SECTOR

Interview MIcompany

Caseday Rosarium

Column Rein Nobel

A week in the life of Omar Elbaghdadi

Transformed Taylor Approximation Marc Nientker

Periodically from Study Association Kraket Year 9, Edtition 1, February 2019

Preface SECTOR

The first edition of the SECTOR for this academic year is now finally here. Once again, this edition is full of interesting and informative articles. As always, we have had the privilege to interview one of Kraket's main sponsors. This time we went to MIcompany, who have a beautiful office in the middle of Amsterdam. The interviewee is Arje Sanders who is currently leading MIcompany's new Israeli office. Arje explains why MIcompany decided to open a new office in Israel and what they hope to achieve by doing so.

Next, Julia Schaumburg the program director for EDS (& EOR) writes about the Bachelor track Econometrics and Data Science (EDS). She points out the reasons for this new track and the importance of Big Data. In addition, a detailed description of the EDS Bachelor layout is given by her. Federica Pasquotto gave this year's Analysis I course. She tells us about her past studies, how she got to the VU and the difficulties and excitements of studying mathematics. Furthermore, for this edition's academic piece Marc Nienkter briefly writes about his research in solutions to transformed Taylor approximations to DSGE models.

The previous Caseday was yet again one of the highlights of the year for many students. It featured many interesting companies such as: Optiver, Friss, Transavia, CBS, Ortec Finance and EY. All cases were a success and more details on them can be found in the text.

Seperate from Ortec Finance is Ortec itself. Omar Elbaghdadi currently works full-time at Ortec and gives us insights to his weekly life at Ortec as well as outside Ortec.

Finally, retired professor Rein Nobel gives a detailed retrospect on his time at the VU. Amidst his review a judiciary perspective is given on university programs, examinations and much more. I definitely recommend everyone to read the full version on the Kraket site.

Without further ado, have fun reading!

Content

1 Preface

3 Interview MIcompany

7 Column

Prof. Julia Schaumburg

9 As Told By

Prof. Frederica Pasquotto

12 Caseday

17 A week in the life of

Omar Elbaghdadi

20 Academic Column

Prof. Marc Nienkter

23 Extra

four students, four extracurricular activities

28 Column

Prof. Rein Nobel

32 Media Review

33 Puzzels

34 Agenda and Publications

Colophon

SECTOR
Year 9, nr 1, febuari 2019

SECTOR is a publication from the study association Kraket (Kritische Aktuarissen en Econometristen), representing the Econometrics & Operations Research and Econometrics & Data Science students at the Vrije Universiteit Amsterdam.

Editors:
Pieke Geraedts
Denise van Dijk
Rajni Rasiawan
Robert Smit
Aloys Aarts

Address:
Kraket - SECTOR
De Boelelaan 1105
Kamer 8A-30
1081 HV Amsterdam
Tel. 020 598 60 15
E-mail: sector@kraket.nl

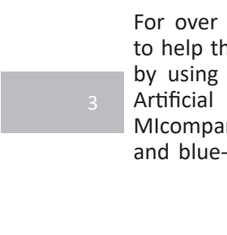
Advertisements:
Information about the advertisements can be requested on the address above.

Advertisers:
MIcompany
Flow Traders
Finaps
Centraal Bureau voor de Statistiek

Design:
gedesign
www.gedesign.nl

Layout:
gedesign
www.gedesign.nl
info@gedesign.nl

Print:
Flyeralarm



Arje Sanders

studied Econometrics & Operations Research at the VU. This year is his 8th anniversary with MIcompany and he leads MIcompany's new Israeli office.

MI COMPANY BUILDING DATA ANALYTICS CAPABILITIES

Interview - MIcompany

For this article we have had the privilege to interview Arje Sanders from MIcompany. Arje has Dutch roots, was born and raised in Amstelveen and has lived in the Netherlands most of his life. He got a bachelor's and a master's degree in Econometrics and Operations Research at the VU. Besides studying Arje pursued a serious career in indoor football, has an interest in kickboxing and loves spending time with his family. In his last year as an undergraduate he started a part-time job at MIcompany and proceeded to write his master's thesis for one of MIcompany's leading clients. After the completion of his Master he continued to work full-time for MIcompany. This year he has his 8th anniversary at the company and meanwhile is leading MIcompany's new Israeli office.

For over 10 years, MIcompany has the passion to help their clients to create sustainable impact by using data analytics. It does so by building Artificial Intelligence skills and apps at scale. MIcompany supports leading multinationals and blue-chip companies in their Data Analytics transformations, such as: Booking.com, eBay, Nike, KPN and Shufersal. In these transformation key business processes are optimized using AI applications. Examples of such themes are elasticity based pricing, customer based forecasting and promotion ROI optimization. As MIcompany is focused on developing in-house skills, it works at client premises, in combined teams with the client. Within MIacademy – MIcompany's AI education school – the AI skills of their clients are further developed. This is done in specific programs on different levels, varying from a program for young data scientists and an AI implementation program for marketing and IT, to a broad program on AI fundamentals. This broad and thorough development is a strong fundament of the data analytics transformation. Another important fundament is the development of AI applications, in which business processes are optimized and automated to increase business value and reduce unnecessary costs.

Most employees at MIcompany have studied econometrics. The rest have backgrounds in statistics, physics or computer science. New employees follow a three-year program within the MIacademy to further develop their AI skills on all fundamental levels. These classes are taught by industry thought leaders and MIcompany experts. Having clients in Europe, the United States, Asia and Israel, MIcompany offers global opportunities to their employees. At MIcompany we are dedicated and drive each other to perform better at work as well as outside work. A healthy dose of competitiveness stimulates us to always strive for more. We challenge each other on the quality of our work, not on the quantity, which ensures that everyone can pursue their hobbies outside work and maintain a healthy work-life balance.

Why did MIcompany choose Tel Aviv?

Tel Aviv is internationally renowned as the AI capital, with over 300 AI driven start-ups. All these companies have the ambition to develop powerful and valuable applications, which can be scaled up to benefit from economies of scale, such as in the United States, Russia or India. An example of a start-up that has done this successfully is Waze. It has developed its own, 'better' version of Google maps for Israel and America and subsequently sold their application to Google. Google could then use this application and the idea behind it to further improve their own applications. This success is due to the strong technological skills in Israel, its entrepreneurial culture and the serious investments the Israeli government makes in developing this thriving environment. MIcompany gets fuelled with knowledge from the AI start-up scene through partnerships with AI innovators and by hiring young talent from Tel Aviv. This enables MIcompany to better serve her international clients such as Ebay and Nike.

What is the role of MIcompany in Israel?

Good question. In some Israeli industries the level of AI and app development skills is very high. We could learn a lot from these focused, pragmatic and smart people. As mentioned, Tel Aviv is full of smart and passionate young talent willing to work very hard to get their opportunity at developing the next big AI application. This has caused a divide in the Israeli community between national and international corporations and industries. On the one hand there are the young and agile start-ups that focus on collaborating with international companies, while on the other hand there are the larger national corporates such as telco's, banks, insurers and retailers for which AI is more difficult to implement. This is caused by the fact that the application of AI within larger companies also requires strategic consultancy – and change management skills. Young, talented employees tend to choose the shorter way to success through a start-up career. In Israel, we bridge this capability gap based on our broad experience in working for national leaders. MIcompany supports the traditional blue-chip companies in their transformation, by building AI application and developing AI skills through our Tel Aviv based MIacademy. At the same time, we have strengthened our MIacademy proposition with specific Israeli modules, collaborations with Tel-Aviv University professors and knowledge sharing with leading Israeli start-ups.

Why is AI so popular in Israel?

The Israeli government stimulates people from a young age to choose subjects such as mathematics and programming. Students are rewarded for high grades on those subjects. In addition, Israeli youth join the army for three years at the age of 18. Nowadays much of the military work is done behind a computer, which results in serious programming and modelling knowledge and experience for many students before they go to university. In addition, the military teaches a different aspect to the way of thinking and solving problems: the continuous focus to find quick and practical solutions to a given, crucial problem. In the Netherlands we have the tendency to do the opposite; think problems through thoroughly, oversee the risks, discuss a little more and then move. This is not necessarily bad, but it is completely different from the Israeli way of thinking and acting. This difference fascinates me, and it is my passion to bring the best of both worlds together in MIcompany.

Could you tell us more about the new office in Tel Aviv?

MIcompany has been growing rapidly since we started. Working for the industry leaders means that many of our clients are international companies, and a significant part of our projects are abroad.

This sparked the first thoughts about internationalization. We asked ourselves: what exactly do we want to achieve from opening a new office abroad? Our goal was to broaden our field of expertise, which would strengthen our entire office, while also finding a new and upcoming market. After much thought and an extra push from my side, it was clear we were going to open an office in Israel. Tel Aviv, as mentioned, has an abundance of practical knowledge in AI from which we are already learning a lot.

About two and a half years ago we started with our first project in Israel. The office has been growing quickly since then and there are over ten employees in Israel now. In Israel, we work with market leaders in different industries: the largest supermarket chain, the leading bank and leading credit card company. Our collaboration with these clients has been excellent and we are hoping to continue this in 2019. Moreover, we have just started our first class for MIacademy in Israel. The class is a mix of Dutch and Israeli participants from different companies. The program is similar to the MIacademy program in the Netherlands, although it has some specific Israeli extra's. It starts with an intensive six-week full-time bootcamp, followed by quarterly 5-day follow-up modules and ends with a three-month project. The total length of the program is three years. To fully capture the local benefits, we adjusted the content of the program to fit the Israeli expertise in AI and technology. The participants had the luxury to be taught by professors from the Tel Aviv University, as well as learn from some leading start-ups about their experience in building AI applications. The first class was a success and we are looking forward to launching a second class in March.

How long is your average workweek?

At MIcompany we do not believe that a workweek with a lot of hours is efficient nor sustainable. We believe in quality not quantity. Hence, we work efficiently and try to get everything done within a 40-45 hour workweek. Inevitably, there will be exceptions. When a deadline is near you can make longer weeks, but this is not the standard we aim to have. We think that you need to peak at the right moments. Otherwise you are always overstretching.

Are there any opportunities for student jobs?

We hire students throughout the year for part-time jobs and do not have a fixed number of positions for students. Anyone is welcome to apply as we always have ample work to do. However, we do have high standards for hiring students and starters. Being able to maintain a high standard on the quality of work is important to MIcompany. We give our students as much responsibility as possible. This way they have the chance to grow individually and prove themselves to us. In addition, it gives us a good view as to how someone works and whether he or she is well fitted for MIcompany and vice versa. Sometimes students that started or applied for a job with us might feel that they are not suited for MIcompany. In this case we often look whether they might be more compatible with one of our clients. Hence, you might end up working for one of our clients instead. This works beneficially for all parties involved.

