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ORSSA Newsletter March 2018

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From The Editor

By Brian van Vuuren (brianjohnvanvuuren@gmail.com)

Brian van Vuuren

Dear ORSSA Members,

It's a new year which already feels old...

Since we last touched base, you're past the point of shoddily scratching over your '7' to make it an '8' everytime you write the year.

And with a new year come new faces, places and challenges. This year we welcome a new president to the ORSSA society, Danie Lötter. You can find his inaugural 'from the president's desk' piece on page 2 of the newsletter. Danie will be supported ably by our previous president, Winnie Pelser, along with the rest of the executive committee. Details of who fulfills each position on the committee can be found on page 4.

On a personal note, I remain in the position of newsletter editor, but in a different professional capacity - having moved from the *University of Stellenbosch* to a software development role at *Allan Gray* (Pty) Ltd. Although an exciting change, it means I no longer have the willing and capable hands of the university students at my disposal to contribute articles and content for the newsletter. I therefore put out a special request to all members to try their best to contribute at least one item over the next year to be shared with the OR community. It's easier than you think, and we all love to hear what's going on in the realm of OR around the country (and world!).

My working in Cape Town while still living in Stellenbosch keeps me on the road for a hefty amount of time each day and, as such, I get through a lot of podcasts - some interesting and educational (and some suitably mind-numbing). Of these, some of my favourite episodes revolve around TED talks which have been adapter for radio. It was here that I first heard about the interesting work of Cathy O'Niel and her strong negativity towards machine learning algorithms.

Although I don't necessarily agree with her views, it makes for excellent food-for-thought and, as such, I've included an article summarising her opinions on page 7.

I hope you enjoy this quarter's edition!

Until next time,

Brian (*Editor*)

Features Page

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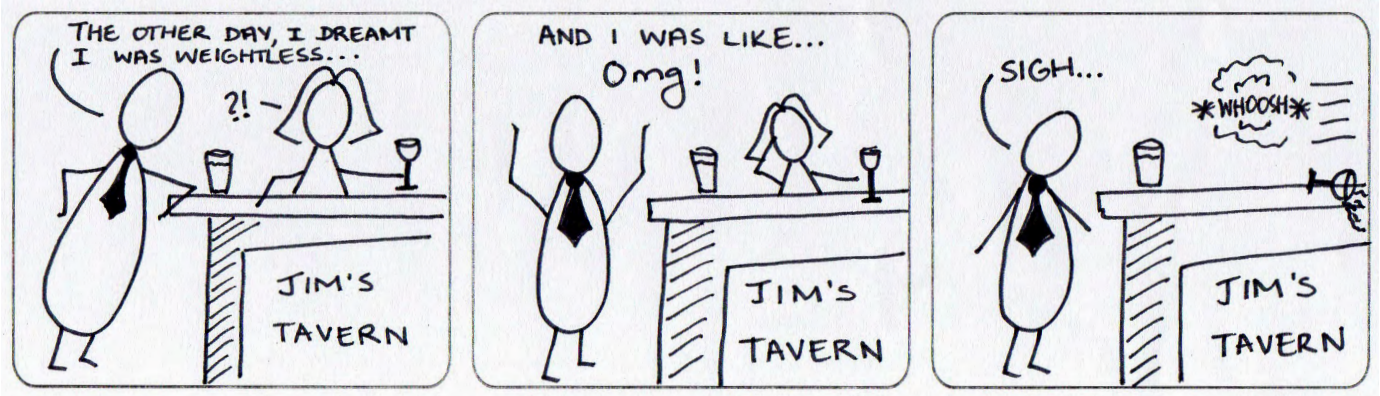
The dating scientest tries out some of his best lines...



From The President's Desk

By Daniel Lötter
(danielotter@sun.ac.za)
ORSSA President

Danie Lötter

Greetings to all ORSSA members! The end of the first term of 2018 is here and the not so recent end-of-2017 holiday spirit is merely a vague memory. I would, nevertheless, like to wish each member of ORSSA a prosperous and very productive year ahead. My sincerest gratitude goes out to the 2017 *Executive Committee* (EC) for the sterling job they did in ensuring that the Society runs smoothly. The success of the Society relies heavily on the EC and without their hard work, achieving the goals of the Society seems almost impossible. Members serving on the EC do so voluntarily (*i.e.* do not receive any remuneration), implying that these members sacrifice valuable time in their personal capacities to the benefit of the Society. In light of this, I wish to thank each and every member who served on the EC for their hard work and dedication in manning their portfolios in such a way to upkeep the professional stature associated with OR and also with ORSSA, despite ongoing pressures posed by their normal working and personal activities. It is much appreciated.

