	Preparatory		Introduction to Data Projects	Data Analysis			Data & Communication Sandbox	Data Fusion and Machine Learning		Data Fusion Sandbox	Special Data Types - Time-series & Networks	Special Data Types - Knowledge Discovery from Natural Language Processing & Text Mining	Special Data	Capstone Project Development & Presentation	Capstone Propeller
2-hours	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
Enabling your people's data science upskilling & project delivery in 15 day program	Introduction to the program tools	Introduction to the program tools	Zero to Data Science in a day	Getting to know the Program Tools: Data munging and exploratory data analysis	Simple predictions: Regression and statistical model building	Multivariate analysis and model building	Effective data storytelling: Communicating results to non-technical audiences	Pros and cons of commonly used statistical and machine learning techniques I	Pros and cons of commonly used statistical and machine learning techniques II	Consolidate approaches covered and test on datasets	The 4th dimension and predictions	Finding needles in wordstacks	Spatial analytics and predictions	Capstone Project pitches to leadership	Project Review Day

Dr Débora Corrêa

Educator

Lecturer, Department of Computer Science and Software Engineering, The University of Western Australia

CORE Skills Data Science Springboard Delivery Team

Débora Corrêa is a Lecturer in the School of Computing, Mathematics and Physics at the University of Western Australia. She is one of the founding researchers of the Australian Research Council Industrial Transformation and Training Centre (ITTC) to Transform Maintenance through Data Science. The Centre is a collaboration between UWA, Curtin and CSIRO with industry partners BHP, Roy Hill, Alcoa, MRIWA and CORE Skills.

She currently teaches data science and machine learning in the Department of Computer Science and Software Engineering. In 2019 Débora was awarded funding from the Australian Research Council through the Discovery Programme for research into the development of new time series techniques for the monitoring and prediction of system behaviour. She has previously been awarded research funding from the Cancer Council of Australia and has published extensively on the application of nonlinear time series analysis and machine learning across a range of applications.

Débora is a recognised expert in her field and has delivered invited keynote lectures and invited short-courses at national and international meeting in Europe and Australia.

Program Delivery Day 9 (Machine Learning II)

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Publications: https://research-repository.uwa.edu.au/en/persons/d%C3%A9bora-correa

Dr Thomas Stemler

Educator

Senior Lecturer, Department of Mathematics and Statistics, The University of Western Australia

CORE Skills Data Science Springboard Delivery Team

Thomas Stemler is a teaching and research academic in the School of Physics, Maths and Computing in the Department of Mathematics and Statistics at UWA. His research area is Theoretical Physics and Applied Mathematics with current research projects involving non-linear time series analysis and irregular sampled data.

As an applied mathematician, he develops and applies nonlinear time series analysis to understand and forecast the dynamics of complex systems. Methods he draws from come from areas of classical dynamical system to machine learning, with applications ranging from paleo-climate analysis to traffic dynamics.

Program Delivery Days 8-9 (Data Fusion & Machine Learning) & Day 11 (Special Data Types - Time Series)

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Schedule

DAY 9

AWST	AEST	Agenda	
08:00	10:00	Open JupyterHub, Q&A	
08:15	**10:15**	**Fundamentals and Multilayer Perceptrons** (*5 min break ~8:45/10:45)*	Debora
09:30	*11:30*	*Morning Tea*	
09:45	**11:45**	**Training Artificial Neural Networks** (*5 min break ~10:30/12:30)*	Thomas
11:15	*13:15*	*Lunch*	
12:00	**14:00**	**Recurrent Neural Networks** (*5 min break ~12:45/14:45)*	Debora
13:30	*15:30*	*Afternoon Tea*	
13:45	**15:45**	**Convolutional Neural Networks** (*5 min break ~14:30/16:30)*	Thomas
15:15	17:15	Q&A, Reflections, Takeaways, Menti Feedback	Tamryn
15:30	17:30	Close	

Aims & Learning Outcomes – Day 9

Aims

1. Introduce artificial neural networks and discuss architectures specially designed for images, sequence data and structured data.
2. Introduce the main concepts of deep learning and provide everyday industry examples.
3. Present the practical strategies to train neural networks.

Learning Outcomes

1. Appreciate the powerful framework given by neural networks and deep learning techniques.
2. Recognise what types of data are required by such algorithms.
3. Have the general idea about how to train a neural network.
4. Know how to develop a project for classification/forecast with deep learning.

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