What topics from your studies do you come across the most in your work?

It's hard to say that a particular topic comes back the most. During my studies I learned to think analytically and how to tackle difficult problems. I encountered many different examples and problems that I would never come across during work. For instance, programming Snake in Java is not necessarily something you need to be able to do at MIcompany. It is the conceptual and practical thinking and way of solving things that I took away from my studies and will always need to use.

MI COMPANY
BUILDING AI APPS & SKILLS AT SCALE

JOIN OUR FRIDAY AFTERNOON DRINKS EVERY FIRST FRIDAY OF THE MONTH!

FOR MORE INFO: TALENT@DATAANALYTICS.CAREER WWW.DATAANALYTICS.CAREER

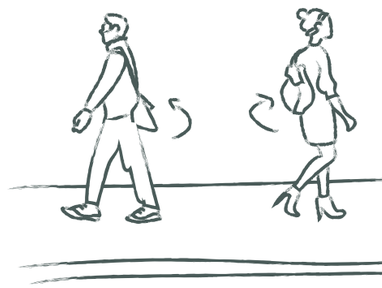
BLUE MONDAY

'Blue Monday' is the most depressing day of the year. On this day twenty people walk apart on the sidewalk of a straight street. They all run in one of two directions: left or right.

However, if they encounter someone else, they immediately turn around and walk in the other direction. After all, they do not want to meet others on this hard day.
If everyone walks at the same speed and needs ten minutes at this speed to walk the entire street, how long will it take until they are all out of the street?

You may assume that the reversal does not result in a loss of time and that each of the walkers starts at any point in the street.

ADVANCED PUZZLES FOR BUSINESS APPLICATIONS



Do you think you can solve this puzzle? Send your answer or question to talent@dataanalytics.career.

Julia Schaumburg

is program director for the new bachelor track, Econometrics & Data Science.

Column
EDS Bachelor track

The Econometrics and Data Science track started in September 2017 at the VU.

But what is this Bachelor about?

Data is everywhere, and in vast amounts. It is created and shared by all of us. In the old days, most of what we did, where and how we traveled, what we bought, liked and thought, went unnoticed.

Data is everywhere, and in vast amounts.

Nowadays, we use apps on our mobile phones, computers and tablets to book hotels and travel tickets provided by Booking.com, Uber and KLM. We buy gifts on Bol.com and Amazon, we stay in touch with friends and colleagues on Instagram, Facebook, and LinkedIn. The data we create in this way are stored by the companies in order to provide us with tailored products that are continuously reviewed and updated. We are all highly diverse persons, generating lots of data – and since there are many of us, we have Big Data.

We are all highly diverse persons, generating lots of data.

Making sense of Big Data in economics, business and finance requires econometricians and data scientists. Data Science is a relatively new field of study that is inherently interdisciplinary. It blends much of the pedagogical content traditionally associated with statistics, computer science, and mathematics, but it is more than a simple intersection of these disciplines. Ultimately, data science is about transforming data into pieces of useful information that benefits our society as a whole, and this requires the mastery of a variety of skills.

The new track “Econometrics and Data Science” (EDS) within the Bachelor Econometrics and Operations Research (EOR) combines novel courses on data science methodologies such as high-dimensional statistics and machine learning with the state-of-the-art econometrics courses from the EOR program. At the end of the program, our students know how to collect, analyze and model Big Data in order to identify causal economic relations, to forecast key economic variables, and to improve economic decision-making. Fields of application include, among others, marketing and e-commerce, banking and financial risk, forensic crime analysis, and health economics. Importantly, the program also addresses the ethical aspects of Big Data.

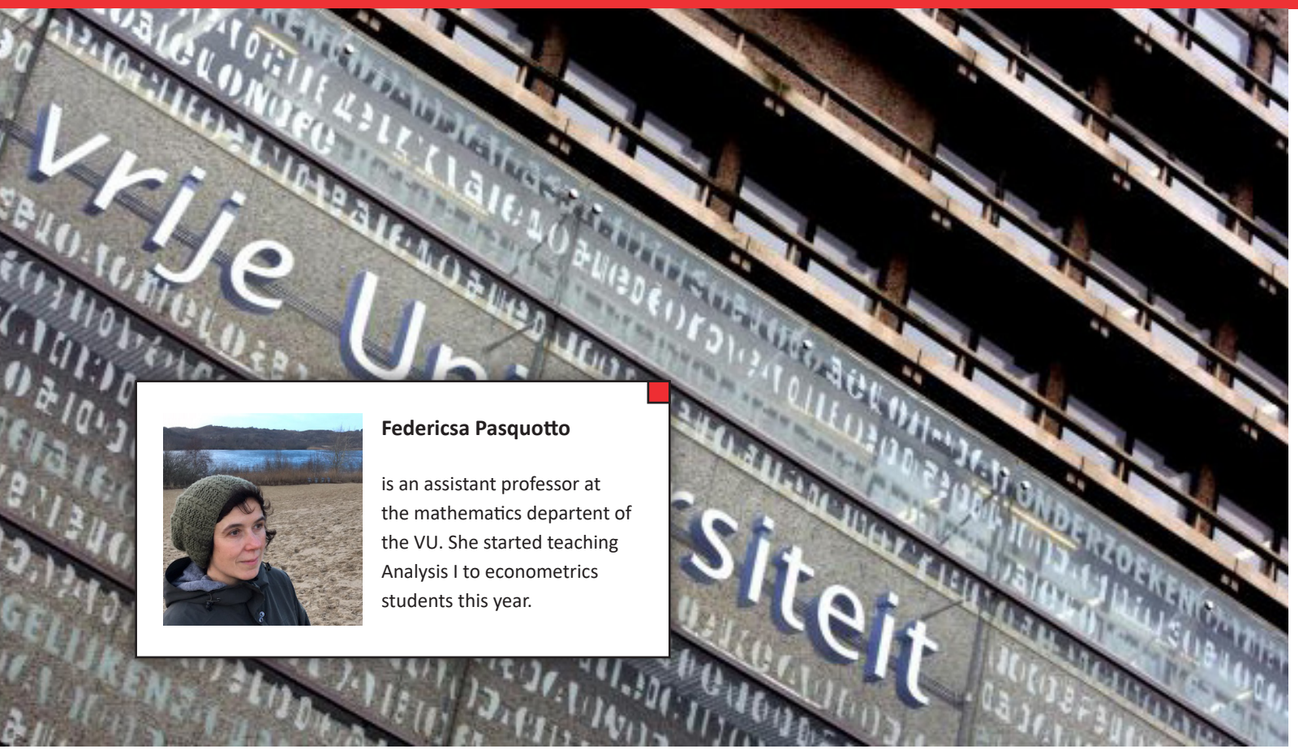
Data science is about transforming data into pieces of useful information that benefits our society as a whole

Detailed structure of the program

In the first year of the Econometrics and Data Science specialization, the focus is on providing mathematical skills (Analysis and Linear Algebra), key programming skills (Introduction to Programming with C or Java), and the foundations in statistics (probability and mathematical statistics). We also offer introductory courses in data science, economics, finance and ethics, in the first year.

The second year is truly focused on Econometrics and Data Science with introductory and intermediate courses in numerical methods, econometrics, data science (data structures, information retrieval, databases), statistics (computational statistics, multivariate statistics) and ethics. Throughout the first two years of the Bachelor, several data science cases (practical and hands-on) need to be carried out by groups of students.

During the first semester of the third year the student follows a Minor program; our recommendation is the Minor “Applied Econometrics: a Big Data Challenge for All”. The second semester in the third year offers three in-depth courses (dynamic econometrics, machine learning and financial econometrics) and is completed with a Econometrics and Data Science Project Thesis that is developed in cooperation with a group of data science companies and includes a lecture series and support from well-known data companies.



Federicsa Pasquotto

is an assistant professor at the mathematics departent of the VU. She started teaching Analysis I to econometrics students this year.

As told by Federica Pasquotto

Federica Pasquotto teaches Analysis I to first-year econometrics students. She is an assistant professor at the mathematics department of the Vrije Universiteit. She studied mathematics in Italy and started at the VU in 2004.

My name is Federica Pasquotto and I am an assistant professor at the VU mathematics department. I have studied mathematics in Italy, at the University of Trento, a somewhat small university in the middle of the Italian Alps, where you can sit in the lecture rooms and enjoy a direct view of mountains and ski slopes... quite a contrast to the VU and the Zuidas financial district! I came to the Netherlands as an exchange student more than 20 years ago: I spent a semester in Nijmegen and I enjoyed my time in the Netherlands (especially the cycling part) so much, that after completing my undergraduate studies in Italy, I decided to apply for a PhD position here.

I do not think I have always wanted to be a mathematician: I seem to remember that my dream job changed over a period of 10 years (8 to 18 years of age, approximately) from hair dresser, to interpreter, to astronomer, and eventually mathematician. In fact the last change of heart only happened after a meeting with Margherita Hack, a fantastic, charismatic astrophysicist working in Trieste, who advised me to study mathematics first, and specialize in astronomy later. Well, I got stuck with mathematics and never succeeded in becoming an astronomer. On the other hand, in the last few years I have been working on a project which has potential application to celestial mechanics and space travel, so maybe in the end I will circle back to that!

I seem to remember that my dream job changed over a period of 10 years from hair dresser, to interpreter, to astronomer, and eventually mathematician.

SECTOR As told by

During my PhD I spent two years in Leiden and two years in Cologne, Germany. My thesis advisor was Hansjorg Geiges, at the time a newly appointed geometry professor at the University of Leiden. I owe a lot to him, he gave me a great opportunity by hiring me as a PhD student. What you get from your thesis advisor is a kind of imprinting: the way you do your research, the way you teach, and your work ethic, the influence still shows after many years! In fact in Germany they call your thesis advisor “Doktorvater”. After my PhD I came back to the Netherlands, this time to the VU, to work as a Postdoc with Rob Vandervorst. I knew Rob from my time in Leiden and I knew he was a very friendly and enthusiastic person, on top of being an excellent mathematician.