In particular, I would like to extend a huge thank you to our outgoing president, Winnie Pelser, for her significant contributions made towards the Society during her term of office (2016-2017). I believe that the President is the glue that keeps the Society together, and I know Winnie worked very hard to maintain this. Congratulations on a job done well — I am certainly going to have to work hard to follow in your footsteps. I am also very grateful for Winnie's return to the EC as Vice President for me to lean on for advice.

I would also like to thank the Society for entrusting me with the honor of taking over the presidential responsibilities of ORSSA. I am truly humbled by ORSSA providing me with the great privilege to be at the head of the Society for the next two years. As the youngest appointed president in the history of the Society, it is certainly going to be hard work to stand in the shoes of the Presidents who went before me. I would therefore like to assure everyone that I will do everything in my power to live up to the demands required by the position.

Unfortunately, some of our EC members have had to resign at the end of 2017. They are Dave Evans (treasurer), Denzil Kennon (marketing manager), Martin Kidd (ORiON business manager), Linke Potgieter (additional member), Jan van Vuuren (additional member), Hennie Kruger (additional member) and Ian Campbell (additional member). Thank you each for the unique contributions that you made to the Society. I would then like to welcome the newly appointed members of the 2018 EC who are Christa de Kock (treasurer), Fanie Terblanche (ORiON editor), Susan Campher (ORiON business manager), Sumarie Koetsier (additional member), Joke Bührmann (additional member) and Patrick Reynolds (additional member). Thank you for your willingness to serve the Society in this manner. The EC for 2018 may be found on page 5 of this Newsletter. I am excited by the prospect of working closely with a dedicated team to serve the Society in an exemplary manner in order to ensure that ORSSA remains the professional OR home for South African (and also recently Zimbabwean) OR practitioners. I shall be relying on each one of you to achieve the Society's goals for 2018.

Furthermore, I trust that 2018 will be filled with many memorable OR events and will present many opportunities for our members. I believe that many OR practitioners in South Africa are capable of providing high-quality decision support to various levels of the South African economy. This may make a significant contribution in relieving the pressure society and the government have currently been facing, such as the ever-increasing water crisis the Western Cape government is facing, the ongoing debate of sustainable renewable energy, and the ongoing debate on the introduction of further nuclear power generating units to the existing South African power grid, to name but a few. I would therefore like to encourage our members to promote the profession of OR in and also ORSSA in their various sectors and to embrace opportunities presented to them in this respect.

I would like to close by urging members of the Society to embrace the opportunities that the Society affords them. Make an effort to attend the chapter events organized by your chapter chairs — these are excellent opportunities to network with other members in your surrounding OR community and to share ideas outside your normal work environment. Please feel free to contribute to the lifeblood of knowledge sharing in the Society through the Newsletter (on a less academic level) and to the Society's scholarly journal ORiON (on a more scientific level). Both these publications are great communication vehicles to showcase your work to members of the Society and also act to build a greater knowledge base. Finally, try your best to attend the highlight on the Society's annual calendar of events, the national ORSSA conference. The conference always affords vast opportunities on many levels to members and brings together communities from industry and academia to network and to share their work.

With my best wishes,
Daniel Lötter

Quarterly Puzzle: *The World's Hardest Sudoku Puzzle*

Provided by Shane van Heerden (17683068@sun.ac.za)

Shane v Heerden

Hey puzzle solvers!

A Finnish mathematician, Arto Inkala, devised this Sudoku puzzle in 2012, dubbing it The Worlds Hardest Sudoku. He named his creation Everest, since conquering this puzzle is alleged to be a near incomprehensible feat.

Inkala specifically designed Everest to be unsolvable to all but the sharpest minds. As a comparison, most Sudoku grids are graded on a five-star scale — five stars being the most challenging. According to Inkala, he rated his Everest creation to be an eleven-star monster! So if you're feeling a bit wimpish, keep paging along, but to the brave, I wish you luck… you're definitely going to need it!

