converging

Chair's Report by Sheldon Lin

After serving as Department Chair for five years, Jamie Stafford is taking a well-deserved Administrative Leave this year. As the Acting Chair and someone who was unfamiliar with the job, I am grateful to all the faculty and staff for helping me keep the department running smoothly.

I am pleased to report that since the publication of the last newsletter, there have been a number of exciting new developments and activities in the department.

This year we welcome three outstanding faculty members: Lei Sun, Vicki Zhang and Nathan Taback. Lei was transferred from the School of Public Health; Vicki Zhang, a Fellow of the Society of Actuaries, brings a wealth of industrial experience to our actuarial science program and Nathan Taback comes to us from research at St. Michael's Hospital and the Department of Biostatistics and Statistics at Harvard University. You can find their profiles in separate articles in this newsletter. Their presence greatly enhances the teaching and research of our department.

All of our faculty have continued to distinguish themselves in teaching and research, evidenced by the awards, course and program developments, and the publications listed in this newsletter as well as external grants. In addition to

the NSERC individual discovery grants, many faculty members also received grants from different funding institutions including CANNSI (Radu Craiu), **Google** (Andrey Feuerverger and Russ Salakhutdinov), **MITACS** (Sebastian Jaimungal), **CIHR** (Lei Sun), **SOA** (Sheldon Lin), **Sloan Foundation**, **Microsoft and Samsung** (Russ Salakhutdinov), **NSERC ACCELERATE** (Fang Yao) and the **Hospital for Sick Children Foundation** (Lei Sun).
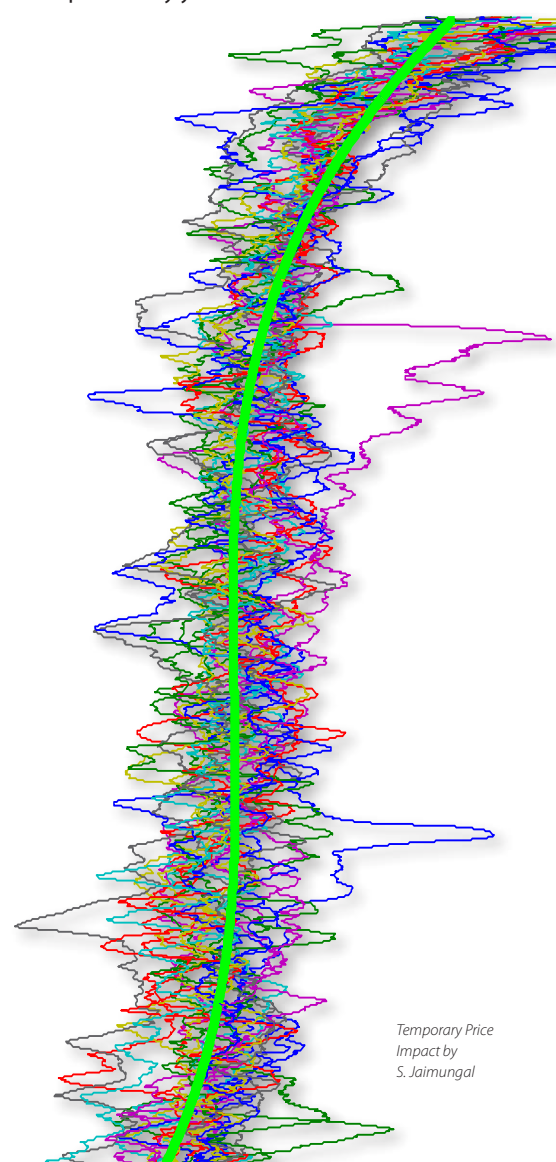
Our undergraduate programs in Statistical Science and Actuarial Science continue to attract a large number of students, as reported by the undergraduate chairs in this newsletter. We are fortunate to have many truly outstanding students who not only excelled in course work but also participate in many extra curriculum activities.

Graduate students organized Student Research Day again in April, 2013. They hosted Yannet Interian (Google); Ji Zhu (University of Michigan, Ann Arbor) and David Hunter (Pennsylvania State University). Many thanks to the organizing committee of PhD students: Cody Severinski, Edwin Lei, Andriy Derkach and Jennifer Jinyoung Yang.

Throughout the year, the department participated in the celebration of the International Year of Statistics. We held six public lectures in

statistics delivered by world renowned statisticians. The lectures were very well received with an audience of more than 200 people each. Several faculty members attended and presented at the 59th ISI World Statistics Congress in Hong Kong in August, a main event of the International Year of Statistics.

Jamie will return this summer to serve another three year term as Department Chair. As my `acting' career comes to the end, I would like to thank everyone for the support over the past year and I am looking forward to Jamie's leadership for many years to come.

Temporary Price Impact by S. Jaimungal

Faculty Awards

Jeffrey Rosenthal wins SSC Gold Medal

Professor Jeffrey Rosenthal received the 2013 Gold Medal of the Statistical Society of Canada. The award honours a person who has made outstanding contributions to statistics, or to probability, either to mathematical developments or in applied work.

Congratulations to Nancy Reid!

Professor Nancy Reid received the 2013 Distinguished Service Award of the Statistical Society of Canada. The award honours a person who contributed substantially and over a period of several years to the operation or welfare of the SSC.

Student Awards

RBC Next Great Innovator Challenge:
Four undergrads and one MBA join forces for third-place finish
By: Christine Elias

In a competition typically dominated by MBA candidates, a team of Arts & Science undergraduate students surprised everyone by winning third place.

Now in its eighth year, the RBC Next Great Innovator Challenge is a nationwide contest in which teams of post-secondary students answer a real-world business challenge.

From left: RBC's J-F Courville and Avi Pollock with students Sergio Betancourt, Haseong Kim, Yiming Shao, Hatsumi Hirota, Yuhao Zhao and RBC's Bruce Ross (photo courtesy RBC)

This year, first place went to a team of MBA students from U of T's Rotman School of Business, comprising **Aneta Filiciak** and **Shehan De Silva** of the evening MBA program, Leon Smith of the morning MBA program and **Katie Wigmore** of the full time MBA program. But the big surprise was the University of Toronto Enterprise Evolution team or UTEE.

Made up of four statistical sciences and one Rotman MBA student, the UTEE team prepared for the event with the help of the University of Toronto's Impact Centre. They were incredible, said **Sergio Betancourt**, a fourth-year statistics student.

"They helped us formulate our solution, finalize our concept, and prepare for the final presentation. Without their mentorship, we wouldn't have made it."

This year, the teams were asked to suggest an innovative concept that would enable RBC to use big data to create a competitive advantage.