I was also intrigued, because coming to the VU would mean expanding my research from geometry to at least some areas of analysis and that was a challenging thought. I came to the VU at the end of 2004 and everything worked out well: in particular, during the first few years of my appointment I received a lot of support from NWO, in the form of 3 different grants to pursue my own line of research. The common theme of these grant applications was the development of geometric and topological tools to predict existence of periodic orbits of differential equations of a special kind, namely Hamiltonian or conservative ones (where the conserved quantity is the total energy of the system). The main challenge in my research was to come up with ways to deal with unbounded level sets of the energy function, a case for which very little is known, but which arises very naturally in physical, chemical, and optical applications. The first grant enabled me to carry out my research as a postdoc over a period of 4 years, the second one financed a tenure-track position and the third one made it possible for me to hire my first PhD student. I really appreciate the support I received from NWO, but I must say I think researchers nowadays are under excessive pressure to write grant applications: it does not seem to be a cost-efficient procedure and a lot of energy gets dissipated in the system. Ultimately the problem is, as it very often is, one of insufficient funding: with every application round, there are many more good proposals than NWO has money for, so only very few get funded and the difference between the ones which are awarded a grant and (at least) the first few ones which do not, is extremely small.

The way academic courses are taught nowadays is very different from my own experience as a student: we used to have very few subjects (for instance, in the first year, only Analysis, Geometry, Algebra, and Physics) which would run over the whole year (October to June) and the examination would only take place at the end of the second semester: you could take a certain exam in June-July and, if you did not pass, retake it in September, before the start of the new academic year. The exams were really tough, you had to prepare a lot of material and it was completely and solely your responsibility not to leave all the work for last couple of weeks, but in a way I think it was better: you really had time to let things sink in, to understand them, which is absolutely important when it comes to mathematics. You can maybe squeeze an incredible amount of information into your head if you work hard enough, but understanding takes its time and, of course, maths is about understanding most of all. If you do not understand a theorem or its applications, it is practically impossible to just memorize it! So I must admit I really sympathize with students when they complain about having to do an exam on topics they have just about started to learn.

The way academic courses are taught nowadays is very different from my own experience as a student: we used to have very few subjects which would run over the whole year and the examination would only take place at the end of the second semester.

As a teacher, up until now I have only taught courses for mathematicians and physicists, and at the Master level only to mathematicians. The Netherlands have a (I should think) rather unique nationwide program, called Mastermath, which includes all math departments in the country and offers specialized Master courses in mathematics, which can be attended by students of any Dutch university.

I have taught Bachelor courses in Dutch and Master courses in English, In fact, becoming sufficiently fluent in Dutch to be able to teach Bachelor courses was a real challenge! In particular, in the beginning it was really hard to formulate the same concept in two different ways, it was often difficult enough to find one way, but when you are teaching, very often this one particular way is not sufficient and you have to come up with a different one. Nowadays, more and more Bachelor programs, including Econometrics and Mathematics, are being taught in English: on the one hand, I still feel more comfortable teaching in English, on the other hand I cannot help but think “What a pity, after all the effort I put into learning Dutch and right when I was getting good at it!”

As a teacher, up until now I have only taught courses for mathematicians and physicists, and at the Master level only to mathematicians.

The Analysis 1 course is the first one I teach at the Econometrics department and it has been quite a challenge, mostly in terms of connecting with the audience: the number of students is much larger, and, understandably, many of these students are possibly not very interested in this particular subject, but see it rather as a necessary evil, something they need to get through in order to continue with the study of their choice. On the other hand, I was also very positively surprised by the genuine interest and enthusiasm of some of the students, and the excellent questions asked. Maybe, if the course is assigned to me again next year, I should try to study some Economics during the summer, to get a better understanding of the students’ motivation and interests. . I hwave recently been put in charge of the foreign admissions to the Business Analytics Master program, so maybe that will also help in this direction. Of course the combination of mathematics and economics is a very natural and interesting one: on this topic I feel that I have to mention (although you all probably know his story) the mathematician John Nash, who proved the celebrated Nash embedding theorem in Riemannian geometry (stating, roughly, that any manifold with a given choice of metric can be realized inside a sufficiently “large” Euclidean space), but those theories also play a fundamental role in economics, in particular, game theory. The advice I would like to give to anyone, anyway, is that learning math “as a mathematician” is the best way to go, regardless of your course of study. Math is an important piece of foundation for all the exact sciences (not surprisingly, some basic analysis, probability, and linear algebra are taught in the first year of all these disciplines) and it can be a real advantage in the future development of any scientist to properly command it.

The advice I would like to give to anyone, anyway, is that learning math “as a mathematician” is the best way to go, regardless of your course of study.

Let me end by trying to explain why I like mathematics: first of all, because it is a fun and beautiful subject. It is challenging and it can be frustrating, but the reward that comes after the frustration has finally given way to understanding is priceless! I know it may be hard to comprehend, but qualities like “beautiful” or “elegant” are very important to mathematicians: for instance, we are not just looking for a proof of a certain statement, we are looking for a “simple, clean, and uncluttered” proof! Secondly, but equally importantly, I like it because it teaches you that you have to be able to prove what you say, you cannot just make unsubstantiated claims and exploit people’s emotions to spread lies and untruths. Unfortunately, this is quite the opposite of the standard in current discussions about important political and social issues, so I would say more mathematical training, at every level, is much needed!

Caseday

Like every year, the Casedag was one of the events organized by Kraket. This year the event took place at Rosarium on November 7. The day started with a cup of coffee or tea, while everyone gathered at the location. The first speaker was Jack Esselink, after which everyone went to their chosen cases. The morning cases were given by Optiver, Friss and EY. In the afternoon the students had the opportunity to attend cases from Ortec Finance, CBS and Transavia. Description of the inaugural speaker and cases are given below.

This years inaugural speaker was Jack Esselink, he talked about the relevance of Big Data and the effect it has on society. He started off by using greek words to explain different aspects of data and the history of data. He followed by pointing out the role Econometricians have in using Big Data and how we can use it to our advantage. Furthermore, the emphasis was set on building AI applications to handle, interpret or work with data. Finally, - due to the abundance of data available - he touched on topics concerning data ethics and privacy.

The case started of with an introduction to Optiver. Optiver is a market maker and improving the market is their guideline principle. Optiver employs very talented and hard-working people to maintain their position as leading global electronic market makers and achieve high standards in doing so. Optiver attracts a wide-range of people from all over the world, making sure they have a dynamic atmosphere in the offices.

Next, a trader from Optiver walked us through his daily life. He told us about the work he does for Optiver. In specific, he covered some basics about options and the relation between the option price and time or stock price. In addition, we learned about what market making is and how it is done. Simply stated it is the notion of providing liquidity to the market by making bid offer spreads.

The case itself was split into two parts. We started with a timed numerical test. Everyone had eight minutes to answer as many addition, subtraction, multiplication or division questions. This was quite hard and eight minutes is not a lot for 80 questions. For the second part we played a market making game. How this work was: a question was asked and the answer to the question can be seen as the price of a derivative. Everyone then had the opportunity to propose a bid-offer according to their guess of the answer to the question as well as buy or sell for the given prices. This was a fun and interactive game that taught you the basics of market making. All in all it was a interesting case where everyone learned something about Optiver.

After a short presentation about EY and what kind of branches most econometricians work for within EY, we quickly started the practical part of the caseround. The goal of the case was to give consultancy to an insurance company that would like to enter the market of insurance. But not just any insurance company, an insurance company for the people that like to do extreme sports like bungee jumping and skydiving, Adrenalinsurance. A company like EY gives such a company consultancy on how to arrange their finances in a way such that they can survive in the world of insurance companies.

In groups we were to separately represent EY and give advice to Adrenalinsurance. In order to prepare for the presentation we were given laptops, which we used to calculate the finances for Adrenalinsurance. In addition, we were provided with a poster, which we used to help in visualizing our policy and ideas to the board of Adrenlinsurance. During the presentation, the goal was to convince the board, by using the calculated numbers, that a certain strategy would be optimal. The best group during the case got a prize for their excellence in presenting and calculating. As a whole, the case gave a good insight as to what a day in the life of a consultant at EY looks like.

SECTOR Caseday

The Central Bureau for Statistics started their caseround with some interesting questions to which we had to guess the answers, for instance: how many kilos of waste is being produced in Amsterdam per year? One of the interesting statistics which are being researched by the CBS. After a presentation about what it is like working for the CBS and what kind of services CBS provides to the Netherlands, the practical part of the case started. We were provided with a laptop which contained the data for all migration and birth/death numbers within Amsterdam. The goal was to use this data to make an as accurate as possible prediction of the population number in Amsterdam in 2050. This prediction could then be used to give advice to the city of Amsterdam as to how many nursing homes would be needed in the year 2050. After some struggles in Excel, we finally calculated some decent numbers. Unfortunately, no winner of the case was chosen, but the numbers behind the predictions were explained. This gave us a good understanding as to what an econometrician / data scientist can do within the CBS.

This round started with an insight into the weekly life of three employees from different teams at Ortec Finance. Ortec Finance provides solutions to investment choices for financial companies all over the world. They work in three phases: ‘discovery phase’, ‘delivery phase’ and ‘support phase’. This is a simple and direct approach that ensures for good and clear solutions.

For this case everyone was split into groups of four. Each team had a laptop on which data and tools were provided in Excel. The goal was to convince the board members of the pension fund to hire them as their advisers. In order to convince the board, they had to choose a policy and convince the board that this was the best policy. Making a policy consisted of: choosing a portfolio to invest in, taking into account the return and corresponding risk, and choosing the coverage ratio, which roughly determined how much liquid assets the pension fund would hold. Finally, every group presented their policy in an elevator pitch. To conclude, it was an interesting and interactive case where the students could apply the theory that they had learned in the introduction.

transavia

One of our fellow Kraketters works for Transavia, during the caseday he talked to us about the company and his work there. One of the projects he works on is about using data that is obtained from surveys to measure customer experience. In order to do this optimally, customer experience is split into two parts: an emotional score and a rational score. These scores are a weighted average of the score customers give to a mix of different questions in the survey.

Correspondingly, this was the topic of the case that he prepared. In teams of three we analyzed the available data from different surveys to find what factors correlated with the score customers gave. For instance, a customer might be inclined to give a higher overall score if he or she is going on a holiday compared to one that is going on a business trip. There are many other factors such as these that Transavia cannot influence. They are, however, important to take into account when analyzing the data.

In contrast, things such as flight departure or arrival times and the in flight experience are factors Transavia can have an influence on. Hence, they are more relevant to look at. Besides analyzing these correlations, part of the case was to come up with new relevant questions that were not in the survey but that could significantly influence the customer experience. This was a good addition to the case, as for many it was an opportunity to consider creative questions.

FRISS

The case of Friss naturally started with an introduction to the company. Friss is an expert in the field of fraud, risk & compliance for the insurance industry worldwide. Industry analysts have recognized FRISS as the market leader concerning fraud and risk solutions for P&C insurance companies. The core of their solutions is the Friss score, which indicates the risk for each policy or claim. Their aim is to expand their leadership by sustaining their focus and dedication in the field of fraud risk & compliance. At least the dedication was also visible from the orange polo shirts the employees of Friss were wearing saying “Keep Calm and Fight Fraud” on the back. Because in the end Friss believes in fair insurance premiums for everyone.