The solution to the puzzle is provided on Page 13

8								
		3	6					
	7			9		2		
	5				7			
				4	5	7		
			1				3	
		1					6	8
		8	5				1	
	9					4		

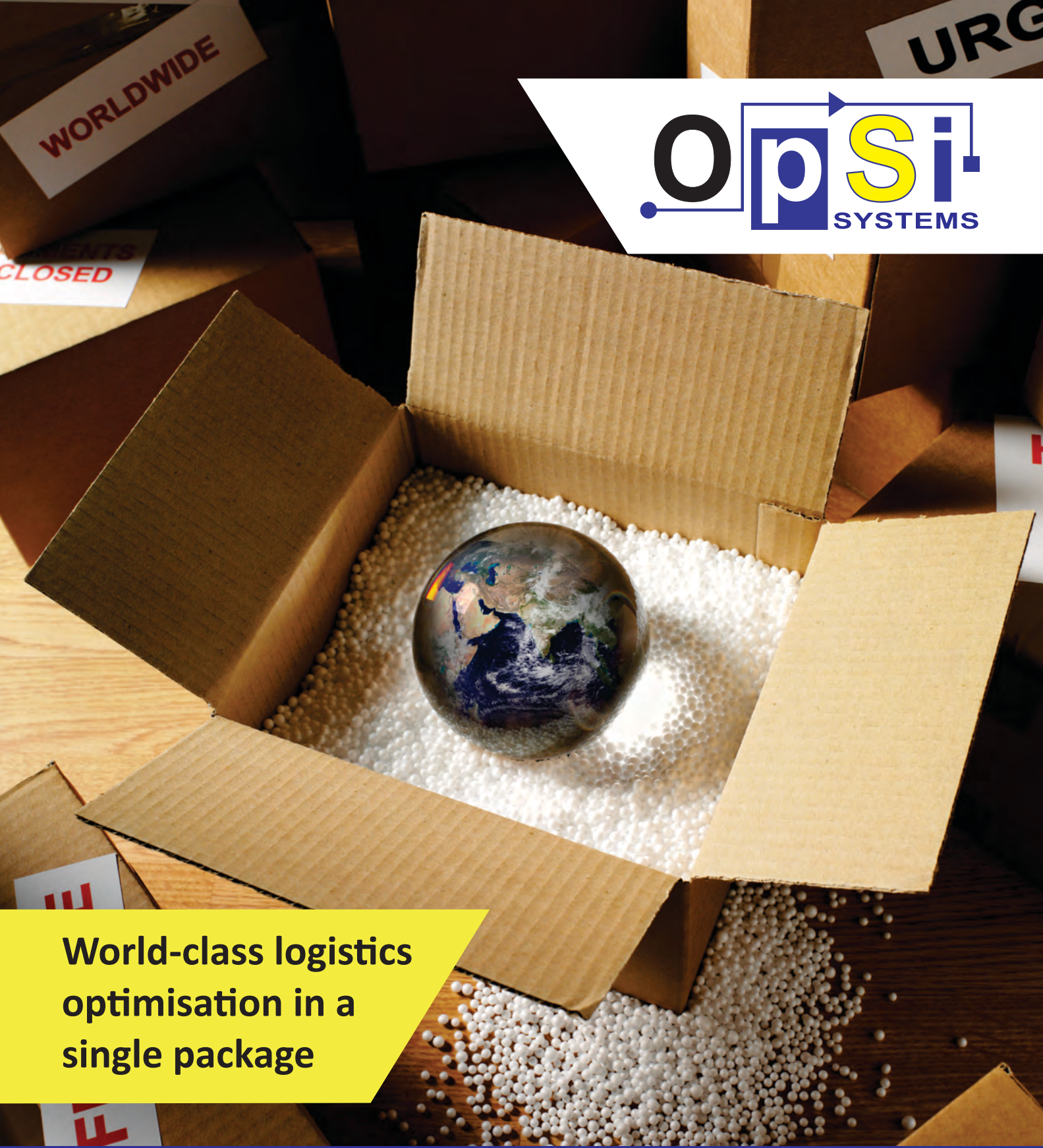
A quick brush up on the rules of Sudoku:

The classic Sudoku game involves a grid of 81 squares. The grid is divided into nine blocks, each containing nine squares.

The rules of the game are simple: each of the nine blocks has to contain all the numbers 1-9 within its squares. Each number can only appear once in a row, column or box.

