Wiskunde Informatica Studievereniging 'Christiaan Huygens'

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Advanced Analytics

Diving Deep into your Data

November 19th

19:00-22:00

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Introduction

Daniël van Gelder

Chairman
Symposium Committee 2019-2020

Nowadays, almost all aspects of our lives seem to be driven by data. Over the last years, data analytics techniques have become more and more sophisticated. Businesses and academia have been pushing the boundaries of current technologies for solving the complex problems that we face. While the possibilities of data analytics seem endless, they offer challenges as well. More and more people ask themselves how much data they are willing to share. Are businesses stepping over moral and ethical boundaries to generate profit?

This will be the core topic of today's symposium by the mathematics and computer science study association "Christiaan Huygens". We have put together an exciting program for today, where we will explore the possibilities of the state-of-the-art data analytics techniques as well as discuss the ethical concerns associated with processing personal data.

Enjoy!

Daniël van Gelder
Chairman Symposium Committee 2019-2020

Partners

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Hi, happy to meet you in tech!

As one of the big four you perhaps might know us as an audit firm, but at PwC we are so much more than that. We would like to get to know you better and let you in on more about all the technical challenging opportunities we have for you.

One of the perks at PwC is that you have the chance to work on projects with members of different teams and disciplines. Meaning no day is the same, every time a new project, new client, new problem, new challenge and a new solution. Working on technically challenging issues means that we need to be on top of new development in all technical relevant fields. We really stimulate you to keep developing yourself with internal and external training, resulting in you really embracing new technologies. This means that we are constantly looking for innovative ways of working and new technologies on how we can find solutions for our clients.

Who are we?
With us, you'll be at the forefront of new initiatives and explore emerging technologies and trends to help our clients unlock their potential, protect their businesses, provide insight and help steer strategy. Digitalization and innovation are important solutions of how we can serve our clients and society better in solving challenging problems!

Let's create tomorrow
At PwC we stand for our diverse & inclusive culture. This means working in mixed teams and departments with people from different cultures, knowledge, views and experiences. We believe that together we are stronger and can serve our clients better. To give you an example, during Covid-19 we have been very active to help and solve problems pro bono in society wherever we can. We want to contribute to society and believe it is extremely important to help in fields that we can.

PwC gives you the experience and luggage to kick off your career in tech!

Program

Time	Activity
19:00	Opening by Eva de Valk
19:10	Trustworthy AI by Cynthia Liem
19:50	Biostatistics by Dimitris Rizopoulos
20:30	Break
20:35	Data, Identity and Privacy: the case for Design for Values by Jeroen van den Hoven
21:15	Panel Discussion
22:00	Closing

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Eva de Valk

Opening - Chair of the Day

19:00 - 19:10

I'm honoured to be acting as the moderator of the Advanced Analytics 2020 symposium of 'Christiaan Huygens', the study association for Applied Mathematics and Computer Science at TU Delft. As a journalist, I focus on technology and innovation, in particular technology's effects on culture and society. From 2012 to 2014 I worked as a correspondent in Silicon Valley. I had the privilege to witness up close the rapid growth of technology companies such as Apple, Google and Facebook, as well as the rise of numerous start-ups. In my book Silicon Valley: Where the Future is Made ('Silicon Valley: Waar de toekomst wordt gemaakt'), I describe how Silicon Valley grew into a hotbed of innovative technologies and disruptive business models that are changing lives around the world in every possible aspect.

There is no doubt that the rapid advance of data analytics and Artificial Intelligence creates amazing opportunities. However, in recent years, there has been a backlash against the once-hyped Silicon Valley companies and the promises they embody. Ongoing data privacy and security concerns were exacerbated by a series of major scandals. In the Facebook-Cambridge Analytica scandal, millions of Facebook users' personal data was acquired without their consent and used for political purposes. Algorithms of Facebook, Twitter and YouTube reward users for spreading sensational or extreme content, thereby threatening democracy. COMPAS, an algorithm used in the US for assessing a criminal's risk to reoffend, proved

to be racially biased. An overview study of the US National Institute of Standards and Technology showed that a majority of face recognition algorithms performed worse on black and Asian faces than white faces.