"Our pitch involved analyzing RBC's customer segmentation structure and coming up with a new model to highlight important information," said **Yiming Shao**, also a fourth-year student and vice-president of the U of T Statistical Sciences Association of Students. "Using data, we were able to identify clients with the greatest earning potential and likelihood of success."

Shao learned of the contest at a campus recruiting event.

"I was very interested in this competition as it fit in perfectly with one of our statistics club's research projects. Most teams are formed in a class – and participation is mandatory – but we decided to enter on our own. We had the passion and the personal interest — and thanks to the Impact Centre, we got some great practice and advice."

The students walked away from the contest with a lot more than the $3000 prize.

"We gained a deeper understanding of financial innovation and business analysis and made new contacts in the banking industry," said **Yuhao Zhao**, a third-year statistics student. "But most of all, we proved that we – a team of mostly undergraduates – can compete with the best MBA students from across Canada."

Other members of the team included **Hatsumi Hirota**, a Rotman MBA candidate and fellow statistics student, **Haseong Kim**.

Christine Elias is a writer with the Faculty of Arts & Science at the University of Toronto.

Program News

Tenure & Promotion

Congratulations to **Radu Craiu** who has been promoted to Full Professor. His research has developed around a number of central themes in modern statistics with particular focus on practical impact, such as: the development of efficient Markov chain Monte Carlo algorithms, copula models for dynamic dependence structures, Bayesian inference for statistical genetics and model selection for clustered data.

Professor
Radu Craiu

Keith Sharp

Keith Sharp has been advanced to the rank of Sessional Lecturer III. He received his PhD in Finance in Waterloo and spent 20 years with the actuarial group, including a few years leading it as Associate Chair. Keith has been teaching at the University of Toronto as a sessional lecturer since 2005. Congratulations!

Canadian Statistical Sciences Institute

The Statistical Society of Canada established the Canadian Statistical Sciences Institute (CANSSI) in November 2012, with Professor Mary Thompson of the University of Waterloo as its first director. Nancy Reid is one of five Associate Directors. The national virtual institute offers leadership and infrastructure to increase and develop statistical science research in Canada. It is part of the national network of mathematical sciences institutes, and applied to NSERC in fall 2013, as part of the Institutes' submissions for ongoing funding; the funding decisions are anxiously awaited. In the meantime, it has established three Collaborative Research Team projects, to start April 1 2014, and appointed a Steering Committee to prepare a proposal to the Fields Institute for a thematic program in Big Data. The proposal submitted to the Fields Institute outlines an exciting series of workshop and training activities proposed for January to June 2015, with allied activity at the Pacific Institute for Mathematical Sciences (PIMS) and the Centre de Recherche Mathématiques (CRM). Themes to be address include inference for machine learning, deep learning, optimization, visualization, health policy, social policy, and environmental science, networks and security. The program promises to be a great opportunity to introduce students, postdoctoral fellows, and researchers to the broad scope of statistical ideas important for making progress with "Big Data".

CANSSI
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Graduate Studies Report

by Sebastian Jaimungal, Associate Chair for Graduate Studies, Associate Professor, Dept of Statistical Sciences, University of Toronto

The year 2013 marked my second year as Associate Chair of Graduate studies and I would not be able to perform my duties without the continual support and expertise of our wonderful, hardworking and talented staff: Andrea, Angela, Annette and Christine. Similarly, I would like to extend my thanks to the graduate committee (Profs. Badescu, Craiu, Evans, Yao, and Zhou) who were invaluable in the admissions process, in award selections and in numerous other supporting roles.

This past year the Department of Statistical Sciences continued its expansion of graduate course offerings by introducing another five short research focused courses (in addition to the six we added in 2012). This is also the second year of our new field in Actuarial Science and Mathematical Finance which continues to be highly popular among incoming students.

In case you missed our last report, the purpose of the short six-week courses is to provide students with an introduction to the tools, methods, and theory that arise in our faculty's research problems, but make them accessible to non-experts. This year we have introduced: Extreme Value Theory and Applications, Insurance Risk Models I & II, Non-Stationary Time Series Analysis and Topics in Likelihood Inference. The series of short courses continues to be popular among students, and, not surprisingly, they are attracting student interest from other Departments and Faculty as well.

The new PhD field in Mathematical Finance and Actuarial Science builds on the strength of the research faculty in this area and reflects (i) the historical fact that many of our graduates produced focused PhD thesis in this field; and more importantly (ii) to meet the demand from industry and incoming and prospective students for course work and supervision in this fast past, dynamic and continually growing field. The new field has specialized course and comprehensive examination requirements, but statistics and probability is still at its core. I am excited to see that this new field is already growing into a successful and integral part of the graduate program.

Over the last year or so, the Department has been developing a new professional Masters in Finance and Insurance, which we will coin as the MFI program. Although final approvals have not been granted for this proposed program, we anticipate that we will begin accepting applications in October 2014 for admissions in September 2015. The new professional program is designed to fill the current gap in graduate training at the interface of finance and insurance with courses ranging over statistical methods, financial and insurance modeling and computational techniques. As a professional program, there is a heavy emphasis on applications and real-world driven tools, techniques and problems and several of the courses will be taught by industry professional. Stay tuned for more details on this new and exciting program that promises to push the DoSS into its next stage of growth.

I look forward to the coming year and wish you all a wonderful, productive and enjoyable summer.

Undergraduate Program in Statistical Sciences Report

By: Dr. Alison Gibbs, Associate Chair For Undergraduate Studies in Statistics

Many thanks to Professor David Brenner for his many years of serving students as the Associate Chair for Undergraduate Studies in Statistics, and the generosity with which he has shared with me his accumulated wisdom as I take on this role. While I feel like I am just getting my feet wet, I can already report how much I am enjoying learning more about the diverse and impressive group of undergraduate students studying statistics at the University of Toronto.