The difficulty lies in that each vertical nine-square column, or horizontal nine-square line across, within the larger square, must also contain the numbers 1-9, without repetition or omission.

Every puzzle has just one correct solution



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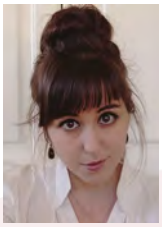

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Hans Ittmann

EURO Representative:
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WC Chapter Event: Colloquium with Prof Paolo Toth

by Victoria Thomas (18287557@sun.ac.za)

Victoria Thomas

Despite the sweltering Stellenbosch heat and Level 6B water restrictions, the ORSSA Western Cape Chapter hosted their first chapter event of the year: a colloquium with Professor Paolo Toth at the Sasol Art Museum on the 7th of February 2018.

Professor Paolo Toth, professor emeritus of combinatorial optimisation in the Faculty of Engineering at the University of Bologna in Italy and former EURO and IFORS president, presented a talk on *Models and Algorithms for the traveling salesman problem with time-dependent service times*.

Figure 1: ORSSA Western Cape Chapter Chair, Shane van Heerden, welcoming chapter members to the event

In his colloquium, Professor Paolo Toth considered the "Traveling Salesman Problem with time-dependent Service Times" (TSPST), a variant of the classical Asymmetric TSP. In the TSPST, he noted that each customer requires a service time whose duration depends on the time at which the customer is visited. It was found that the TSPST calls for finding a Hamiltonian circuit minimising the total duration of the circuit. A branch-and-cut algorithm and a metaheuristic was then proposed. Finally, computational experiments on benchmark TSPST instances were reported, showing the effectiveness of the proposed algorithms.

Figure 2 (left to right): Students, Celine Jansen van Rensburg and Maegan Mac Kenzie, and ORSSA Secretary, Lieschen Venter.

Figure 3: Colloquium presented, Professor Toth, engaging with the audience

Members were then presented with an opportunity to engage with Paolo and interact with fellow members of the chapter, whilst enjoying light refreshments in the beautiful setting of the Sasol Art Museum.

The colloquium proved to be overall an informative and enlightening chapter event. On behalf of all the Western Cape Chapter members, we would like to thank Professor Paolo Toth for the insightful colloquium and the ORSSA Western Cape Chapter Executive Committee for ensuring the event's success.

Figure 4 (left to right): ORSSA Western Cape Chapter Vice-Chair, Thorsten Schmidt-Dumont, and ORSSA President, Danie Lötter.

Weapons of Math Destruction

Originally appeared on 99percentinvisible.org

On April 9, 2017, United Airlines flight 3411 was preparing to take off from Chicago when flight attendants discovered the plane was overbooked. They tried to get volunteers to give up their seats with promises of travel vouchers and hotel accommodations, but not enough people were willing to get off the flight.

So United ended up calling some airport security officers, who boarded the plane and forcibly removed a passenger named Dr. David Dao. The officers ripped Dao out of his seat and carried him down the aisle of the airplane, nose bleeding, while horrified onlookers captured the scene with their phones. The public was outraged.

But how did Dr. Dao end up being the unlucky passenger that United decided to remove? Immediately following the incident, there was speculation that racial discrimination played a part — and it's possible it played a role in how he was treated. But the answer to how he was chosen is actually an algorithm, a computer program that crunched through reams of data, looking at how much each passenger had paid for their ticket, what time they checked in, how often they flew on United, and whether they were part of a rewards program. The algorithm likely determined that Dr. Dao was one of the least valuable customers on the flight at the time.

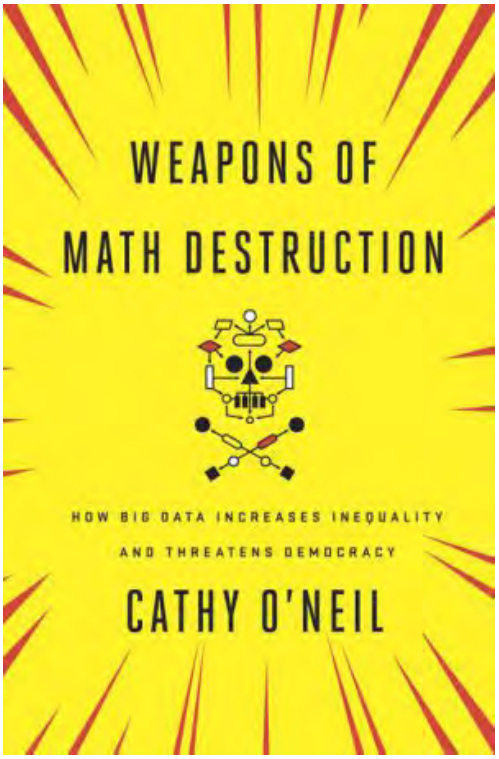
Computer algorithms now shape our world in profound and mostly invisible ways. They predict if we'll be valuable customers and whether we're likely to repay a loan. They filter what we see on social media, sort through resumes, and evaluate job performance. They inform prison sentences and monitor our health. Most of these algorithms have been created with good intentions. The goal is to replace subjective judgments with objective measurements. But it doesn't always work out like that.