To show us what the work at Friss was like we were tasked with a case where we tried to find the characteristics of potential fraudulent customers of car insurance. So on a dataset of claims and with the use of a few algorithms in Python we tried to detect possible fraudulent people. Factors like the type of claim, the time between the accident and the claim but also the car brand as it turns out all could play a part into whether or not a person had a high risk of fraud.

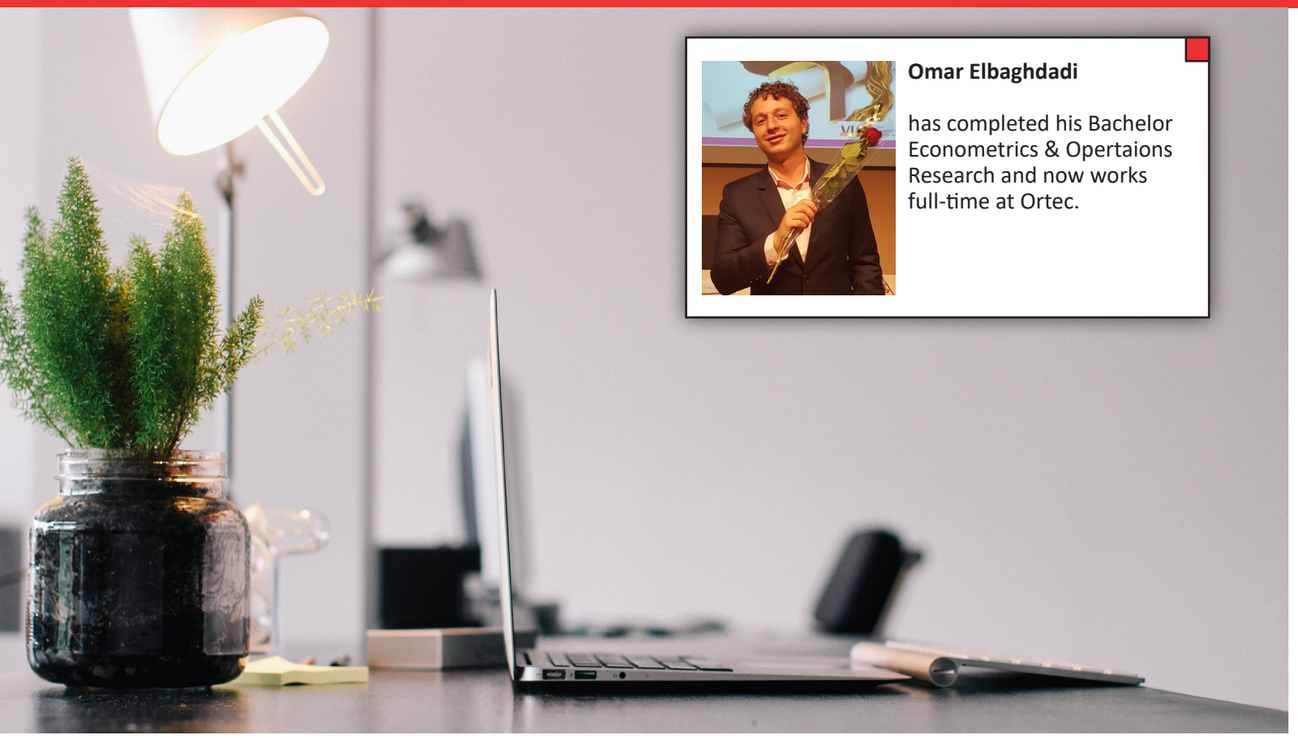
FINAPS is hiring!

```
const JoinFinaps = () => <div>
  <ul>
    <li>Do you have a creative mindset?</li>
    <li>Do you have passion for data?</li>
    <li>Do you want to work for an award-winning
      software development company?</li>
  </ul>

  <p>Curious? Join us for a cup of coffee to discover the
    possibilities or skip the bullshit and sent your CV</p>

  <button onClick={() => sendEmail('info@finaps.nl')} />
</div>;

export default JoinFinaps;
```



Omar Elbaghdadi

has completed his Bachelor Econometrics & Opertaions Research and now works full-time at Ortec.

A week in the life of Omar

Hey there, nice to meet you! My name is Omar! Last year, I received my Bachelor's Econometrics and Operations Research from the VU. At the time however, I didn't know which master's degree I wanted to apply for. Faced with this dilemma, I decided to delay my choice by taking a gap year. In this gap year, I wanted to do three things: figure out which master I want to do, do an internship for half year, and travel in South America the other half of the year.

By now, it's already been three months since I started doing a full-time internship at ORTEC, a consultancy firm focused on Operations Research. I'm having a very good time there, and I'd like to tell you a bit about my experience working so far, along with a description of a 'typical' working week. With this, I hope to give you some insight on what it is like to work at a company, especially one that is very much in line with our field of Econometrics and Operations Research. Without further ado let's get into it!

To understand what I'm doing at ORTEC, it's useful to understand the organization a bit first. ORTEC is a consultancy company, which means its customers are other companies. Some of our big customers include Shell, TNT Post and KLM, amongst others. A large variety of interesting projects are done. At KLM, for instance, we work on a model deciding which price to assign to a flight ticket. These kinds of projects that are done in close collaboration with the customer, are done by "market teams". Since I was more interested in researching the methods used in projects than consulting work itself, I was assigned to the "Center of Excellence" (CoE). The CoE supports the market teams by building, collecting and spreading knowledge on topics such as optimization, forecasting, data science and so on.

SECTOR A week in the life of Omar

I work in the data science team that focuses on predictive models. We often want to predict some kind of variable we're interested in using some other known variables. We're doing one such project for Brussels Airport. They want to predict how many passengers will arrive and transfer for each arriving airplane in advance. They can use this information to schedule their workers and logistic teams.

To make these predictions, we use Machine Learning models that learn from historical data. Most of the time however, we do not only want the predictions themselves. We also want to know why a certain prediction was made. Which variables were important for this prediction? Would the prediction increase or decrease if this variable increases? The econometrician's favourite model, the linear regression, is relatively simple to interpret (although this can be argued about). The size and sign of a parameter give us the relative importance of each variable. The simplicities of the linear models are however often a limitation for predictive performance, which is why we use more complex models most of the time. These more complex models are not as straightforward to interpret though. Can we have the best of both worlds?

That's what I'm working on. I'm making a software package that makes it easier for our teams to interpret and explain the predictions of our so called 'black box' predictive models. I've mainly been working on this project for the past three months, recently releasing the first version. Right now I'm working on getting our consultants to actually use the package I made by preparing presentations and a master-class.

Besides working on that, I also do some side projects like: creating material on Machine Learning for The Analytics Academy, a collaboration between ORTEC and the UvA to train companies' staff in data analytics; standardizing the way we do forecasting projects; and making a predictive maintenance game. In short, a lot of things are going on.

The thing that I had to get used to the most was the regular working time. You can't just take a day off when you don't feel like working, which you can do more easily as a student. Every day, I come in at 9 am and leave at around 5 pm. During the day, I continue working on one of the projects I mentioned above. Some days, it's just me working on my computer all day. Other days, I have meetings with my colleagues, my team, my manager, and so on.

An example. It's Tuesday. I go to the office in Zoetermeer, because I have some meetings there (I normally work in the Amsterdam office). I start the day looking at some mail and working on one of my projects. Then I have a meeting, which can be about anything, such as a progress update on a project or a monthly CoE team meeting. At around 12 pm, we usually go for lunch and walk outside for a bit, before resuming work at 1 pm. At 5 pm, I say my goodbyes.

There is not too much time left for stuff after work, but I do like to keep busy. I go to salsa class every Monday evening. On Tuesdays, Thursdays and Saturdays I go to the gym, and the rest of the time I spend by meeting with friends, going out, brewing beer and relaxing.

To conclude, it's been busy after I started working. The 9 am to 5 pm took some time getting used to, but I like the structure it brings. I'm definitely very fortunate to be able to make money doing things I like and learning lots of things, all at the same time! I fulfilled one of my goals for the year already, finding out which master's I want to do: Artificial Intelligence at the UvA. It's not the route Econometrics students usually take, but it is something I'm deeply interested in. Doing a master's in Econometrics or Operations Research is perfectly fine, but you shouldn't feel obligated to do either. There are many other interesting programs that may fit you better. Just see where life takes you! I hope you enjoyed reading this, good luck with your own journey!

Transformed Taylor approximation to DSGE Model solutions

Marc Nientker

is an assistant professor at the VU. He teaches the statistics course for the first year students.

Introduction

This article introduces a new solution method for a class of macro economic models, specifically Dynamic Stochastic General Equilibrium (DSGE) models, that produces non explosive paths. DSGE models are a collection of specications that attempt to study how the economy evolves over time using general equilibrium theory, while including the fact that the economy is affected by random shocks. For the purpose of this text we focus on a simple consumer behaviour model taken from Deaton (1991) and Den Haan and De Wind (2012). A representative agent at each point in time has an amount of cash on hand which we denote x_t and has to decide how much to spend on consumption c_t and how much to save or borrow into assets a_t. Note that saving corresponds to a positive a_t while borrowing results in a negative a_t. Next periods cash on hand is determined according to

$$x_{t+1} = (1+r)(x_t - c_t) + e^{z_{t+1}}$$

where r denotes the real interest rate and e^{zt+1} is a random income determined as $z_{t+1} \sim N(\mu,\sigma^2)$. The amount of consumption chosen at time t gives an amount of utility denoted $U(c_t)$ while the amount of assets decreases utility with a penalty $P(a_t)$. The penalty function is decreasing and thus gives a large penalty if the agent decides to borrow, while being more forgiving towards saving behaviour. Now how is the choice made between consumption and saving? The agent does so by maximising its entire future discounted utility given its current information. That is, the optimization problem becomes subject to (1), where $E_0(.)$ denotes the conditional on information

$$\max_{\{c_t,a_t\}_{t=1}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(U(c_t) - P(a_t)\right)$$

available at time $t = 0$ and is the discount factor (future utility is valued lower than current utility).