We have seen some serious data scandals in the Netherlands as well. For instance, a system employed by the Tax Authorities to determine the risk of a citizen committing fraud with childcare support allowance was found to have a bias against citizens with a dual-nationality ('toeslagenaffaire'). Another comprehensive governmental fraud detection system was halted for being in violation of the European Convention on Human Rights ('SyRI-arrest').

When I lived in Silicon Valley, I was shocked by the apparent lack of interest developers had in the cultural and social consequences of their creations. Or maybe it was not so much a lack of interest, but a lack of shared conceptual framework to deal with these often-complex ethical questions. Being ethical was often conflated with being compliant and seen as a responsibility of the legal department rather than that of developers. In my opinion, the tech-backlash of the past few years could have a cathartic effect. It should be considered not so much as a rejection of technology, but as the starting point for a comprehensive debate about the consequences of widespread use of data. We should be looking for ways on how technology can serve all of us, and not just a few.

Therefore, I'm thrilled to be diving into these questions during the Christiaan Huygens study association's Advanced Analytics 2020 symposium. You will be creating the algorithms of the future. There is no better moment to immerse yourself in the moral and ethical questions of data analytics than now.

Cynthia Liem

Trustworthy AI: what are we really after?

19:10 - 19:50

Abstract

In this talk we ask ourselves the question how our data, models and systems reflect what we want to measure. Are we measuring and predicting what we intend to? In the current era of big data, we can acquire and analyze more data than ever, but this data is unstructured and messy, and measurement procedures may not have been optimal. Even more strongly, in many human-focused use cases, we may not be able to fully articulate what and where to measure, even though we have a good sense on what is an intended or unintended outcome.

How can we therefore use such insights in the way we assess the success of our solutions? Where do our current technical frameworks and paradigms fall short? What are common points of friction, as at least experienced by an interdisciplinary academic coming from an artistic and engineering background?

Biography

Cynthia Liem is an Assistant Professor at the Multimedia Computing Group. In 2007 and 2009, she obtained her BSc and MSc degree in Media and Knowledge Engineering (Computer Science) at the TU Delft, after which she continued pursuing a PhD at the same institution (defended in 2015). Besides, she obtained the BMus (2009) and MMus (2011) degree in classical piano performance at the Royal Conservatoire in The Hague.

Her current research interests fall under two categories, which both are strongly motivated by her combined background in computer science & engineering and music: the algorithmic surfacing of information that users would not discover by themselves and validation and validity in data science.

Dimitris Rizopoulos

Biostatistics

19:50-20:30

Abstract

In early-stage chronic non-communicable diseases, invasive procedures, such as biopsies, endoscopies are used for diagnosing disease progression. Patients typically undergo these invasive tests in a fixed one-size-fits-all manner. An example of such a setting that also forms the motivation for our work is prostate cancer patients with low-grade tumors. Namely, patients in this disease stage are closely monitored using blood tests. Still, the decision to treat is based on prostate biopsies. The problem is that biopsies are painful and lead to complications. The current standards are to perform biopsies for all patients every one or three years.

We argue that a better approach is to opt for personalized test schedules. Our approach utilizes the progression-risk of each patient. It aims to balance the number of tests (burden) and time delay in detecting progression (shorter is beneficial). Our approach uses a novel statistical modeling framework called joint models for time-to-event and longitudinal data. Using these models, we consolidate patients' longitudinal data (e.g., biomarkers) and previous tests' results into individualized future cumulative-risk of progression. We then create personalized schedules by planning tests on future visits where the predicted cumulative-risk is above a threshold (e.g., 5% risk). We update the personalized schedule with data gathered over follow-up. To find the optimal risk threshold, we minimize a utility function of the expected number of tests and expected time delay in detecting progression. These two quantities are estimated in a

patient-specific manner, using a patient's predicted risk profile. Patients/doctors can employ these quantities to compare personalized and fixed schedules objectively. Last, we implement our methodology in a web-application for prostate cancer patients.

Biography

Dimitris Rizopoulos is a professor of biostatistics at the Erasmus Medical Center Rotterdam. His research focuses on joint models for longitudinal and time-to-event data with applications in biomarker identification, precision medicine, screening and active surveillance. He currently serves as a co-Editor for Biostatistics.