"I don't think mathematical models are inherently evil — I think it's the ways they're used that are evil," says mathematician Cathy O'Neil, author of the book Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. She has studied number theory, worked as a data scientist at start-ups, and built predictive algorithms for various private enterprises. Through her work, she's become critical about the influence of poorly-designed algorithms.

An algorithm, in a nutshell, is a step-by-step guide to

solving a problem. It's a set of instructions, like a recipe. Computer algorithms are sets of rules for calculations that take historical data and predict future successful outcomes. And many companies that build and market these algorithms like to talk about how objective they are, claiming they remove human error and bias from complex decision-making.

But in reality, every algorithm reflects the choices of its human designer. O'Neil has a metaphor to help explain how this works. She gives the example of cooking dinner for her family. The ingredients in her kitchen are the "data" she has to work with, "but to be completely honest I curate that data because I don't really use [certain ingredients] … therefore imposing my agenda on this algorithm. And then I'm also defining success, right? I'm in charge of success. I define success to be if my kids eat vegetables at that meal …. My eight year old would define success to be like whether he got to eat Nutella."



Of course, the fact that algorithms reflect the subjective choices of their designers doesn't necessarily make them bad. However, O'Neil does single out a particular kind of algorithm for scrutiny, a subset she refers to as "Weapons of Math Destruction" (or: WMDs). These have three properties: (1) they are widespread and important, (2) they are mysterious in their scoring mechanism, and (3) they are destructive.

One kind of WMD that O'Neil explores in her book are "recidivism risk algorithms," which are supposed to assess how likely it is that a person will break the law again. Some judges use these risk scores to determine amount of bail, length of sentence, and likelihood of parole.

The algorithms were built with a positive goal in mind — they were supposed to add some objectivity to a process that can be very subjective and prone to human bias. "These recidivism scores were actually originally introduced to cut down on racism by the judges," says O'Neil. The ACLU has found that sentences imposed on black men in the federal system are nearly 20 percent longer than those for white men convicted of similar crimes. Other studies have shown prosecutors are more likely to seek the death penalty for African-Americans than for whites convicted of the same charges. So you might think that computerized models fed by data would contribute to more even-handed treatment. And increasingly the criminal justice system has turned to "risk assessment algorithms" to do just that.

Most recidivism algorithms look at a few types of data — including a person's record of arrests and convictions and their responses to a questionnaire — then they generate a score. But the questions, about things like whether one grew up in a high-crime neighborhood or have a family member in prison, are in many cases "basically proxies for race and class," explains O'Neil. The score generated by the algorithm is used by judges when making decisions about the defendant. People with higher scores will often face higher bail, longer sentences, and lower chances of parole. Instead, O'Neil believes these results could be used to select people for rehabilitation programs or to better understand society's structural inequalities.

Well-designed algorithms can result in positive reforms within the criminal justice system. For example, the state of New Jersey recently did away with their cash bail system, which disadvantaged low-income defendants. The state now relies on predictive algorithms instead — ones carefully designed to try and eliminate racial bias. Data shows the state's pre-trial county jail populations are down by about 20 percent.

But still, algorithms like that one remain unaudited and unregulated, and it's a problem when algorithms are basically black boxes. In many cases, they're designed by private companies who sell them to other companies. The exact details of how they work are kept secret.

O'Neil also sees a more fundamental issue at work: people tend to trust results that look scientific, like algorithmic risk scores. "I call that the weaponization of an algorithm … an abuse of mathematics," she says, "and it makes it almost impossible to appeal these systems." And this, in turn, provides a convenient way for people to avoid difficult decision-making, deferring to "mathematical" results.