Perturbation

DSGE models are fairly simple to specify, as they are based on intuitive micro economic foundations. Solving them, however, turns out to be a much more dicult task. The solution to our DSGE model is a function f that determines the agents decision according to $x_{t+1} = f(x_t) + e^{zt+1}$. Generally, a closed form analytical description of f does not exist and numerical solution methods are needed. Many such methods have been developed over the past few decades, see for example Aruoba et al. (2006). When selecting solution methods, two properties are of main interest: speed and accuracy. Arbitrarily accurate solution algorithms have existed for a long time. However, such methods need long computing times, which poses a problem when one is interested in estimating the parameters of the DSGE model. The function f depends on those parameters and thus each step in the chosen estimation algorithm requires a new f, making the estimation procedure impractically long. It follows that for estimation purposes one needs a fast solution method. One such fast method is called perturbation and depends on the equilibrium properties of the model. Let x be the steady state value for cash on hand in the DSGE model, this value can be determined by setting σ^2 to zero and solving the resulting set of equations. Even though f is unknown one can use the equilibrium properties of the model to determine the derivative

of f at $\bar{x}$. Therefore it is possible to use Taylor approximations such as

$$f(x) \approx f(\bar{x}) + f'(\bar{x})(x - \bar{x}) + f''(\bar{x})(x - \bar{x})^2 + f'''(\bar{x})(x -$$

We illustrate such a second order approximation for a given set of parameter values in Figure 1 and compare it to the true solution that has been obtained with an accurate but slow method. Recall that a Taylor approximation is a local method, which results in great accuracy close to $\bar{x} \approx 1.5$. However, further away from the steady state the Taylor approximation loses its accuracy which causes a big problem. The approximation crosses the $y = x$ line a second time close to 2.7, which causes sample paths to explode. This can be intuitively explained as follows. Suppose that for some $t \in N$ we have $x_t > 2.7$. Then $f(x_t) > x_t = 2.7$ and likewise $f(f(f(x_t))) > f(f(x_t)) > f(x_t) > x_t$, hence consecutive iterations of f will explode to infinity. This implies that common estimation methods will produce inconsistent estimators. For example, theoretical moments do not exist, which makes the (generalised) method of moments and indirect inference estimators infeasible.

Transformed perturbation

Taylor approximations of a DSGE solution are fast, but generate explosive sample paths if the order is greater than one. These explosive sample paths occur because higher order monomials such as $(x - \bar{x})^2$ have derivatives exploding to infinity when moving away from the origin, because these force the approximating function to end up above/below the $y = x$ line on the right/left. However, recall that Taylor's method is a local approximation one and hence there is little basis for the use of $(x - \bar{x})^2$ far away from the origin. Francisco Blasques and I have therefore proposed to multiply the higher order monomials with an exponentially decreasing function $\phi(x) = e^{-\tau(x - \bar{x})^2}$, where $\tau > 0$ is a fixed number, resulting in a transformed polynomial approximation first introduced by Blasques (2014). The transformed polynomial approximation hence is

Note that the transformation $\phi(x)$ is equal to one at the approximation point $\bar{x}$, so that the transformed polynomial approximation is almost equal to the regular Taylor approximation close to $\bar{x}$. In fact, the transformed polynomials share the same fundamental approximation properties as regular polynomials such as denseness in the space of continuous functions and convergence on analytic function domains as the order goes to infinity. However, the transformation $\phi(x)$ goes to zero at a rate stronger than polynomials go to infinity. Therefore transformed monomials tend to zero as we move away from the origin and hence ensure non-explosive sample paths for our approximation function. Indeed, we have shown that transformed perturbation produces solutions that are stable and strictly stationary ergodic with bounded moments and that laws of large numbers apply to our sample paths. These are crucial properties for conducting simulation-based estimation of parameters and simulation-based analysis of the DSGE model.

Something we haven't discussed yet is the constant τ, which determines the rate of nullication implied by the transformation $\phi(x)$. We have to choose some value for τ, but the choice strongly affects the resulting monomials as we illustrate in Figure 2. Here we plot the second, respective third, order transformed monomial in the left, respective right, panel for values of $\tau \in \{0, 0.2, 0.5\}$. Clearly, the larger τ is the faster we nullify the regular monomial and the chosen value for τ vastly changes the shape of the resulting transformed monomial. We propose two different ways to set τ. The first method is a slower computational one and finds the optimal τ, denoted τ^*, by minimizing some criterion function. In an estimation setting we x the optimal τ^* at the start and then estimate the remaining parameters while τ^* remains fixed. The second method is designed to avoid the optimization completely and is characterised by a plug-in τ, denoted $\hat{\tau}$, which is less precise, but found immediately. In an estimation setting we update $\hat{\tau}$ as the parameters are updated, since its calculation is very fast. Further explanations of these two methods is outside the scope of this text, please contact me if you are interested in the most recent version of our paper.

Results

I conclude this article by applying the transformed perturbation approximation to the earlier discussed DSGE model. The results can be found in Figure 3, where we see that the optimal τ^* and plug-in $\hat{\tau}$ deliver very similar approximations. Notice how both of them are as accurate as regular perturbation around the steady state at approximately 1.5. However, further away from the steady state, they successfully negate the explosive properties of the second order monomial, resulting in a superior global approximation.

There are other fast ways to find DSGE solution approximations that guarantee non explosive sample paths, most notably first order perturbation and pruning (Kim et al., 2008). In the paper we compare our method to those alternatives on sample path and moment accuracy for multiple DSGE models. For the model discussed here we find that sample path errors of our method are less than half of those of pruning and up to six times less than those for first order perturbation. This then results into sample moments of the transformed perturbation method being up to ten times more accurate than pruning and one-hundred times more accurate than perturbation. These results indicate that a signicant increase in estimation accuracy can be obtained by using our method compared to current techniques.

References

Aruoba, S. B., Fernandez-Villaverde, J., and Rubio-Ramirez, J. F. (2006). Comparing solution methods for dynamic equilibrium economies. Journal of Economic dynamics and Control, 30(12):2477-2508.

Blasques, F. (2014). Transformed polynomials for nonlinear autoregressive models of the conditional mean. Journal of Time Series Analysis, 35(3):218-238.

Deaton, A. (1991). Saving and liquidity constraints. Ecomometrica, 59(5):221-248.

Den Haan, W. J. and De Wind, J. (2012). Nonlinear and stable perturbation-based approximations. Journal of Economic Dynamics and Control, 36(10):1477-1497.

Kim, J., Kim, S., Schaumburg, E., and Sims, C. A. (2008). Calculating and using second-order accurate solutions of discrete time dynamic equilibrium models. Journal of Economic Dynamics and Control, 32(11):3397-3414.

Extra

The life of a student is more than studying. Extracurricular activities make the students who they are. Think about the development of communucative or organisatorical skills and other practical tools that they do not learn just by studying. In this column, some fellow students talk about what they do besides studying Econometrics and Operations Research. Maybe their stories will inspire you to look further yourself!

Demi de Kort

Demi is currently in her last year of the Bachelor Econometrics & Operations Research as well as working part-time at Mediasynced.

Hi, I am Demi and I am currently completing my Bachelor Econometrics & Operations Research. The past three and a half years I have been a very active member of Kraket. I can often be found in the association's room to have a nice chat or relax and play a fun game. In the academic year 2017-2018 I was the chairman of Kraket and this brought me a lot of joy. After a year full of new impressions, a lot of fun and a continuous stream of to-do's, I was afraid that I would not know what to do with all my free time. That is why at the end of last year I decided to start a part-time job as student.

With all the possible employers we have as Econometrics students, it is not so easy to find out where you would like to work. My search started on the vacancy page of Kraket. After this, I had an informal appointment at MIcompany and Mediasynced to get a feeling of the atmosphere at these two companies. The conversation at Mediasynced was completely different from what I had initially imagined. I had expected that I would mainly be the one to ask the questions and that the information would mainly come from the employees of the company. However, from the start of the conversation they showed much interest in me. They asked me what kind of work I would like to do and what I would get energy from. This conversation really got me thinking about the factors that were most important to me when making a choice.
After the conversation I went home with a very good feeling. That is why I sent an e-mail a few days later to Mediasynced, in which I indicated that I would really like to work there for two days a week. Fortunately they were enthusiastic about me as well and I could start in September as Junior Data Analyst. At Mediasynced we make advanced tools that give essential insights to the performance of advertising campaigns for our customers. At Mediasynced I had the feeling from day one that I had an input, and that my ideas were seriously considered. This gave me a lot of self-confidence and made sure that I always tried to think along as much as possible during each project.

I myself am working on improving the existing models. The hardest part of this is knowing when a model is good enough. Everything can always be better, but the question is whether the improvement will make a difference. In addition to my work on these projects, I get a lot of freedom to learn new things. On an average day there are eight people at the office. This is a very small and intimate setting, making it easy to help each other and get to know one another. There is a friendly atmosphere, which is very important to me.

I work at Mediasynced for two days a week. The rest of the week I am busy finishing the last few courses of my bachelor and enjoying my free time. By working for Mediasynced I have realised that my programming skills are particularly useful. In addition, I got to know what kind of work gives me energy. As a result, I better know which courses I want to choose in my future studies.

SECTOR Extra

Ruben Konijn

Naast dat Ruben zijn master doet, is hij momenteel part-time aan het werk bij Building Blocks

Na vaak genoeg nèt iets over 11 uur 's avonds naar de beveiliging van de VU te moeten lopen omdat ik weer een dagje de VU had uitgespeeld, was ik klaar voor iets anders. Het theoretische aspect van econometrie had ik met mijn bachelor op zak wel enigszins onder de knie, ik was benieuwd hoe dat in de praktijk in zijn werk zou gaan. Worden econometristen in de praktijk nog steeds laaiend enthousiast als ze een significante schatter vinden of een Shapley value kunnen toepassen op een praktisch probleem? (spoiler: zeker!). Ik besloot naast mijn studie een werkstudentschap te gaan volgen.

Als econometrist heb je een luxeprobleem: waar je vrienden van de middelbare school een gat in de lucht springen als ze na hun bachelor al ergens vakgerelateerd werk kunnen verrichten, wordt er bij jou voordat je überhaupt je bachelor hebt al aan je getrokken. De kunst is dan om de juiste keuze te maken. Wat wil je eigenlijk leren en doen in zo'n werkstudentschap en bij wat voor soort bedrijf?

Ik wilde graag bij een klein bedrijf dicht bij huis aan de slag, het liefst in de data science. Daarnaast wilde ik een plek waar ik flexibel kan werken zodat ik buiten mijn colleges en `uitslaapdagen' om kon werken. Het kleine aan een organisatie trekt me aan omdat je iedereen kent en het vaak een wat plattere structuur heeft, een beetje zoals bij Kraket zelf! Data science is een tak dat in de originele econometrie studie op de VU niet veel voorkomt, wat juist een reden is om het op deze manier ernaast bij te leren. Ook wilde ik graag in een consultancy bedrijf terechtkomen omdat ik wilde werken aan diverse projecten en met collega's met dezelfde achtergrond.