Enrolment in our statistics undergraduate programs has been growing at an unprecedented rate. In the past five years, enrolment has doubled in many of our core courses. We are extremely pleased to have so many excellent students interested in studying statistics.
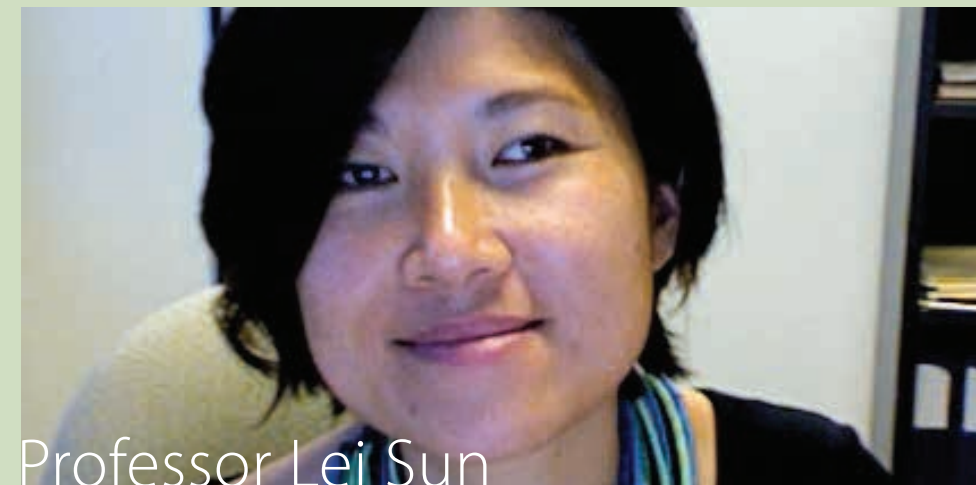
That Statistical Sciences Association of Students has been very active this year under the leadership of president Haseong Kim. You can read more about their activities elsewhere in this newsletter.

The department congratulates all of our students who will be graduating soon. At the June 2014 convocation, we expect to have more than 175 students completing undergraduate programs of study in statistics, including over 100 majors and specialists. This year will also mark the graduation of our first student to complete the Applied Statistics specialist program. Linda Ding will be completing with a concentration in Cognitive Psychology. She chose the program in order to develop strong analytic skills that she can apply in studies of neuroscience and human cognition. She is especially interested in gene-environmental interaction studies of complex mental disorders, and she looks forward to working on related projects during her graduate studies, hoping to bring new insight into future research both as a Psychologist and as a Statistician. We wish Linda and all of graduates well. Keep in touch!

Linda Ding

Undergraduate Program in Actuarial Science Report

By: Professor Sam Broverman, Associate Chair of Undergraduate Studies in Actuarial Science

The actuarial science program at U of Toronto continues to keep pace with the evolving nature of the actuarial profession and the professional requirements. The program continues to maintain its status as a Centre of Actuarial Excellence of the Society of Actuaries, and the program continues to maintain its accreditation status with the Canadian Institute of Actuaries University Accreditation program.

The program continues to be popular with students, with over 150 students entering into the program in 2nd year. The specialist and major program have been slightly refined so that entry into the specialist program has been coordinated with student requirements for accreditation by the CIA.

The confidence shown by the Faculty of Arts and Science in the program is indicated by their approval of a new permanent lecturer position effective with the 2013-14 academic year. The department is delighted to have **Vicki Zhang** join the actuarial program in that position. Vicki will tell more about her background and future plans for the position in a separate article in this newsletter. The program is very excited about a proposal that Vicki made for a new course that will incorporate AXIS software into the program. Vicki's proposal was successful and has received funding from the Faculty of Arts and Science. AXIS is widely used in the insurance industry and this course will be of great benefit for our students. Vicki will have more to say about that as well.

The communications course taught by local actuaries **Ian Genno** and **Howard Lyons** continues to be very popular. This year we have added a course in the basics of casualty insurance being taught by a pair of casualty actuaries. We feel that the experience that courses taught by practicing professional brings to our students is very valuable.

The actuarial program has an industry advisory board that meets once or twice per year. The board consists of the faculty members of the actuarial program and about 10 local actuaries in various areas of practice. The board has been in existence for over 20 years and has contributed greatly to the development of the program.

New Faculty

Professor Lei Sun

Lei Sun studied mathematics at Fudan University and obtained her PhD in statistics from University of Chicago in 2001. Since then, Dr. Sun has been a faculty member at the Division of Biostatistics at the Dalla Lana School of Public Health at the University of Toronto, and recently she joined the Department of Statistical Sciences.

Dr. Sun's research area is in Statistical Genetics. The overall aim of her research program is to develop statistical methods and computational tools to solve problems arising from genetic studies of complex human traits.

Largely funded by NSERC and CIHR, Dr. Sun's recent methodological work has focused on problems arising from data generated from high-throughput technologies. One of her major research interests is developing improved large-scale multiple hypothesis testing strategies such as the stratified false discovery rate (sFDR) control approach. Another broad topic of interest is developing robust association methods in various settings, including strategies for reducing model selection bias (also known as the winner's curse), and generalized Kruskal-Wallis tests that incorporate group un-certainty when comparing k samples. Her more recent research interests include developing novel multivariate methods for joint analyses of multiple genetic variants and multiple trait phenotypes.

An important research component of Statistical Genetics is the implementation of developed and tested methodology as user-friendly and open-resource software. Dr. Sun's research program has developed multiple frequently used programs including PREST and sFDR. Another integral part of research in Statistical Genetics is cross-disciplinary collaborative work. Through collaboration with geneticists, clinicians as well as other statistical geneticists, Dr. Sun's work has provided important insights into the mechanisms of cystic fibrosis and type 1 diabetes. Such collaboration in turn generates new analytical questions for the research program.

Dr. Sun has given numerous invited lectures at international conferences and research seminar series, she has been a referee for over 15 international journals in multiple disciplines, and she is a member of the Editorial Board of Genetic Epidemiology.

Nathan Taback received his PhD in statistics from the University of Toronto in 1998. After graduating Nathan spent four years as a research scientist and lecturer in the Departments of Biostatistics and Statistics at Harvard University. During this period he worked on the design and analysis of AIDS clinical trials in the Center for Biostatistics in AIDS Research (CBAR) and taught undergraduate statistics courses. In his position at CBAR he was the chair of the scientific review committee and lead statistician for the Adult AIDS Clinical Trials Group (AACTG) studies' involving patient reported outcomes. Dr. Taback then moved back to Toronto where he worked at St. Michael's Hospital as a Research Scientist in the Centre for Research on Inner City Health, and had a status-only appointment as an Assistant Professor in the Biostatistics, at the University of Toronto. During this period he taught introductory biostatistics and conducted research on measuring the health impact of armed violence on populations. He has been involved in many projects aimed at quantifying these health impacts with various humanitarian organizations such as the International Committee of the Red Cross in Geneva, Switzerland; in addition to publishing in this area his work has been presented at numerous international conferences and organizations

Nathan Taback

such as the International Criminal Court in the Hague. Dr. Taback started his own consulting business in 2008 where he continues to work with clients on statistical issues related to armed violence, and the planning and analysis of clinical trials and observational studies in medical research. Examples of recent projects include, developing a predictive model of cancer recurrence using insurance claims, using propensity scores to deal with confounding in a Cox proportional hazards model, modification of the

Simon two-stage design in the development of a phase II clinical trial, and developing statistical models of health outcomes in armed violence studies.

