



# Committee Innovation and TopQuants launch first College Tour for Professionals on Data Analytics

## ANNOUNCEMENT

August 13, 2018

## 1 Announcement

The **Committee Innovation** of PWN (Platform Wiskunde Nederland) and **TopQuants** are proud to announce their first College Tour on data analytics for professionals. The college tour consists of a series of lectures on a number of related topics. Each topic is carefully selected to align with current developments and trends in analytics, data science and machine learning. The lectures cover a) a historic overview and b) a deep dive in recent developments. After a lecture you will have a deeper understanding of the topic and a number of practical pointers to explore further on your own.

The lectures are intended for professionals with a background in science interested in current trending topics, possibly working in, but not limited to, the financial sector. It is envisioned that the lectures and the networking afterwards facilitate a healthy dialogue between academia and industry to foster the sharing of knowledge.

The lectures will take place in the evening starting in September. Catering will be provided during walk-in and afterwards participants are invited to join the informal networking part of program. Complementary drinks will be served.

The fee for the program is set at €480,- with everything included. An early bird fee of €420,- applies for registrations before August 26th, 2018. The number of tickets for the complete series of lectures is limited to 40. Separate registration per lecture is also available for €120,-. The number of these tickets is limited to 10 per evening.

## 2 Program

Details of the program are given below.

Location:	De Nieuwe Poort		
	18:45	-	19:30 Walk-in
Schedule:	19:30	-	21:30 Lecture
	21:30	-	23:00 Networking

Scheduled topics:

Day	Date	Topic	Lecturer
Thurs	13-09-2018	Dynamic Pricing and Learning	dr. A.V. (Arnoud) den Boer (UvA)
Tues	18-09-2018	Deep Learning	dr. V. (Vlado) Menkovski (TU/e)
Tues	25-09-2018	Network Analysis	Prof. dr. R (Remco) van der Hofstad (TU/e)
Mon	01-10-2018	Anomaly Detection and Monitoring	dr. A. (Alessandro) Di Bucchianico (TU/e) and Prof. dr. M. (Mykola) Pechenizkey (TU/e)
Tues	09-10-2018	GPU Computing	Prof. dr. ir. C. (Kees) Vuik (TU Delft)
Mon	15-10-2018	Natural Language Processing	Prof. dr. A. (Antal) van den Bosch (Radboud University)



kindly sponsored by ING



### 3 Registration

To register, please go to the [TopQuants](#) site.

### 4 Abstracts

**Dynamic Pricing and Learning** In this talk I will review state-of-the-art academic research on so-called “learning-and-earning” problems: how to optimally learn from accumulating sales data which selling prices optimize profit or revenue? I will also draw connections to related data-driven problems such as online advertisement optimization and A/B testing for websites.

**Deep Learning** Machine Learning is receiving growing attention due to recent successes in long standing problems such as speech recognition, computer vision and natural language processing. These successes are mainly due to a combination of advances in artificial neural networks or deep learning methods, as well as the availability of large dataset and computational resources. This lecture covers the motivation for the underlying technology: When to use Machine Learning and particularly when to use Deep Learning? Why does Deep Learning work so well and what are its drawbacks? We will go over a number of examples that illustrate the modelling process, the design decisions and present a number of successful architectures.

**Network Analysis** Networks are all around us. Millions of people use the Internet to find a hotel, and Facebook to share experiences in their daily lives. We also use our own social networks to find jobs, and realize ourselves that the economy is one huge network of companies, banks and governments that are intricately intertwined, thus creating large systemic risks. Since two decades, networks have also attracted the attention of scientists. Remarkably, they have discovered that many networks share unexpected features, in that the number of connections between elements in the network vary tremendously, and that such networks are often small worlds, with information, but also diseases, spreading at enormous speeds.

In this lecture, I will discuss the basics of network science. I will discuss empirical findings on real-world networks, and highlight the usefulness of viewing many real-world features in terms of networks by describing the friendship paradox. I will next discuss network statistics as ways to classify them, and introduce centrality or importance measures to find the central players in networks. I will conclude by discussing networks in economy, and relate so-called systemic risks, arising from companies failing leading to other companies failing, to cascades in networks. While the settings described remain relatively simple, they sketch a picture of why networks are important to all of us. We assume hardly any prior knowledge, except very limited background in basic probability.