Uiteindelijk viel mijn oog op Building Blocks, wat prima bij mijn voorkeuren paste. Building Blocks doet veel met data science en heeft oplossingen voor bedrijven in de retail- en verzekeringsbranche. Dit is erg leuk, omdat dit soort bedrijven erg aansprekend zijn. Inmiddels werk ik er al bijna een jaar en heb ik projecten gedaan bij onder andere Corendon en CZ. Per project werk je met andere collega's aan een ander probleem op een ander kantoor, waardoor elke werkdag weer anders is. Ook de programmeertalen zijn bij elk project anders. SQL, Scala, R en Python komen eigenlijk allemaal voorbij en vind ik gezien hun populariteit handig om nu in de vingers te hebben.

Na een aantal weken bij Building Blocks, kon ik gelijk aansluiten bij een project voor een groot elektronicaconcern. Ze wilde dat hun klantenservice betrouwbaardere antwoorden kon geven met mindere wachttijd voor de klant. Hiervoor hebben we een voorspellend model bedacht dat bij een inkomende vraag automatisch een antwoord genereert op basis van eerdere gesprekken. Het model kan het onderwerp van de vraag uit de tekst halen en daarmee een passend antwoord geven, erg cool! Ik had vooraf niet verwacht dat ik als parttime werknemer gelijk volledig kon bijdragen aan de projecten en ook net zoals mijn collega's mee ga naar de klant, wat het werk extra leerzaam maakt.

Een vakinhoudelijke baan naast je studie bevalt mij dus erg goed. In principe is dit in de master ook best te combineren gezien de weinige colleges die er zijn, al zal je wel een tandje bij moeten zetten om het dan nominaal af te ronden. Gelukkig mag je in de master uitlopen, wat ik ook gepland heb staan. Dit zorgt voor een mooie leerzame ervaring extra en een verlenging van mijn studententijd!

Carmel Bosch

Carmel is currently in her second year of the Bachelor Econometrics & Operations Research as well as playing hockey in the "Hoofdklasse"

Hi Kraketters, my name is Carmel Bosch, I am 19 years old and I am currently in my second year of the bachelor Econometrics & OR. I play hockey in the "Hoofdklasse", the highest league in the Netherlands and also in the Dutch U21 team. I play a competition match every weekend with my club Bloemendaal and we train 4 times during the week. I play tournaments in the summer with the U21, we train twice a week and have test matches during the season.

After high school a lot of players of the Dutch teams decided to take a gap year to only focus on hockey or they chose a study that is based on a combination of studying and hockeying.
I did not choose to do that. For me it works to have challenges next to sport. I like to focus on something else sometimes and to achieve goals, other than in sports. I can use a lot of the things I learned in hockey in university and the other way around.

For me it works to have challenges next to sport

For example being disciplined and motivated. In order to improve yourself apart from the many trainings, you have the responsibility to take care of your body, your health and make sure you rest well. To achieve this you need to make sacrifices and be disciplined enough to go to the gym, sleep enough, etcetera. It is easy to be disciplined if you know what your motivation is. The same holds for studying, if you want to achieve something, you have to know why. Of course it will still be hard, but it will be easier because you are motivated.

I have played for the Dutch youth teams since I was 15 years old, so I have been combining high school and top sport for a long time. I got used to travelling for hockey, missing classes and studying on my own. There have been periods in which I had a lot of trainings and matches or tournaments and I was not able to prepare or catch up with studying because of the high intensity of the hockey program. As soon as I had a little time off for hockey, I had to start studying. I needed my discipline and motivation.

I got used to travelling for hockey, missing classes and studying on my own

This may sound like playing hockey on a high level is no fun, but the opposite is true. Most of the time, playing hockey is a privilege. You are in a group of people you are really close to and you work towards a goal together. What you learn in sports, more than anywhere else, is to work in a team. You have to deal with social situations and put the team, not yourself, first. If you achieve your dream with the team, it is the best feeling ever. You can share the happiness with the people you are really close to. We won the European Championships in the U18's, I was top scorer of the tournament and we played very good in the final. It had been a long period of preparations and this was not easy, but we helped each other and eventually achieved our goal. This was the best feeling ever.

It may take me a year longer to get my bachelor, but I have learned so much next to my studies in this period, which is absolutely worth the delay!

SECTOR Extra

Selin Essiz

Selin is currently in her second year of the Bachelor Econometrics & Operations Research as well as being a Public Relations committee member of SV Anatolia

Full days of studying, being on the campus all day and actually only having a bit of off-time in the weekends. In short, doing your job and for what you actually pay those 2000 euros of tuition each year. My name is Selin Essiz and I am currently in my second year of the bachelor Econometrics and Operations Research. The things I have just summed up are the ideas I had, and more specifically the things I was totally not looking forward to, about the life of a student. After all the rumors I heard about Econometrics, I would not even dream about comparing my life with those of the students in those typical American college movies. My first half year ended to be just like I expected, strolling from UB to UB. In the beginning, it was bearable though. Later on however, something began to gnaw on me. I did not want to spend all my time being busy with studying like I did in the first half year. After this insight, I opened my eyes and looked at what life outside the lecture tables had to offer.

Around this time I discovered a student association named SV Anatolia. SV Anatolia is a Turkish student association settled at the VU and it immediately got my attention due to my own Turkish background. A good friend of mine, who I met at Anatolia, was in the board of Anatolia when I had just joined. When I told her that I was studying Econometrics, she was the first person who did not respond with "wow, that is a really difficult study, right?". Instead she said "try not to spend all your time just by studying". At the time she was president of a different student union called the SRVU Studentenbond. She asked me if I wanted to join the SRVU board as head of Public Relations. I was honored, however my first reaction to her was "no". I just had a busy year behind me, did not have my BSA yet nor did I want to take risks. I always thought that a diploma and high grades would be enough in my life, but when I looked at my CV and saw that it was not even half a page long, I got my doubts. However, my biggest insecurity was whether my grades would be affected by all these extra responsibilities. After some consideration I decided that it might be good to change, so I accepted the offer.

From that moment on I was officially a board member for SRVU. There I was, running to meetings wbetween the lectures. It was different to spend your time off in working voluntarily, but it was very informative. I learned to handle responsibilities, to work with others, to run business pages on social media and I did this in just a few hours a week. It was a nice way of spending my time, but the SRVU is a very small union so at some point I just did not have much to do besides posting on social media every now and then. Near the end of the year I started spending more and more time with SV Anatolia, I saw how fun and professional they are. I started to feel like I was ready for a bigger challenge and I aimed for a function inside the board of SV Anatolia. If I think back, I don't really know what gave me the courage to go for it. But I became Public Relations committee member in the biggest Turkish student association in the Netherlands and I separated from the SRVU.

Currently, I am still busy with this function at SV Anatolia. The first two periods of this year where quite busy. Next to my courses I had to attend two meetings each week and approximately three or four events every month. Despite me being very busy, I have not regretted my decision for a split second.

It has been an interesting journey so far. The time I have spent in both these associations have taught me a lot of things that I am sure I would not have learned at my study. Since joining SV Anatolia I have been at the University from 9 to 9 more often than I was in the first half year of my studies. But I also have had much more fun than I ever had before. As a person I have gained more experiences and I discovered my qualities and grew in these. I learned how to work in teams and trust my fellow colleagues, how to present social media as attractive as possible, how to make flyers and use photoshop and I improved my social skills. SV Anatolia also has contact with a lot of companies, which gave me the opportunity to meet Econometricians at PwC. Next to all the serious stuff, I have met people who have become very important to me.

All in all, being a board member was good way to express my creativity and be more socially active. It has helped me from the thought of studying all day. At the end of my first year I received my propedeuse with cum laude and I am planning to continue with this judicium combined with being a board member. I am really excited as to what the future has planned for me and I advise everybody to be active as board member as well in a student association. Reading about the great things that happened in someone's life is nice, but feeling the impact by going for it yourself is greater than you might think!

NOTHING BEATS WINNING

"Be ready to make quick decisions and seize opportunities."

Do you thrive on outsmarting your competition?

Flow Traders is looking for Junior Traders, Quantitative Traders, Quantitative Researchers, Graduate Software Developers and Trading Interns with excellent mathematical and analytical skills combined with an interest in global financial markets. In this exciting and challenging trading environment you will strive to continuously improve.

If you want to be part of our winning team, sign up for our events at www.flowtraders.com

Flow Traders is a leading global technology-enabled principal trading firm.

www.flowtraders.com
careers.amsterdam@nl.flowtraders.com

FLOW TRADERS

AMSTERDAM - CLUJ - HONG KONG - NEW YORK - SINGAPORE

Een wiskundige verdwaald tussen de econom(etrist)en: een verantwoording

Rein Nobel

De universiteiten zal het de moed blijven ontbreken om harde wetenschap te onderwijzen. Men zal erin volharden de studenten te misleiden en elke volgende fase in de infantilisering zal toegejuicht worden als een onderwijskundige stap voorwaarts.
Edsger Wybe Dijkstra (1930-2002)

Vooruitgang bestaat niet en dat is maar goed ook, want zoals het is, is het al erg genoeg.
Gerard Reve (1923-2006).

Ruim twee-en-dertig jaar geleden, op 1 augustus 1986, trad ik als universitair docent toe tot de Vakgroep Econometrie, die enige maanden eerder samengevoegd was met de Vakgroep Kwantitatieve Methoden en daarmee onderdeel was geworden van de Economische Faculteit. Voor een student van nu is dat heel lang, letterlijk een generatie geleden, maar voor mij lijkt het eergisteren geweest te zijn. Tijdsperceptie is zeer persoonlijk en hangt nauw samen met de eigen verstreken levensduur.
Om een idee te krijgen hoe een student in 2018 het jaar 1986 ziet is het illustratief 32 jaar terug te gaan naar het jaar 1965, toen ik zelf begon met mijn wiskundestudie op de UvA, en 32 jaar dáárvoor in Duitsland Hitler aan de macht was gekomen (1933), een historische gebeurtenis die de rest van de twintigste eeuw getekend heeft, maar die voor ons, de na de Tweede Wereldoorlog geboren babyboomers, onderdeel was van de niet-beleefde geschiedenis waarvan we alleen via onze ouders en op school kennis hadden genomen. Ik moet me dus realiseren dat het jaar 1986 toen ik op de VU kwam voor een student van nu even ver verscholen ligt in een onbekend ver verleden als voor mij destijds het jaar 1933 toen Hitler aan de macht kwam! En hoe verschrikkelijk de periode 1933–1945 ook geweest was, wij aanloop naar de Tweede Wereldoorlog en de oorlog zelf niet aan den lijve ondervonden, en daardoor bleef deze periode voor ons onvermijdelijk gedeeltelijk in duisternis gehuld, en bleef hij altijd ver weg, ondoordringbaar verscholen achter de tijdshorizon die gemarkeerd wordt door ons naoorlogse geboortejaar.