In her book, for instance, O'Neil cites the example of a man named Kyle Behm who took some time off from college for mental health treatment. After getting treatment, he applied for a part-time job at a large supermarket chain. In the process, he took a personality test, which is not uncommon for applicants to large companies. Behm did not receive an interview.

In most similar cases, the applicant wouldn't know why

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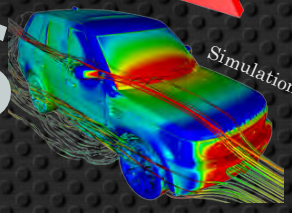

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they were rejected, but Behm happened to have a friend who worked at the supermarket who told him the test results were a deciding factor. Behm told his father, a lawyer familiar with the Americans with Disabilities Act, who ended up filing a class action lawsuit against the company. The type of test Behm took was a lot like a common one used in mental health testing. It generates something called an OCEAN score, an acronym referring to five personality traits: Openness, Conscientiousness, Extroversion, Agreeableness, and Neuroticism.

Again, it becomes a question of how these scores are used. For certain jobs, some businesses can petition regulators for exceptions that will allow them to legally use such scores. "And then the regulatory body can decide whether it's a valid reason," explains O'Neil. Often, though, "companies just sell the same personality test to all the businesses that will buy them" and those businesses don't bother to determine whether their usage is legal, fair, or even useful.

So how should we go about addressing the problem of poorly-designed algorithms? O'Neil says the solution is transparency and measurement. She says researchers must examine cases where algorithms fail, paying special attention to the people they fail and what demographics are most negatively affected by them.

A Look into the History Books

by Brian van Vuuren (brianjohnvanvuuren@gmail.com)

As many of you would know, the ORSSA website is busy getting a well-deserved makeover. That said, our existing website still does an excellent job of documenting the society's history and ethos.

A further delight of this website is the archive of newsletters gone by. I enjoy clicking through some of these old editions of the newsletter and seeing what was happening in the soceity in those years - which conferences were being attended, which problems were being addressed and who was serving on the exec of the ORSSA society.

What I find particularly inspiring is that so many names which are so prevalent in ORSSA today — those who attend conferences, serve in different administrative roles and contribute content to the publications — are the same names which litter the newsletters of 10+ years ago. For me, that just goes to show the passion for OR and ORSSA that these exceptional men and women have.

Take the 2006 Executive Committee pictured to the right, for example. I've only been part of ORSSA for a few years, yet I recognise almost all of the names and faces on the list (as i'm sure you do too). What a wonderful group of OR purists we are so fortunate to have within our society! I'll be publishing more short extracts from previous newsletters in future newsletter editions to come!

Other than the familiar faces, these newsletters also include chapter calendars for the upcoming quarter, member profiles, CVs of young graduates and more. These are great potential additions which I'd love to revive and include in the newsletter. Please get in touch if you have content which you'd like to see published in the newsletter.

On that note - this quarter proved to be particularly quiet in terms of media for publication in the newsletter. I therefore charge the members to consider putting together a small piece for inclusion in one of the future newsletters. Be it an academic, professional, consulting or passion project - let the soceity know what you're working on! Conference reports, chapter events, profiles and interviews are also warmly welcomed.

Book Review: 50 Years of Integer Programming 1958 – 2008: From the Early Years to the State-of-the-Art

by Hans W. Ittmann (hittmann01@gmail.com)

Hans Ittmann

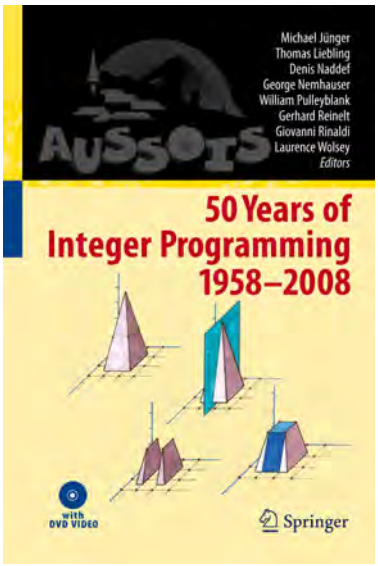
The book that is reviewed this quarter was already published in 2010 and the material presented in the book comes from a Combinatorial Optimization Workshop held in January 2008 in Aussios, France. The workshop theme was Fifty Years of Integer Programming and was to celebrate the 50th anniversary of integer programming. The material in the book captures in essence the history and subsequent development of an important optimization technique, integer programming. When browsing the Springer website, searching for available books on Operations Research topics, this book pop-up. The book gives an introduction and a historical perspective of integer programming. It is a concise, yet voluminous, book giving the theoretical, algorithmic and computational aspects of integer programming. Even though it is now 10 years since the workshop the material contained in the book remains a fascinating collection of documentation on how integer programming developed over the first 50 years.