Dr. Taback's primary focus is on applied statistics, statistical education, and statistical consulting. In his position in Statistical Sciences he is able to bring all of his practical experience using and communicating statistical methods back into the classroom.

Vicki Zhang

Vicki Zhang joined the faculty of Actuarial Science program in July 2013. She is a Fellow of Society of Actuaries (FSA, 2008) and an Associate of Canadian Institute of Actuaries (ACIA, 2013). She holds a Master's in Statistics (with a successful completion of PhD qualification exams) from University of California, Santa Barbara.

Before joining University of Toronto, Ms. Zhang worked more than seven years as a consulting and teaching actuary in the private sector of United States and Canada. She spent the first three years of her professional career developing predictive models and risk adjusters for health and life insurers in the largest actuarial consulting firm in the US. As a career interlude, she served as a consulting actuary for

United Nation's Microinsurance program in Mongolia and China. After relocating to Canada, she spent the first year working as a developer of the widely-used actuarial software AXIS at GGY Consulting, learning the ins and outs of modeling actual insurance products in Canada. She then focused on teaching and training AXIS users in the Canada, US, China, Singapore, Japan, UK and Germany. Her teaching courses included modeling regular life, participating life, disability/LTC products using the actuarial software. Her trainees ranged from new actuaries to chief actuaries of major insurers. She strived to create a learner-focused environment by creating hands-on in-class exercises, case study modeling, and mini-group presentations to encourage students to think deeper and identify real modeling issues relevant to their own products.

Ms. Zhang just spent the first year teaching second-year core courses in the Actuarial Science program. She has a keen interest in exploring various pedagogical methods and introducing new techniques to existing courses. In her first year, she experimented with techniques such as team-based learning (TBL), jigsaw reading, peer teaching and grading in her courses. She introduced Excel as a crucial tool for actuarial work, designed hands-on projects so that students can be exposed to real-world products, and incorporated writing and presentation components in her courses. Recognizing that there are still plenty of gaps to fill between expectations of students, credentialing organizations, the industry, and the

public, she is determined to explore and improve pedagogical methods new to the actuarial curriculum in the years to come.

In the wake of the worst global financial crisis since the Great Depression, Ms. Zhang believes that public-minded actuaries, especially those who are able to see the big picture and understand the new regulations, will be in high demand. She successfully applied for a large course design grant from the Faculty of Arts and Science and will offer a capstone seminar course in insurance regulation from the 2014-2015 academic year. The course will focus on the key insurance regulatory responses following the most recent crisis, but will also include the larger historical background of the regulations since 1970s. Ms. Zhang understands that the modern insurance products and regulations can no longer be analyzed using pen and paper. She has acquired a teaching license for the leading actuarial software AXIS and will incorporate it in her new seminar. Ms. Zhang has an equally strong interest in the "early" financial ethics education. She is hard at work writing materials for a first-year seminar that will explore difficult questions such as the role and philosophical underpinning of the insurance sector, product driven vs. principle-based regulations, and the future of insurance regulations. She hopes to employ dialogical approaches to stimulate intellectual debates and discussions among students, to cultivate their critical thinking skills and widen their horizon in her upcoming seminars.

New Programs

Why Numbers Matter
by Jessica Lewis

"You need $2,000 to escape the mob by tonight, otherwise you'll be killed. You have $1,000. Let's say you decide to play red at Roulette at the casino to get the money. What's the best option?"

Statistics professor **Jeffrey Rosenthal** posed this scenario to his class of about 80 students in a classroom on the second floor of the Old Vic building. What are the best odds for making another $1,000? Bet it all or bet by small increments?

"You bet the entire $1,000 on the first spin," he said, to laughter and sighs. "You have to be bold and get it all over with. The more bets you make, the more chances you have of losing. Don't drag it out. I still don't recommend this, but it's smarter than the other options!"

Rosenthal teaches a new statistics course on quantitative reasoning called Why Numbers Matter. It's designed especially for humanities students who think they have no talent for mathematics or haven't taken it since high school. Some take it to fulfill a breadth requirement; others because they know quantitative reasoning is a handy skill. Rosenthal uses examples from all over, including music, poetry, lottery, politics, sports and gambling. He'll use a scene from Casablanca to discuss gambling or

ask "who here owns music by the rapper Drake" when discussing representations in sample statistics.

"These topics are related to things students care about, but here they will think about the topics in a different way," says Rosenthal. "And we'll go through the topics and spend as long as it takes to make them clear and develop a series of different quantitative themes and perspectives."

Rosenthal, who wrote the book *Struck by Lightning: The Curious World of Probabilities*, is frequently quoted on statistics and was even featured in a commercial this year on the odds of finding a gold key in a Caramilk bar. His Why Numbers Matter course was created through the Faculty of Arts & Science's Curriculum Renewal Initiatives Fund which supports the development of new and innovative courses using hands-on learning approaches.

"This course is one of many new initiatives in the Faculty of Arts & Science designed to ensure that all students graduate with a set of key transferable skills that they can apply to every situation and that will ensure their success no matter what careers or roles they take on over a

Professor Jeffrey Rosenthal teaches a new statistics course on quantitative reasoning designed for students lacking confidence in math skills

lifetime. These include the ability to critically evaluate information , as well as adaptability, strong communications skills, problem-solving and the ability to work alone or in groups," says Meric Gertler, dean of the Faculty of Arts & Science.

"Students have already told me it's interesting and understandable," Rosenthal says. "I hope that even if these students don't take any more statistics or math classes in the future, they will have a little more of an open or curious mind. You can be a more informed citizen and understand things that come up in the newspaper and even make better daily life decisions by understanding statistics."

Massive Open Online Course (MOOC)
by: Professor Jeffrey Rosenthal

In April 2013, **Alison Gibbs** and **Jeffrey Rosenthal** launched the university's first statistics MOOC (Massive Open Online Course), offering a free introductory statistics class 60,000 students around the world via videos on the internet. The course is still available for viewing in archived form at **www.coursera.org/course/introstats.**

It involved creating and editing many hours of video footage in a special studio in the basement of Sidney Smith Hall, and responding to student questions in the online discussion forums—with lots of help from an energetic group of Teaching Assistants.