Je kunt nog zoveel over de Tweede Wereldoorlog lezen, herinneringen zul je er nooit aan krijgen, deze periode blijft voor mijn generatie beperkt invoelbaar, en wat dit betreft is de kloof tussen de generatie van de jaren zestig en die van hun ouders onoverbrugbaar: wij hebben simpelweg niet meegemaakt wat bij hen vaak een stempel op de rest van hun leven heeft gedrukt waardoor het voor hen moeilijk viel de nieuwemaatschappelijke ontwikkelingen van de jaren zestig en zeventig te volgen, laat staan te accepteren. In onze opvoeding kwam indirect de oorlog wel regelmatig ter sprake en werd vaak door kleinigheden de herinnering eraan levendig gehouden. Zo had mijn moeder een linnenkast vol toiletzeep, omdat daaraan in de oorlog een groot tekort was geweest, en er kon toch opnieuw oorlog komen, en als ik in de jaren vijftig mijn bord niet leeg at, dan werd soms verwezen naar de Hongerwinter (1944/45), en werd ons regelmatig virtueel een menu van tulpenbollen en suikerbieten voorgeschoteld.

Maar de naoorlogse tijden waren onomkeerbaar aan het veranderen, en de oorlog was steeds ver-
der weg. In de eerste helft van de jaren zestig nam de welvaart toe, de vrije zaterdag werd ingevoerd, maar zelf ging ik op zaterdag nog gewoon naar school. Er was de oorlog in Vietnam, waartegen veel jongeren protesteerden, tot groot verdriet van hun ouders voor wie de Amerikanen in 1945 de bevrijders waren geweest. In Amsterdam waren er de Provo's met hun witte-fietsen plannen, tegen wie de politie hard optrad en in 1966 trouwde prinses Beatrix met de Duitser Claus von Amsberg, waartegen ook veel jongeren in opstand kwamen vanwege zijn lidmaatschap van de Hitlerjugend, en zo bleek die niet-beleefde oorlog toch ingezonken te zijn in het cultureel-politieke dna van de nieuwe generatie. Voor de millennials, dus ook voor de huidige studenten, zijn vele van deze feiten waarschijnlijk zelfs onbekend en dit zal ook gelden voor de ingrijpende gebeurtenissen die hebben plaatsgevonden in de tweede helft van de jaren tachtig toen ik op de VU kwam, zoals de Kernramp in Tsjernobyl (1986), de Val van de Muur (1989) en de ondergang van de Sovjet Unie (1991). Voor de huidige student zullen al deze historische mijlpalen ook niet veel meer zijn dan niet-beleefde geschiedenis, terwijl ze bij mijn generatie in het geheugen gegrift staan. Wij babyboomers zijn opgegroeid in de periode van de Koude Oorlog die begon met de Berlijnse Luchtbrug (1948/49), en een volgende oorlog kwam angstaanjagend dichtbij met de Hongaarse Opstand (1956) en de Russische inval in Tsecho-Slowakije (1968). Maar dertien jaar later was het directe gevaar blijkbaar al uit het collectieve geheugen weggewist en werd er massaal gedemonstreerd tegen de plaatsing van Kruisraketten (1981). Een student van nu heeft misschien een oude oom of tante die destijds heeft meegelopen in deze ongekend grote demonstratie, maar die gebeurtenis van 37 jaar geleden is voor hem of haar net zover weg als voor mij in 1965 de beurskrach van Wall Street in oktober 1929. En zo kunnen we doorgaan met het trekken van historische parallellen, die alle het verschil illustreren tussen het referentiekader van de millennial en dat van de babyboomer. Kort gezegd, de Val van de Muur neemt in het wereldbeeld van de student anno 2018 ongeveer dezelfde plaats in als de opkomst van Hitler in het mijne en dit onloochenbare feit maakt al dat millennials en babyboomers hun idee¨en en wereldbeeld baseren op bijna disjuncte historische databanken. Zoals mijn ouders en leraren de Tweede Wereldoorlog als referentiepunt kenden, zo is dat voor mijn generatie, naast de niet-beleefde Tweede Wereldoorlog, voornamelijk de zeer bewust beleefde Koude Oorlog met de oorlog in Vietnam, de dreiging uit Rusland en de Culturele Revolutie in het China van Mao Zedong. En voor de millenial en de student van 2018? Ik moet bekennen dat ik dat eigenlijk niet goed weet. Is het Nine/Eleven (2001), de moorden op Pim Fortuyn (2002) en op Theo van Gogh (2004), de Euro-crisis (2008) of de de opkomst van Islamitische Staat (2014 tot nu)? Nogmaals, ik weet het niet, het is misschien ook nog te vroeg om al verantwoord terug te kunnen blikken op een te recent verleden, de feiten zijn nog nauwelijks gestold tot helder te interpreteren historische gebeurtenissen. Ook weet ik niet of de analogie, die ik misschien enigszins lichtzinnig poneer tussen de opkomst van Hitler en de Val van de muur enig hout snijdt. Er zijn domweg te veel verschillen en de analogie beperkt zich tot het gegeven dat beide historische gebeurtenissen zo'n dertig jaar plaatsvonden voordat respectievelijk mijn generatie en de huidige studenten aan hun universitaire studie begonnen en dat zij de belangrijkste omwentelingen zijn geweest die drie decennia v´o´or de aanvang van onze universitaire jaren de wereld een ander aanzien hebben gegeven, om het zwakjes uit te drukken. Maar dit alles neemt niet weg dat de vraag wat de babyboomer de millennial nog te vertellen heeft met bovenstaande overpeinzingen in het achterhoofd levensgroot opduikt. Zijn de communicatiekanalen tussen onze generaties nog open en kan een babyboomer de millennial een glimp tonen van de universitaire sfeer van toen die de simpele anekdotiek zal overstijgen? Ik heb er een hard hoofd in, maar het onderstaande

moet als een poging hiertoe gezien worden. Vanaf 1982 was de Twee-fasen Structuur ingevoerd, die de universitaire studies drastisch hadden ingeperkt. Voor 1982 bestond elke universitaire studie ook uit twee fasen, die werden afgesloten met respectievelijk het kandidaatsexamen (na drie jaar) en het doctoraal examen (nog eens ongeveer drie jaar). De totale studieduur was dus zo'n zes jaar, maar snelle studenten rondden hun studie in vijf jaar af en langzame studenten, zoals ik, deden er een paar jaar langer over. Er bestond, zeker in de doctoraalfase, een grote vrijheid in het kiezen van vakken, en je kon er zo lang over doen als je zelf wilde, uiteraard binnen zekere grenzen, maar studenten die tien jaar over hun studie deden waren geen uitzonderingen. Veel tentamens waren mondeling en je maakte een afspraak met een hoogleraar als je meende de stof in je vingers te hebben. De selectie vond in de pre-kandidaatsfase plaats, en het kandidaatsexamen kon je als een soort toelatingsexamen opvatten: in de doctoraalfase vielen weinig studenten af, hoewel sommigen, zeker in de sociale wetenschappen, bleven steken in hun scriptie en nooit afstudeerden. Omdat ik na mijn kandidaats al les gaf op een school voor chemisch analisten (onbevoegd; er was een groot tekort aan wiskundedocenten) had ik minder tijd voor de studie, en verder reisde ik in die jaren veel. De reis over land naar India, in de jaren zestig/zeventig heel populair (Overland to India: the hippie trail), maakte ik drie keer en onderweg bezocht ik landen die nu vaak ontoegankelijk zijn geworden door politieke omwentelingen of (burger)oorlogen (Iran, Irak, Syrie, Afghanistan, Pakistan). Na terugkomst deed ik dan weer een paar mondelinge tentamens. Door al deze 'buitenschoolse' activiteiten haalde ik pas in maart 1974 mijn doctoraal zuivere wiskunde met specialisatie grondslagenonderzoek, een vakgebied dat de fundamenten van de wiskunde ter discussie stelt. Mijn doctoraalscriptie ging over *intuitionistische* logica, op het eerste gezicht niet bepaald een degelijke voorbereiding op een toekomst bij de vakgroep econometrie.

In augustus 1975 begon mijn loopbaan op het Amsterdamse Spinoza Lyceum als wiskundedocent (zonder pedagogische aantekening!) waar ik tien jaar na mijn eigen eindexamen een school aantrof die nog maar heel weinig leek op een middelbare school zoals ik die als leerling had gekend. Eind jaren zestig waren de babyboomers namelijk openlijk in opstand gekomen tegen de oorlogsgeneratie met hun vooroorlogse als autoritair ervaren opvattingen. Hierboven wees ik al op Provo, maar dat was slechts het begin. In 1968 begon in Parijs de studentenrevolte en die waaierde in 1969 ook uit naar Nederland waar studenten het Maagdenhuis (administratief centrum van de UvA) bezetten. Wij wiskundestudenten hielden ons voor het merendeel verre van deze zogenaamde democratiseringsbeweging, maar de politiek zag het als zijn pacificerende taak met nieuwe wetgeving te komen die studenten veel invloed gaf, ook op hun eigen studieprogramma! Zeker in de sociale faculteiten, waar het Marxisme en de Communistische Partij Nederland (CPN) heel populair werden, is in die tijd meer gediscussieerd dan gestudeerd. En begin jaren zeventig begonnen deze 'alternatief' opgeleide studenten op de middelbare scholen de oude vooroorlogse generatie docenten te vervangen. Op het Spinoza Lyceum waren het vooral de docenten Nederlands en Duits bij wie het virus van de revolutie er flink had ingehakt. Docenten van de exacte vakken, maar ook die van Aardrijkskunde, Engels en Frans bleken veel minder gevoelig te zijn voor de waan van de dag. Ik kwam daar als jong docent tussen te bivakkeren, aan de ene kant vertegenwoordiger van de nieuwe 'verlichte' generatie, maar ook docent van een vak waar de waarheid niet ideologisch van kleur verschiet met de nieuwste maatschappelijke modes. Dit schisma tussen de ideologisch bevlogen hemelbestormers en de traditionalisten waartoe ik me zelf zonder gˆene wenste te rekenen, leidde vaak tot botsingen, bijvoorbeeld tijdens de overgangsvergaderingen. In 1968 was de Mammoetwet ingevoerd en leerlingen moesten in de vierde klas een pakket kiezen van zeven vakken. De begrippen 'een vak laten vallen' en 'pretpakket' deden hun intrede en zo stelden de revolutionairen vaak voor dat een leerling bevorderd kon worden omdat hij of zij "wiskunde en natuurkunde (waarvoor de betreffende leerling meestal een 3 had staan) toch zou laten vallen, en in andere vakken zo creatief was en ook zo krities kon discussi¨eren". Ook het experimenteren met soft drugs werd door een klassementor (meestal een mentrix) soms gezien als een signaal dat de 'leerling bezig was zichzelf te ontdekken' en daarom ondanks de zware onvoldoendes wel over kon naar de vierde klas. Kortom, soms leek de school op een gedemocratiseerde psychiatrische inrichting waar de pati¨enten alle macht in handen hadden gekregen. Mijn collega natuurkunde en ik stonden te midden van deze waanzin pal voor de kwaliteit van de oude hbs-b (een schooltype dat Nederland wetenschappelijk op de kaart had weten te zetten, zoals blijkt uit de vele Nobelprijzen die aan het begin van de twintigste eeuw aan oud hbs-ers zijn toegekend), maar vaak delfden wij het onderspit,

