CPD Course | Dept. of Electrical Engineering

Introduction to Machine Learning

28 May—1 June 2018

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA · UNIVERSITEIT VAN KAAPSTAD

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Introduction
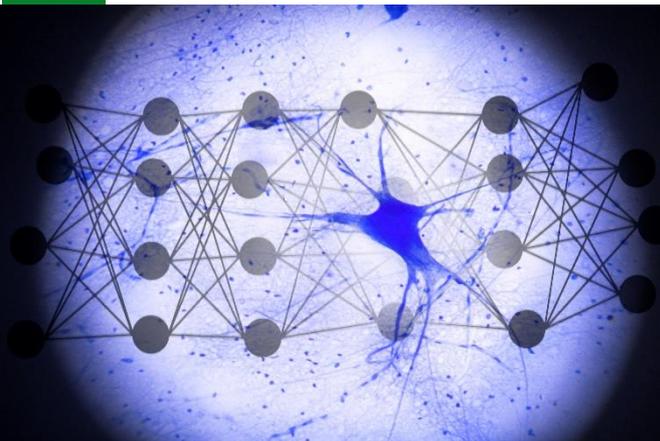
Over the last few years the field of machine learning has become very active mainly because of two major innovations, namely the invention of deep learning algorithms and the development of echosystems which made users able to program parallel computational platforms with greater ease.

Currently people are trying to use machine learning in a range of uses starting from space data analysis to farming. One example is shown here: "How a Japanese cucumber farmer is using deep learning and TensorFlow" https://tinyurl.com/zh9f268. New startups are venturing into interesting uses of machine learning and established industries are investigating how they can benefit as well.

This short course is intended to expose the audience to the basics of machine learning and to get them started with using some of the powerful tools available.

The course is suitable for working engineers and software developers interested in the emerging field of machine learning and to gain some hands on using opensource toolboxes

Salient Features:

– More than 50% of the contact hours shall be spent in lab-work
– Use of real-life data, e.g. Radar, RFI, SETI or Stock-exchange data
– **Limited seats: please confirm your participation as soon as possible**

Course Objectives

Exit level outcomes

– Understand the basics of statistical machine learning
– Appreciate the working of a single artificial neuron and a basic neural network
– Code a basic neural network in Python
– Use TensorFlow to code a multilayer neural network

Specific learning outcomes

– Can identify the data required for a particular machine learning problem
– Apply a simple single layered artificial neural network to solve a simple data classification problem
– Apply Keras and Tensorflow to solve a complicated pattern classification problem

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Course Content

Each of the following topic sections will have 50% of the time devoted to lectures and 50% to lab work. The attendees shall be required to come with their laptop and will be given remote access to our GPU server to work on the lab sessions.

Topic	Contact hours
Machine Learning Strategies	8–10
– No Free-lunch Rule	
– Re-sampling for Classifiers Testing	
– Dimension reduction using PCA and kPCA	
Introduction to machine learning and pattern recognition	4–5
– Bayes rule	
– Statistics and linear algebra	
Introduction to Tensorflow and Keras	5–6
– Data flow graphs (DFG) way of coding	
– Basic model-building in Tensorflow and Keras	
– Data handling	
ANN & Support Vector Machines	8–10
– Perceptron	
– Error Back-propagation and network regularization	
– Kernel Methods	
– Support Vector Machines	
Deep Learning	8–10
– Convolutional Neural Networks	
– Recurrent Neural Networks	

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Course Presenter

A/Prof. Amit Kumar Mishra has been working in the field of statistical signal processing and radar system development for past 12 years. He is an Associate Professor with the Department of Electrical Engineering, University of Cape Town. He is a Senior Member of IEEE and has more than 25 journal papers in ISI listed journals and is an inventor/co-inventor in eight patent applications.

A/Prof. Mishra shall be assisted by Mr. Jarryd Son who is a research scholar at University of Cape Town working in the domain of cognitive robotics.

Course Overview

Name	Introduction to Machine Learning
Duration	28 May – 1 June 2018
Venue	Room 6.01, Menzies Building, Upper Campus, UCT
CPD	5 CPD points, ECSA Validation No: UCTIML18
Participants	Working engineers and software developers interested in the emerging field of machine learning and to gain some hands on using SciKit Learn and Google's TensorFlow toolboxes.
Fees*	Standard delegate: R11 700.00 UCT staff/student: R5 850.00 Non-UCT student: R8 775.00
Other	For technical enquiries, contact A/Prof Amit Mishra amit.mishra@uct.ac.za

*The course fee includes online course notes as well as lunch and refreshments.

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Registration and Cancellation

- You can register for this course in one of the following ways:
    1. register online or
    2. download the registration form and email it to ebe-cpd@uct.ac.za
- Registration covers attendance of all sessions of the workshop, teas and lunches, and a set of notes.
- Registrations close one week before the start of the course. Confirmation of acceptance will be sent on receipt of a registration form.
- **Cancellations must be received one week before the start of a course, or the full course fee will be charged.**

Certificates and CPD Points

A certificate of attendance will be awarded to CPD participants. Participants need to attend 80% of the lectures to qualify for an attendance certificate. CPD participants can also request a formal university transcript, which will show this course as part of a Professional Development Career.

Contact details

For more information or details on CPD courses, visit our website or contact us.

Web: http://www.cpd.uct.ac.za
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