The course was taken by students from such diverse countries as Pakistan, Bangladesh, Australia, Delhi, Indonesia, Spain, Ecuador, Palestine, United States, Venezuela, Mexico, Chile, Tanzania, India, Puerto Rico, Dominican Republic, Ukraine, Germany, Korea, Aruba, Hungary, Australia, Philippines, Israel, Japan, Cameroon, Brazil, Ireland, Scotland, England, Kazakhstan,

Norway, Portugal, Malaysia, Belgium, and Slovenia. The students posted loads of positive comments in the online discussion forums, from "I'm impressed at how much work the professors and the TAs have put in" to "I learned sooo much from this class" to "I am TOTALLY LOVING THIS CLASS and the PROFESSORS! I am actually learning the subject matter, and I am impressed!" **(For more student feedback, see www.probability.ca/moocfeedback.txt.)**

The video lectures from the MOOC were then re-used by Alison in the Fall 2013 semester, to turn two sections of STA 220 into "inverted classrooms" in which the students first watched statistics lectures online at home, and then participated in interactive group activities during class time. Other novel teaching innovations are sure to follow!

Alison Gibbs and
Jeffrey Rosenthal

Alumni Profile: Jennifer Umlauf, MSc (2008) and Chunyi Wang, PhD (2012)

Jennifer Umlauf

We recently checked in with two of our alumni to find out what they've been up to since completing their degrees.

Jennifer Umlauf grew up in Mississauga, and completed BSc and MSc degrees in statistics at the University of Toronto. We remember Jennifer well as an enthusiastic and involved student, who was not afraid to take on any challenge. Since completing her MSc she has worked in decision support for Halton Healthcare Services, overseeing the management and analysis of hospital information including everything from human resources and budgets to bed planning. She has currently continuing her education, working part time on an MBA at McMaster University.

We asked Jennifer to tell us some more about what she's doing now and her time at the University of Toronto. Here is what she had to say.
Tell us some more about what you're doing now?
I am currently in the healthcare data analytics sector and really do enjoy it. In my current role, supporting a small team of analysts and data management experts, we work hard to make the most of various data sources, leveraging best industry practices, analytical models and frameworks in support of evidence based decision making to our stakeholders. Data mining and machine learning methodologies could be leveraged more here, I think, from my own experience, as well as simulation, to identify bottlenecks and capacity optimization, as well as continued use of risk adjustment models

How did your time as a student at UofT prepare you for what you're doing now?
Having a 'keen trained eye' for data analysis, formal statistical consulting experience and a plethora of statistical tools to interpret data effectively has really has helped me in my career. I use my education from UofT on a routine basis to convert data into information for use by stakeholders, very similar to the kind of statistical consulting experience received from UofT's Statistical Consulting Service. Data management is a big part of what we do, with considerable time spent on data cleaning and integration,

which can be a challenge at times. The education received at UofT helped me tremendously here as well.

Specific to the business sector, I find that statistics provides a unique, and ever-expanding point of view that allows us to provide great expertise and support to other subject areas, from marketing to operations research. I hope to continue to sharpen my skills in the years to come.

Why did you decide to study statistics?
I started my career as a life-long student wanting initially, like many, to become a healthcare professional. As I ventured down this path, it became clear to me that I really enjoyed analytical work and the joy that comes with providing such expertise to various stakeholders. It was not long until I had my Associate Statistician (A.Stat.) designation from the Statistical Society of Canada, and programming expertise, to support me on my journey.

What do you do for fun?
Quality management, and business administration in general, has recently become a passion of mine. When I am not working, you would, probabilistically, find me focused on my MBA, which I am also very grateful for. I am a keen reader of various literature, and when I am not reading up on new and exciting data management processes, I am reading anything and everything from Marketing 101 to the 'rules of management' to "Eat that Frog!".

What do you do for fun?
I play, train and compete at tennis; I used to do the same at 9-ball, table tennis and other sports as well... but I do not have enough time to train at more than one activity these days. I like to read when time allows. I always appreciate a good pint with friends.

What advice would you give our current students?
Enjoy being a student. Also, I found that getting direct consulting experience with clients, to support effective statistical communication in an easy to understand manner, to be helpful – maybe you will too.

Chunyi Wang

Chunyi Wang was born in Dalian in Northeast China. He earned three degrees from the University of Toronto statistics department: BSc (2007), MSc (2008), and PhD (2012). During his time as a student in the department, he won several academic awards, helped organize the Statistics Student Research Day, and developed a reputation as an excellent teacher. Before he became a student at U of T, he worked as a computer software engineer in Beijing for 5 years. He has been working as a Data Scientist at Zillow in Seattle since October, 2012.

Here's how Chunyi responded to our questions.

Why did you decide to study statistics?
I've always been fascinated by numbers. Being a "labour coder" is not as fulfilling as being a machine learning scientist.

How did your time as a student at UofT prepare you for what you're doing now?
My time working with Prof. Radford Neal was instrumental for my current work. I had to write a lot of code to build my own algorithms from scratch. That was the single most helpful thing for my daily work.

What is one of your fondest memories of your time at Uof T?
It was June 2006 during the FIFA World Cup. I watched the first half of Italy vs Australia at home then went to school, watched the second half and the added time in Sidney Smith, then rushed to my final exam. It was the happiest exam ever for me since my team (Italy) won!

What advice would you give our current students?
Be prepared, and be proactive. The statistics profession has evolved tremendously. If you want to be a big data machine learning scientist, learn R/Python, parallel computing (perhaps Hadoop, etc.). Getting an internship at a company like Amazon or Google also helps a lot.

What do you do for fun?
Travel. My wife and I will hop on a plane to fly somewhere else whenever we have a few days to spare. It becomes harder when you start a job as you get less time off, but we still try to travel as much as we can.

Leave Reports

Professor Andrei Badescu

I have spent my sabbatical year 2012-1013 visiting my colleagues **Katrien Antonio** and **Jan Dhaene** at KU Leuven, Belgium. The main focus of my research program was related to modeling the insurer's surplus process together with the analysis of stochastic processes that occur in claim reserving. As a result of my visit we submitted a paper co-authored with **Katrien Antonio, Sheldon Lin**. Further research in the areas of predictive modeling in insurance and stochastic claim reserving are under investigations and they are the direct result of the collaboration with my colleagues at KU Leuven.

KU Leuven has been a centre of learning for almost six centuries

Professors Nancy Reid & Don Fraser

Nancy Reid and **Don Fraser** enjoyed a sabbatical leave of travelling, meetings, and making new friends and old. They spent a month at the University of Padova, established in 1222, and home to Galileo and Copernicus; it has an excellent Dipartimento di Scienze Statistiche, and an active program of visitors and workshops. Much of their fall term was taken up by a visit to University College, London, home to the first university department of statistics in the world, established by Pearson and Galton in 1911. Other places visited included Boston, MA for the AAAS annual meeting, the University of North Carolina, and Florida International University. At UNC we had a happy, though brief, reunion with Ana-Maria Staicu, a PhD graduate of our department.