Integer programming is that class of constrained optimization problems in which some or all of the variables are regarded to be integers. As a generalization one can state that in integer programs' and integer problems that have been most widely used, solved and studied, the objective function is linear and the constraints are linear inequalities. George Dantzig in 1947 developed the simplex method which is a finite method for optimizing a linear objective function subject to a finite set of linear constraints. Adding integrality constraints to some or all of the variables would make the models more applicable but there was in the early years no known general method to solve these kinds of problems. Gomory[1] in 1958 published his ground breaking paper that was surprisingly short, outlining how, with relatively straightforward modifications, the simplex method can be adapted to provide a finite algorithm for finding an optimal finite integral solution.

50 Years of Integer Programming 1958 - 2008 is organized into four main parts with in total nineteen chapters. Part I has the title The Early Years and covers the period 1954 to 1979. It contains copies (reprints) of ten fundamental papers published during that period, in order of publication date, on various issues concerning integer programming. From the Beginnings to the State-of-the-Art is the title of Part II with only three chapters and then Part III, Current

Topics, containing the last six chapters. Part IV is two video DVDs that captures the entire first day workshop discussion that included all the pioneers of the field that attended the workshop.

There is a short introduction to Part I where the contribution of each of the ten papers/chapters in Part I is highlighted and then there is a list of some 40 odd "most influential papers" that contributed to the different facets of integer programming over the period 1954 -1973. Two references to books covering the history of integer programming are also listed. What makes the reprints of the chapters in Part so interesting is that there are introductions to each of the papers. For example in the case of the paper of Gomory (Chapter 4), Gomory himself tells the story of how he got interested in finding solutions that were integer (some Navy guys remarked in a presentation that it would be nice to have whole numbers instead of 1.3 aircraft carriers as the solution!!) and how he went about developing the algorithm to find a solution to integer programming problems. Gomory worked on very small problems, with a few variables, since all calculations still had to be done by hand! Just these introductions at the start of each of the chapters in Part I make for fascinating reading.



The first article in Part I appeared in 1954 and outline the solution of a large scale travelling salesman problem. A problem of 49 cities was solved but what is so historic of this paper is that it marked the birth of the cutting-plane method. The titles of the next nine chapters gives a clear indication of the value of these contributions, these are: the Hungarian method for the assignment problem; polyhedral approaches to mixed integer programming; the algorithm of Gomory and "an algorithm for the mixed integer problem" that he developed; an automatic method for solving discrete programming problems (in this paper published in 1960 by Land and Doig they introduced the concept of branch-and-bound for the solution of integer programming problems); Integer Programming: methods, uses, computation; Matroid partition; reducibility among combinatorial problems; Lagrangian relaxation for integer programming and disjunctive programming. The authors of the ten chapters are all pioneers in the field. The chapters in Part I give a good overview of various developments of different facets in integer programming over the first 20 years.

The three chapters in Part II are all surveys addressing specific topics on integer programming and combinatorial optimization from the beginning to current state-of-the-art. In Chapter 11 the focus is on tools from polyhedral theory that are used in integer programming. Giving some context the theory and methodologies that has been developed over the years are presented. In Chapter 12 solution approaches to combinatorial problems as it has evolved over fifty years are discussed. Combinatorial optimization problems, such as the traveling salesman problem, have influenced the development of techniques and methods for solving integer programming problems and these are discussed in this chapter. The use of relaxations is important when using branch-and-bound methods. Ways to reformulation of integer and mixed integer programs to obtain stronger linear programming relaxations are outlined and a comprehensive surveyed of these methods are given in Chapter 13.