en zo zal het op vele scholen gegaan zijn. Het resultaat is geweest dat vanaf begin jaren zeventig veel leerlingen een vwo-diploma gehaald hebben met een pretpakket die vervolgens door konden stromen naar de universiteit en daar sociologie, politicologie, culturele antropologie, pedagogie of psychologie zijn gaan studeren en anno 2018 een grote invloed hebben weten te verwerven tot in de haarvaten van de samenleving. Nederland transformeerde van een land vol nuchtere ingenieurs en dijkenbouwers die gewend waren tegen de wind in te fietsen in een land vol agogen die met een universitaire graad op zak een hulpverlenersindustrie in het leven hebben kunnen roepen, die als een verstikkende deken over het publieke debat ligt: elk falen is volgens deze sociale wetenschappers te verklaren uit onderdrukkende maatschappelijke structuren, en daarmee verdween in de jaren zeventig de eigen verantwoordelijkheid van de burger uit het zicht. Deze ontwikkeling heeft de nieuw afgestudeerde psychologen en pedagogen geen windeieren gelegd: half Nederland moest in therapie. Niet alleen in de politiek maar ook in de media, bijvoorbeeld in de dagelijkse nieuwsprogramma's en talkshows die er geen been in zien elk maatschappelijk vuurtje flink op te stoken door een aantal 'deskundigen' hun zegje te laten doen, worden overal slachtoffers ontdekt van vermeende misstanden. In bijna elk maatschappelijk debat heeft ideologische vooringenomenheid de plaats ingenomen van een koele analytische benadering en dit is een van de grote kwalen waarmee de zo optimistisch begonnen vernieuwing van de jaren zestig met in zijn kielzog de genoemde onderwijsvernieuwing Nederland heeft opgescheept. Niet gehinderd door veel kennis van zaken weten de ideologen precies te vertellen hoe gevaarlijk de klimaatverandering is en dat de door velen gevreesde gevolgen van de immigratie naar her rijk van de xenofobe fabels verwezen moeten worden, om maar eens twee heikele onderwerpen te noemen. We zien in de media heel zelden een fysicus, een geoloog of een demograaf aan het woord die met beide benen op de grond iets verder kijkt dan een paar droge zomers of een verwoestende orkaan, of opmerkt dat een ongecontroleerde mondiale bevolkingsgroei misschien ook wel eens van invloed zou kunnen zijn.

Het eind van deze ideologisering lijkt voorlopig niet in zicht, zoals de opkomst van intersectionaliteit en het identiteitsdenken, de jongste loten aan de boom van het slachtofferdenken, laat zien. De ironie wil dat dezelfde jaren zestig die de ontplooiing en de bevrijding van het individu voorstonden, nu mede door de hierboven aangestipte verloedering van het onderwijs tot nieuwe vormen van conformisme geleid hebben. Het breed gedragen streven naar inclusiviteit en diversiteit lijkt op het tegendeel te wijzen, maar dit streven onderstreept slechts de weg naar dit conformisme waarin de nieuw gekwetsten de toon kunnen zetten omdat ze weinig weerwoord krijgen, zeker niet in de zogenaamde 'kwaliteitspers', intellectueel leidraad voor veel hoogopgeleiden, die de gekwetsten maar al te graag naar de mond praat. De babyboomers kijken machteloos toe hoe vele verworvenheden van de afgelopen decennia bezig zijn te verkeren in hun tegendeel. Heel kort samengevat, de harde grap is taboe verklaard, cabaret en satire blijven angstvallig binnen de stilzwijgend geslagen ideologische piketpaaltjes en een nieuwe preutsheid en truttigheid vieren hoogtij. We zijn o zo bang om elkaar te kwetsen, en politiek en media kiezen steevast voor de nieuwe gekwetsten die overal opduiken als paddenstoelen in een herfstig bos. De zuiverende zuurstof, zo noodzakelijk voor elk publiek discours, is bezig op te raken, en de burger die zich verzet hangt in comateuze toestand in de touwen: hij wordt al snel een extremist of een tokkie genoemd, en krijgt de meest verschrikkelijke verwensingen naar zijn hoofd geslingerd. Hij houdt zich voorlopig koest want na twee politieke moorden hebben slechts weinigen nog de moed hun nek uit te steken. En toch zullen de opgekropte frustraties eens naar buiten komen, in welke vorm valt op dit moment moeilijk te voorzien, maar de opkomst van diverse zogenaamd populistische partijen wijst op een nu nog ondergronds gistingsproces dat niet vanzelf zal overwaaien.

Een link tot de volledige versie van dit stuk kan gevonden worden op de Kraket site. Ga naar mykraket -> SECTOR -> Extra artikelen.

Media Review

Good Will Hunting

Gus van Sant

Good Will Hunting is an American drama film starring Matt Damon, Ben Affleck and Robin Williams. The movie is about Will Hunting (Matt Damon) who is 20 years old at the beginning of the movie and born in South-Boston. He has been severely abused as a child and has been in trouble with law ever since. Will Hunting has an extraordinary gift for mathematics, chemistry and more. He learned everything by reading and remembering every book in his local library. He works as a janitor at the prestigious M.I.T. University. One day his talent is discovered by one of the professors: Gerald Lambeau, who catches him solving a difficult proof he had written on the blackboard in the corridor. Will gets in trouble with the law once again, this time he isn't able to talk his way out of the conviction and he gets sentenced to jail. The professor convinces the judge to let him go, granting that he stays under the supervision of professor Lambeau and attends weekly therapy sessions. Will frustrates every therapist at M.I.T that professor Lambeau sends him to. So Lambeau resorts to his old college roommate, now a community college professor Sean McGuire (Robin Williams) with who Will eventually connects. To complicate things further, he meets a pre-med student, who managed to open up his heart for the first time in his life. After the eventually effective weekly therapy sessions, Will made a decision that will change his life forever. The movie was also well perceived by the movie critics. One way that you can see that is by the fact that in 1998 Matt Damon & Ben Affleck received the Oscar for the Best Original Scenario and Robin Williams for the Best Supporting Actor at the 70th Academy Awards. Among many other awards.

Good Will Hunting is an original, heartfelt and honest drama. The actual mathematics is only second to the plot since you can only catch the mathematical questions and proofs in short screenshots. What you can see from these few moments is that the proofs are mostly about graph theory. Although these proofs might be interesting to us as EOR and EDS students the story is more about the troubles in life which are important to everyone. Especially for a genius with a troubled past, personified by Will Hunting in this movie. His troubles are mostly about two parts: pride and old mental wounds. Since he sees being a bricklayer as honest work and being a mathematician not. While also not wanting to leave the safe space that he has with his childhood friends.

Good Will Hunting shows a lot of the troubles in all facets in life and it does this without becoming preachy. From the problems that Will faces to the professors Lambeau and McGuire to almost all the people who Will has a relationship with among which is his childhood friend Chuckie (Ben Affleck) who along with the professors, the pre-med student helps come to his eventual decision on his 21st birthday. Good Will Hunting, which is available now on Netflix, is therefore definitely recommended!

Puzzels

Carnaval in Tullepetaone City

It is Carnaval! Marcel, Belle and Jesse celebrate Carnaval in Tullepetaone City (the name of Roosendaal during Carnaval). In Tullepetaone City they want to do a pub crawl along eleven pubs, where they start in the bar Mother Superior. They aim to visit all eleven pubs, but due to their enthusiasm about Carnaval they find themselves in a daze so that they can only remember at each bar in which two previous pubs they have been. So every time they choose the next pub, they only know in which pub they are at the moment plus the two previous pubs. You can assume that the bar will be chosen at random.

What is the probability that they will be able to visit all eleven bars, given that there are only eleven bars?

Answers edition 8-2

Skiles

Het spelletje zal nooit aflopen, bij 10 pylonen is het niet mogelijk dat alle kinderen bij één pylon terecht komen.

- Geef de pylonen van links naar rechts de nummers 1 t/m 10. Als we bij het begin van het spelletje de nummers van alle kinderen optellen krijgen we: 1 + 2 + ... + 9 + 10 = 55 (bij elke pylon staat namelijk precies één kindje).

- Als de leraar op z'n fluitje blaast gaat één kind n pylonen naar rechts (zijn puntenaantal wordt dus n hoger). Een ander kind gaat op dat moment n pylonen naar links (zijn puntenaantal wordt dus n lager). Hiermee verandert de som dus niet. De 'score' blijft het hele spel gelijk, namelijk 55.

- Omdat 55 niet deelbaar is door 10, is het niet mogelijk dat alle kinderen tijdens het spel bij één pylon staan.

Publications

Barra, I; Borowska, A; Koopman, SJ (2018), 'Bayesian dynamic modeling of high-frequency integer price changes' Journal of Financial Econometrics, vol. 16, no. 3, pp. 384-424.

Karabiyik, H; Urbain, JRYJ; Westerlund, J (2018), 'CCE Estimation of Factor-Augmented Regression Models with more Factors than Observables' Journal of Applied Econometrics.

van der Laan, D. (2018). Assigning multiple job types to parallel specialized servers. Discrete Event Dynamic Systems, 28(4), 471-507.

Sitters,R; Yang, L (2018), 'A (2+ϵ)-approximation for precedence constrained single machine scheduling with release dates and total weighted completion time objective' Operations Research Letters, vol. 46, no. 4, pp. 438-442.

Wang, W; Sun, H; van den Brink, R; Xu, G (2019), 'The Family of Ideal Values for Cooperative Games' Journal of Optimization Theory and Applications, pp. 1-22.

Agenda

Diversity & Development

March 6 (registrations: February 20)

Forum

April 30

EFchallenge

May 14

SECTOR is a publication of

Kraket

Kraket is the study association for Econometrics and Operations Research at the Vrije Universiteit in Amsterdam. The name Kraket stands for ‘Kritische Aktuarissen en Econometristen’.