The entrance to the Department of Statistical Science, Padova

The front quadrangle at University College London

CBC show exposing health abuses of major chain restaurants driven by U of T student research

Applied graduate statistics class project looked at Tim Hortons, Moxies, more

by Brianna Goldberg

Michael Guerzhoy and Nathan Taback

Maybe it's time to start brown-bagging it: one in four major Canadian chain restaurants has experienced a health violation according to new research from the University of Toronto showcased in an unsettling investigation by CBC Marketplace.

The study will be featured in "*Canada's Restaurant Secrets*" which aired Friday 11 April at 8pm ET on CBC Television.

It's the largest analysis of its kind, said CBC Marketplace Associate Producer Nelisha Vellani – examining nearly 5,000 health inspection reports from 13 popular restaurants including Swiss Chalet, Starbucks and The Keg in major cities across the country.

"About two million Canadians become ill after eating out every year, yet health inspection records can be hard to access and understand," said Vellani. "Statisticians **Michael Guerzhoy** and **Nathan Taback** at the University of Toronto were key to the success of this ground breaking investigation, which spanned many months. Their data analysis allowed us to crunch the numbers to find out how these restaurants rank when it comes to cleanliness and safety."

Guerzhoy pursued the work as part of a project in an applied statistics course led by Taback, which pairs students and their number-crunching skills with real-world clients and practical applications.

"With the help of U of T, *Canada's Restaurant Secrets* gave Canadians a new tool to make more informed choices when deciding where to eat out," said Vellani. "The project has already spurred reaction, with one province making inspection records available for the first time and some restaurant chains promising to work to improve their records."

Writer **Brianna Goldberg** spoke with statistical sciences lecturer Taback about the troubling restaurant data, the impact of statistics and what it's like to have student work featured on a platform such as the CBC.

Tell us about the course that inspired this student project
The title of the course is "Statistical Consulting," a graduate level course offered by the Department of Statistical Sciences. My primary aim is to mentor students during the academic year who are interested in applying statistical methodologies to problems encountered in areas such as medicine, public health, business and environmental sciences. One of my major goals is to foster students' ability to communicate statistics to non-statisticians.

Students usually come into the course with a theoretical knowledge of statistics, with no experience applying that knowledge to tackle real problems. During the course they meet with clients that have statistical questions and problems, give many oral presentations to the class and present written reports to clients. In many ways, it's an apprenticeship as an applied statistician. I hope that students learn how to gain new knowledge on their own and communicate it to non-statisticians.

How did one of your students' projects end up featured on the CBC? CBC contacted our departmental consulting service; we felt that this would be a great project for the consulting course so I met with the producer. Then Michael and I discussed the statistical approach he would use to rank the restaurants and he presented it to the class.

After that point he worked on it with the CBC with very little supervision. I try to encourage students in the course to become independent thinkers that can weigh the advantages and disadvantages of various approaches to a problem; the course is based on real problems and data so there is no "right answer." Then at the end we wrote the report together.

Are students in this course ever surprised by what they learn working with clients?
Statistics students that are new to applying their knowledge to problems in different domains, such as public health, are often surprised how much background information about the topic is required to develop a solution that is feasible and will help solve a client's problem.

At the end of the year I ask students to summarize all of their projects and tell me what they learned, and what they wished they had done better. One student's report noted that I should be aware he did not do any statistical analysis for any of his clients. He actually spent most of his time learning about his clients' problems and advising on what analyses should be done, which didn't feel like a traditional "statistics" course.

I'm certain this course altered his perception on the application of statistics to real problems.

What do you wish people knew about statistics' role in public health, and their lives?
I wish people knew more about the role statistics plays in public health, including its limitations. A lot of public health policy is based on statistical evidence. Statistics is a powerful tool for developing arguments based on identifying trends such as the dirtiest restaurant chain in Canada. But all arguments, including ones based on statistics, have strengths and weaknesses. It seems that people have a more difficult time evaluating the limitations of arguments based on statistical evidence compared to non-statistical arguments.

Originally published on U of T News
http://news.utoronto.ca/cbc-show-exposing-health-abuses-major-chain-restaurants-driven-u-t-student-research

Actuarial Science Club

by Sam Doan, President, University of Toronto Actuarial Science Club

During the 2013-2014 academic year, the University of Toronto Actuarial Science Club continued to host a variety of social and industry events for actuarial science students. The club continued its tradition of pub nights and professional seminars in conjunction with Sun Life Financial. In addition to these events, two office visits to Manulife Financial and Sun Life Financial were added to the club's list of annual events. Students were able to network with actuaries in the field while seeing the actual work environment of an actuary. To conclude the successful semester, the club hosted its annual semi-formal at the One King West hotel on March 21st, 2014. The night of festivities was very well received amongst students and faculty alike and was a fitting conclusion to a successful year. The Actuarial Science Club has continued to stand the test of time and will remain a symbol of community in the program for many years to come.
For more information please visit
www.uoftactsciclub.com
Facebook group: www.facebook.com/groups/utstatsclub/

Backpack to Briefcase (b2B) Career Panel Discussion

By Joanne Lu (U of T SSAS Informations Director)

photo credit: Carlo Siochi, Alumni Relations Officer, University of Toronto

The Backpack to Briefcase (b2B) event for students in the Department of Statistical Sciences was held on Thursday March 20, 2014. Its purpose was to connect students and recent graduates with alumni who successfully transitioned out of university and who have since entered the workforce. For the first hour, each alumnus shared their personal experiences and career stories - touching on topics such as how aspects of their statistics degree is applied in daily work, how they made the decisions that guided their career paths, and the challenges they faced throughout their careers and how they overcome them. The panelists came from different backgrounds and companies. From Scotiabank to the Faculty of Medicine at the University of Toronto, each alumnus had a unique perspective to share with the students.

Following the panel discussion, there was an opportunity for students to ask lingering questions during a Q&A session. For the last portion of the evening, students and alumni were able to engage in lively conversation and network with each other while enjoying light refreshments.

A big thank you goes out to the following guest speakers present during the event:
Louis Chan, Financial and Reporting Analyst, Faculty of Medicine (U of T)
Milena Nazaruk, Senior Manager, Retail Analysis - Cadillac Fairview
Nicole Wang Senior Quality Assurance Analyst for Mobile Banking - Scotiabank
Yang-Hai Wang, Managing Director, K&Y Vision Inc.