**Anomaly Detection and Monitoring** Detecting changes in data streams is an important task in several business and industrial applications, e.g. fraud detection in financial transactions or network intrusion in computer networks. Several approaches exist to detect changes, but an overview of state-of-the-algorithms is not easy to get because this is being studied in different scientific communities and thus various names are used (changepoint detection, anomaly detection, concept drift etc.). We will provide an overview of state-of-the-art approaches from both the statistical and data mining community so that business/industrial professionals know where to look for solutions for the challenges they face in detecting changes.

**GPU Computing** The Graphics Processing Unit or GPU is nowadays a mainstream component in Scientific Computing. For relatively little money one can have supercomputer performance. However, some extra work has to be done to make an ordinary sequential program suitable for use on the GPU.

One of the most important tools for using GPUs is currently “CUDA” (Compute Unified Device Architecture). This is basically an extension to the C programming language, which can be used to program the GPU in an easy way. Another tool is OpenCL, but as this is less mature than CUDA and performs less on especially the newest GPUs, the focus will be currently on CUDA.

During this lecture we will explain the basic principles of GPU programming. For a more in depth course, see: [http://ta.twi.tudelft.nl/users/vuik/gpu\\_flyer.pdf](http://ta.twi.tudelft.nl/users/vuik/gpu_flyer.pdf).

**Natural Language Processing** Natural Language Processing (NLP) is one of the classic fields of artificial intelligence that deals with the natural language and communication side of software and robots. Since the 1950s, work in NLP has focused on building systems that allow people to communicate with and through machines in natural language. This requires basic systems for understanding language(s), being able to convert language in structured information, and vice versa: to generate narrative text from data. Well-known NLP applications include human-machine interaction (e.g. chatbots), machine translation,

text mining, and more mundane tasks such as spelling correction and writing assistance. NLP is closely connected to the sister fields of speech technology and information retrieval. NLP uses machine learning for fast deployment; the field offers rich libraries (both open source and commercial) of ready-made NLP components. Still, building NLP applications is not trivial. If an NLP tool works for English, it does not automatically work for Dutch or other languages. NLP tools can be very accurate within a specific domain, but this requires adaptation and integration of machine learning with domain expert knowledge. There is no “big green NLP button”. Also, universities produce fewer experts who know how to build NLP systems than there is demand. NLP is red hot, but how can you get it to work for you?

## 5 Biographies

### dr. A.V. (Arnoud) den Boer



After obtaining a mathematics degree at Utrecht University (2006) and a post-master degree Mathematics for Industry at Eindhoven University of Technology (2008), Arnoud wrote his PhD thesis “Dynamic Pricing and Learning” (2013) at the CWI Centrum for Wiskunde and Computer Science, under the supervision of Bert Zwart and Rob van der Mei. After having had positions at Eindhoven University of Technology (postdoc), University of Amsterdam (postdoc), and University of Twente (postdoc / Assistant Professor), he joined the University of Amsterdam in 2016 as assistant professor in the mathematics department. He is also affiliated to the

Amsterdam Business School.

Arnoud’s research focuses on the interface of learning and optimization, with applications in dynamic pricing and revenue management. His PhD thesis and subsequent research has been awarded the 2015 Gijs de Leve prize for best PhD Thesis in operations research defended in the Netherlands in the period 2012-2014, a honorable mention for the Willem R. van Zwet Award for best PhD Thesis in statistics & operations research defended in the Netherlands in 2013, a finalist place for the 2015 European Doctoral Dissertation Award, an NWO Veni grant in 2014, and the INFORMS Revenue Management & Pricing Section Prize in 2016. Arnoud organized the 2017 INFORMS Revenue Management and Pricing Section conference, and is Associate Editor for Management Science.

### Prof. dr. R. (Remco) van der Hofstad



Remco van der Hofstad received his PhD at the University of Utrecht in 1997, under the supervision of Frank den Hollander and Richard Gill. Since then, he worked at McMaster University in Hamilton, Canada, and Delft University of Technology.

He is currently full professor in probability at Eindhoven University of Technology and acting scientific director of Eurandom. Further, he is jointly with Frank den Hollander responsible for the ‘Random Spatial Structures’ Program at Eurandom.

Remco received the Prix Henri Poincaré 2003 jointly with Gordon Slade, the Rollo Davidson Prize 2007, and is a laureate of the “Innovative Research VIDI Scheme” 2003 and “Innovative Research VICI Scheme” 2008. He is also one of the 11 co-applicants of the Gravitation program **NETWORKS**.