Jeroen van den Hoven

Data, Identity and Privacy: the case for Design for Values

20:35 - 21:15

Abstract

In the age of Big Data and AI we can learn a lot about people. Analytics can benefit us in many sectors and applications of society, but it can also generate a range of threats and create new vulnerabilities. These should be identified as early as possible and anticipated in the design of our advanced digital technologies. This is what we call Designing for Values or Responsible AI.

Biography

Jeroen van den Hoven is university professor and full professor of Ethics and Technology at Delft University of Technology and editor in chief of Ethics and Information Technology. He is currently the scientific director of the Delft Design for Values Institute. He was the founding scientific director of 4TU.Centre for Ethics and Technology (2007-2013). In 2009, he won the World Technology Award for Ethics as well as the IFIP prize for ICT and Society for his work in Ethics and ICT. Jeroen van den Hoven was founder, and until 2016 Programme Chair, of the program of the Dutch Research Council on Responsible Innovation. He published Designing in Ethics (Van den Hoven, Miller & Pogge eds., Cambridge University Press, 2017) and Evil Online (Cocking & Van den Hoven, Blackwell, 2018). He is a permanent member of the European Group on Ethics (EGE) to the European Commission. In 2017 he was knighted in the Order of the Lion of The Netherlands.

Panel

Ronald Prins, co-founder Hunt & Hackett

Ronald Prins graduated from TU Delft in 1994, in Applied Mathematics. He specialized in digital technology and cryptography. After completing his studies he worked at the Dutch Forensic Institute on breaking security used by criminals. In 1999 Prins founded Fox-IT with fellow TU Delft alumnus Menno van der Marel. The company would eventually be in the very first rank of internet security providers. Since then, he has been an Associate member at the Dutch Safety Board and member of the TiB, an independent organization that supervises whether the AIVD uses their power legitimately. Currently, he is busy with a new venture he co-founded, Hunt & Hackett, that helps their customers to fight digital espionage by other countries.

He is the perfect example of someone who turned his hobby into his job, followed his heart and by that achieved great success. This does not only make him a top entrepreneur, but also a great inspiration for current and future students. For this and other accomplishments he was also pronounced as Alumnus of the Year 2016. We are proud that Ronald Prins, 'the most powerful nerd in the Netherlands', is now an ambassador of our association.

Wouter Welling, Ministry of the Interior and Kingdom Relations

Wouter Welling is coordinating policy officer digital identity at the Ministry of the Interior and Kingdom Relations. He has been working in the domain of a rapidly changing digital government for quite some time. Both in the private sector, in IT implementation and in government policy making. In the past he worked on digital services for citizens by the government, information platforms for the government, data exchange within the government and advising the political top on these subjects. He has also made documentaries on these subjects and regularly gives guest lectures at universities on the government's relationship with new technology. At the moment he deals with the role of the government around our digital identity and all the questions that come with it.

Vincent Warmerdam, Research Advocate at Rasa

Currently Vincent works as a Research Advocate at Rasa where he collaborates with the research team to explain and understand conversational systems better. In his previous career he worked over at GoDataDriven in Amsterdam. He was their first data scientist. Here he helped companies get better at what they do by using data. He had been given a fair amount of proper cases with impact for important clients while trying to keep the hype at bay. After a few years he felt compelled to leave. He believes in open source and doesn't mind to evangalise from time to time. He is known for speaking at events but also for giving free lectures in data science around Europe. "The future is pretty awesome, all we have to do is build it." - Vincent Warmerdam

Jeroen van den Hoven, TU Delft

The discussion panel will also be joined by Jeroen van den Hoven, whose information can be found prior in the book (page 13).

Board of Advice

For acquiring contacts with several parties, we have turned to the long experience and wisdom of professors from our university for support and tips. These people form the Board of Advice.
Our Board of Advice consists of:

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For the organization of our symposium, several companies and universities were contacted. By their participation in our Board of Recommendation, the following people, speaking for their respectable institutions, acknowledge the importance and competence of the symposium and recommend supporting the organization:

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Committee

This symposium is organized by the Symposium Committee of 2019-2020 of Mathematics and Computer Science Study Association ‘Christiaan Huygens’.

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Colophon

Symposium Committee 2019 - 2020

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