Up to date overviews and surveys of current hot topics in integer programming is contained in the next six chapters. Chapter 14 the survey topic is integer programming and algorithmic geometry of numbers and the survey considers a number of results from the interplay between integer programming and the geometry of numbers. Not surprising there is also a chapter on nonlinear integer programming. In Chapter 15 this is outlined where the primary goal is to present a simple version of general nonlinear integer problems where all the constraints are still linear. Solving integer and mixed integer programming problems has come a long way over the last 50 years and there are solvers that provide reliable and effective solutions. The history of computational developments is highlighted in Chapter 16 while it is shown that a lot of work is still required to improving and extending the modelling capability of these solvers. Chapters 18 and 19 both deal with aspects related to relaxations for integer programming. Semidefinite relaxations and recent theoretical and computational advances in the study of the group-theoretic approach in mixed integer programming are the hot topics in these two chapters respectively.

It is almost impossible to do justice in a short book review of 50 Years of Integer Programming 1958 – 2008. It is not only a comprehensive history of how integer programming and the solution of integer programming problems have developed from 1958 but it is an excellent encyclopaedia of all the methods, techniques and computational approaches towards solving integer programming problems. The book provides and serves as an excellent introduction to integer programming. In addition it gives an in depth and great historical perspective of the huge amount of research and development that has taken place in the field of integer programming over a period of 50 years. A lot of the material

in the book is now possible dated especially the hot topics where further research has taken place subsequent to the 2008 workshop. Nevertheless the value of the book lies in the fact that it is a single source of integer programming material while the history it contains cannot be found elsewhere.

The cover of the book is also of interest. The four figures on the cover illustrate adding Gomory mixed integer cuts to a polyhedron of dimension 3. A full explanation of the meaning of these figures and how they should be interpreted is given after the Preface of the book.

50 Years of Integer Programming 1958 – 2008: From the Early Years to the State-of-the-Art by Michael Jünger, Thomas Liebling, Dennis Naddef, George Nemhauser, William Pulleyblank, Gerhard Reinelt, Giovanni Rinaldi and Laurence Wolsey Eds., 2010, Springer-Verlag, Heidelberg Berlin, pp. 803, ISBN 978-3-540-68274-5 (Print) and e-ISBN 978-3-540-68279-0 (eBook), 139.00 USD (Hardcover), 109.00 USD (eBook).

[1] Gomory, R.E., 1958. Outline of an Algorithm for Integer Solutions to Linear Programs, Bulletin of the American Mathematical Society , 64 (5), pp. 275-278, from https://www.researchgate.net/publication/230872913_Outline_of_an_Algorithm_for_Integer_Solutions_to_Linear_Programs

Sudoku Puzzle Solution

2	5	**4**	8	1	3	6	**9**	7
7	**1**	6	9	2	**5**	**8**	3	4
8	**6**	3	4	7	6	**1**	2	5
4	**3**	5	6	9	**1**	7	8	2
1	2	**7**	**5**	**4**	8	6	9	3
6	6	8	**7**	3	2	4	**5**	1
3	8	**2**	1	**6**	4	5	**7**	6
5	7	1	2	8	**6**	**3**	4	6
6	4	6	3	5	7	2	1	**8**

AFROS NOTICE

AFROS is the **A**frican **F**ede**R**ation of **O**R **S**ocieties which was founded in November 2016 – *see article in IFORS News:* http://ifors.org/december-2016-issue/.

Its inaugural conference, AFROS 2018, to be held in Tunis and organized by the Tunisian Decision Aid Society, will, it is hoped, give a kick start to the wider use of OR in Africa. It includes plenary talks by guest speakers from IFORS , INFORMS and EURO as well as presentations of high quality research papers by researchers and practitioners from Africa and all over the world. Selected extended abstracts among those presented in the conference will be considered as potential full-paper publications, subject to peer reviews, in the publication '*Operational Research - An International Journal*' (ORIJ) published by Springer. For more details about the conference, please visit: http://afros.tdasociety.org/.

Grants: A limited number of small conference grants towards a reduction in registration fees, courtesy of IFORS and EURO, will be available for young African researchers who plan to present a paper at AFROS 2018. The researchers must provide evidence from their academic institutions that they are currently studying for a PhD and submit an extended abstract of their paper up to 2 pages long, in English, which will be used to select the highest quality applicants for the grants. Applicants must have a relationship with Africa due to birth, study, or employment, and should show a demonstrated need for reduced registration support. Applications must be submitted by the end of April to hatem.masri@gmail.com. Results will be notified to applicants by mid May. Queries about this process should be sent to the conference program chair hatem.masri@gmail.com.