Remco is acting spokesman for the Dutch Mathematics platform “Platform Wiskunde Nederland (**PWN**)”.

Remco is editor in chief of the “**Network Pages**”, an interactive website by the networks community for everyone interested in networks.

### dr. V. (Vlado) Menkovski



Vlado Menkovski is an Assistant Professor of Data Mining at the Department of Mathematics and Computer Science, TU Eindhoven. His interests lie in Machine Learning and its applications in domains such as Image Analysis, Computational Biology, Applied Physics, and Natural Language Processing. His background includes a tenure at Philips Research as a Research Scientist involving work in Deep Neural Networks (Deep Learning) for Medical Image Analysis in Digital Histopathology and Interventional Radiology and analysis of gene expression data in Genomics. His particular focus is on applications of Deep Learning in natural sciences, and

development of methods for efficient learning, model interpretation, and learning from interactions with experts. Vlado Menkovski holds a PhD degree (Cum Laude) from Eindhoven University of Technology and a MSc from Carnegie Mellon University, USA. Vlado Menkovski has co-authored over 45 peer-reviewed publications in

various journals and conferences on a range of applications of Machine Learning. Has received multiple awards including best PhD project in 2014 from Eindhoven University of Technology.

### dr. A. (Alessandro) Di Bucchianico



Alessandro Di Bucchianico is an Assistant Professor in the Department of Mathematics and Computer Science at Eindhoven University of Technology (TU/e). He is specialized in industrial statistics, statistical process control, reliability analyses, statistical computing, statistical software R and rare event simulation. Alessandros main research interests are Statistical Process Control (SPC), (control charts for specific alternative hypotheses and foundations of SPC in view of big data challenges), Condition Based Maintenance (integration of SPC monitoring procedures with predictive maintenance and data pooling in view of big data challenges), Reliability Theory (correct inference for software reliability models and test plans for reliability testing) and the importance of sampling applications to semiconductor production problems.

He is also highly active in the field of statistical education and statistical computing, especially use of R in industrial context and literate reporting. In particular, Alessandro likes to explore the relations between his research topics and address the challenges and opportunities offered by the Big Data revolution. In the teaching of his data analysis courses he tries to emphasize the use of teaching software (e.g. Statlab), reproducible research, and to link the scientific method with data analysis.

### Prof. dr. M. (Mykola) Pechenizkiy



Mykola Pechenizkiy is Professor of Data Mining at the Department of Mathematics and Computer Science, TU Eindhoven. At the Data Science Center (DCS/e) he leads the Customer Journey interdisciplinary research program aiming at developing techniques for informed and responsible analytics. As principal investigator of several applications-inspired research projects he aims at developing foundations for next generation predictive analytics dealing with anomaly detection and handling concept drifts. Mykola advocates responsible data science, including accountable and transparent machine learning. Over the past decade he has co-authored more than 100 peer-reviewed publications and served on program committees of leading data mining and AI conferences.

### Prof. dr. ir. C. (Kees) Vuik



Cornelis Vuik has obtained his MSc on Applied Mathematics at the TU Delft. After that he has worked at Philips Research Laboratories. He then studied at University Utrecht and obtained his PhD in Mathematics in 1987. He joined the Delft Institute of Applied Mathematics at the TU Delft. From 2007 he is full professor Numerical Analysis. Furthermore he is Scientific Director of 4TU.AMI Applied Mathematics Institute and Director of TU Delft Institute for Computational Science and Engineering (DCSE). Kees Vuik has written more than 180 ISI papers. He has an H-index of 40 and more than 6000 citations. His domain of expertise is fast and robust solvers for (non)linear systems of equations.

### Prof. dr. A.P.J. (Antal) van den Bosch



Antal van den Bosch (MA, Computational Linguistics, 1992; Ph.D., Computer Science, 1997) is Professor of Language and Speech Technology in the Faculty of Arts at Radboud University Nijmegen, and director of the Meertens Institute of the Royal Netherlands Academy for Arts and Sciences, Amsterdam. His work is in the crosssection of machine learning, language technology, and the humanities. He held research positions at Tilburg University, the Netherlands and the Universit Libre de Bruxelles (1992-1994), Universiteit Maastricht (1994-1997) and Tilburg University (1997-2011). He is guest professor at the Computational Linguistics and Psycholinguistics Research Centre at the University of Antwerp, Belgium, a member of the Netherlands Royal Academy of Arts and Sciences, and fellow of the European Association for Artificial Intelligence.