Graduate Student Research Day 2013

Statistics in Networks

Jinyoung Yang Vice President, Statistics Graduate Student Union Co-Chair

"Able to exchange ideas and have direct interaction with top researchers in the field and establish connections for future collaborations."

BACKGROUND

Statistics Graduate Student Research Day is an annual student led event in the Department of Statistics, University of Toronto. The purpose of the event is to provide students with an opportunity to present their research work and share ideas with their fellow students, faculty, guests, and international stars. It is a chance for the entire department to collaborate and discuss the current methods and future directions of the field. The day includes keynote addresses, graduate student presentations, and a panel discussion.

Graduate Student Research Day 2013 was hosted by the Statistics Graduate Student Union and the Department of Statistics on April 18, 2013 at the Fields Institute. The theme was Statistics in Networks. The theme was selected as it ties statistics to many other fields, including computer science (social networks), biology (disease spread), and several others, supporting the goal of International Year of Statistics.

The invited keynote speakers were international leaders in the field:
David Hunter: Professor, Department of Statistics, Pennsylvania State University
Ji Zhu: Professor, Department of Statistics, University of Michigan
Yannet Interian: Quantitative Analyst, Google Plus

Presentations were made by students and postdoctoral fellows both internal and external to the department:
- Raoul Normand: Postdoctoral Fellow, Department of Mathematics, University of Toronto
- Alex Shestopaloff: PhD Candidate, Department of Statistics, University of Toronto
- Shivon Sue-Chee: PhD Candidate, Department of Statistics, University of Toronto

There were about 50 attendees, ranging from students, faculty, and alumni from the University of Toronto and other North American universities.

The morning started with a keynote talk by Professor David Hunter discussing statistical models for large, time-varying networks. He introduced a continuous-time regression model that can encompass both time-varying network statistics and regression coefficients. This speech was followed by a student presentation from Raoul Normand on Migration under constraints. His talk is about a population model, where migrations are constrained by the need to find new resources. The morning continued

with a second keynote talk by Professor Ji Zhu who discussed on consistency of community detection in networks. He presented his current work on community detection under the degree-corrected block model. We closed the morning with a second student presentation by Alex Shestopaloff on Inference for non-linear, non-Gaussian state space models with ensemble MCMC methods. A new Markov Chain Monte Carlo (MCMC) method for nonlinear state space models were introduced and applied to the Ricker model of population dynamics.

The afternoon began with a third student presentation by Shivon Sue-Chee on Semiparametric Functional Quantile Regression with High-dimensional covariates. She proposed functional quantile regression model that seeks alternative solution to least squares type procedures. Doctor Yannet Interian followed with her talk on Practical open problems on large scale social networks. She discussed practical issues facing companies in building a social network. The talk covered A/B testing on a network, ranking of news feeds and friend suggestions.

The event closed with a panel discussion involving the three keynote speakers and two professors from the Department of Statistics, University of Toronto:
- Radu Craiu: Associate Professor, Department of Statistics, University of Toronto
- Radford Neal: Professor, Department of Statistics, University of Toronto

The panel focused on three main topics:
- Anonymity and Privacy;
- The Impact of Big Data;
- Computational Toolkits.

Panelists discussed about the importance of protecting private information collected explicitly and implicitly through social networks and the responsibility of statisticians who frequently end up handling private information. They also talked about what Big Data means and its implications for statisticians. All panelists had much to say in regards to the importance of computing training in Statistics degree program and they believed Statistics degree program should not be a step behind in terms of interdisciplinary training. The panel discussion promoted interaction between the panelists as well as the audience and stimulated thought and the sharing of new ideas. It was an enjoyable way to end the day and left everyone with new perspectives to contemplate.

CONCLUSION

Overall, the Research Day 2013 was a huge success and an important academic and social event for all those who participated. In particular, students benefited greatly as they were able to exchange ideas and have direct interaction with top researchers in the field and establish connections for future collaborations.
*Statistics Graduate Student Research Day 2013 was supported and funded by:*
- The Statistics Graduate Student Union,
- The Department of Statistics at the University of Toronto,
- The Fields Institute

ORGANIZING COMMITTEE

- **Cody Severinski:** Co-chair, PhD Candidate, Department of Statistics
- **Jinyoung Yang:** Co-chair, PhD Candidate, Department of Statistics
- **Tadeu Ferreira:** PhD Candidate, Department of Statistics
- **Edwin Lei:** PhD Candidate, Department of Statistics
- **Andriy Derkach:** PhD Candidate, Department of Statistics
- **Angela Wang:** MSc Candidate, Department of Statistics
- **James Stafford:** Chair, Department of Statistics
- **Fang Yao:** Associate Professor, Department of Statistics

WITH ADDITIONAL THANKS TO:

- **Christine Bulguryemez:** Assistant to the Chair, Department of Statistics
- **Alison Conway:** Manager of Scientific Programs, Fields Institute
- **Natasha Hanif:** Program Coordinator, Fields Institute
- **Andrea Yeomans:** Communications Officer, Fields Institute
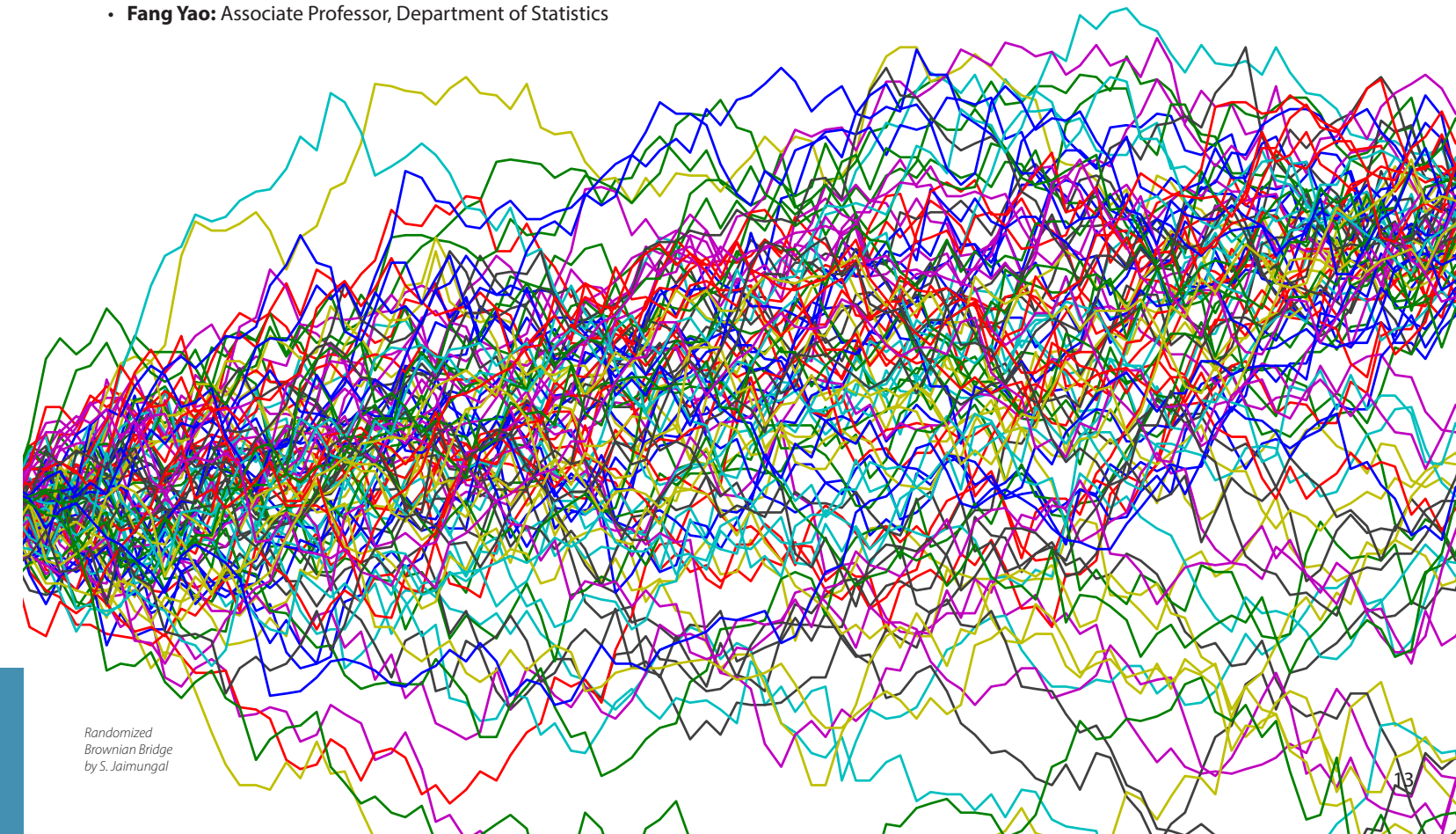
Randomized Brownian Bridge by S. Jaimungal

Statistical Sciences Association of Students

by Haseong Kim, President

The academic year 2013-2014 was the transitional year for the student club in Statistical Sciences Department. During the year, U of T SSAS (Statistical Sciences Association of Students) has established its foundation through renaming the club, getting recognized by both UTSU and ASSU, creating club's logo and reconstructing its constitution, motto and infrastructure.

U of T SSAS has expanded its role by launching and developing 16 academic and practical programs, projects, competitions, seminars and annual events with great success. Through these, it promoted the participation and in-

volvement of students that has benefited them academically, socially and practically. As a result, the general members of the club was increased by approximately 400% during the year.

U of T SSAS has attempted and successfully created professional relationships with several external organizations and departments. U of T SSAS co-hosted and organized various events with these parties for more networking and learning opportunities for associated students.

We also have two programs for students: the **Peer Mentorship Program** and the **Industrial Mentorship Program**. In the Peer Mentorship

Program, upper year Statistics students academically help the lower year students by giving the real-life advice and tips to maximize the learning at U of T. In the Industrial Mentorship Program, SSaS and the Alumni Office at U of T pairs student mentees with the industrial professional mentors who are the alumni of U of T Statistical Science department. Mentors give the advice about career paths, share their experience, and make networks with students.

U of T SSAS will continue to fulfill its mission to assist students and be the platform of the academics and professionals.

SSAS Activities 2013-2014

Sep. 4 & 10 Clubs Fair & St. George Street Festival Event was held with the purpose of promoting the club to the incoming students for 2013-2014 year by giving them information about our club and the upcoming events of the year. We accepted new members at the booth.
Sep. 27 SSAS Welcome Orientation The orientation was open to all students at U of T including club members. We started off by introducing our club and executive team, followed by an overview of the events planned for the year. Through this, students got an opportunity to learn about research opportunities and social events. Students also had time to mingle with fellow students and participated in the jeopardy game in a team.
Sep. 30 Statistical Research Information Seminar To help both undergraduate and graduate level students pursue research opportunities in the field of statistical sciences, UofT SSAS held a research seminar. We presented information about SAS 'Statistical Research Group' at U of T which aims to connect students to the faculty of statistics in a variety of ways: by providing networking opportunities with professors and by offering opportunities for students to work on interdisciplinary research projects supervised directly by faculty members.
Oct. 4 R Crash Course I (for Beginners) The purpose of this workshop was to provide students with a basic introduction to programming in R. The workshop was conducted by Dr. Lopez, a lecturer at UTM as well as the executives of UofT SSAS.
Nov. 14 Statistics Graduate School Workshop This 2 hour-long workshop was aimed to provide students the opportunity to learn about U of T Statistical Sciences graduate program, to get tips to prepare for the program, and to answer their questions. The workshop was given by faculty professor Brunner and 3rd year PhD student, who shared his experience as a graduate student.
Nov. 15 Peer Mentorship Orientation In the orientation, the mentors and mentees learned about the program and their responsibilities and rules. They got to meet their own mentors and mentees in the event and other students as well.

Nov. 15- Dec. 6 SAS Professional Workshops An instructor from SAS programming training firm taught the sessions. Students were provided the full SAS installed environment for each session. The materials being covered in the workshops are designed based on one of the official courses provided by SAS. Workshops included: Introduction to SAS; SAS Datasets, Variables and Data; Data Step, Procedures and Commonly Used SAS; Data Manipulation Techniques and Reporting
Nov. 29 STA257 Exam Review for Charity As gesture of goodwill to support the victims of Hurricane Haiyan, the executives held an exam review session for STA257. All proceeds were sent to the Red Cross.
Jan. 17 RBC Next Great Innovator Competition SSAS has promoted the challenge and recruited participants registered in any undergraduate and graduate program in U of T. Five team members in Statistics, Economics, and Rotman MBA ranked in the third place after the final presentation in front of the senior executives at RBC Headquarter office.
Mar. 16-28 Statistical Modeling Competition The purpose of this competition is to provide the undergraduate students an opportunity to develop their researching and problem-solving skills. The finalists present their solutions to the judges composed of professional statisticians on March. 28th.
Mar. 15-20 Business Consulting Case Competition (co-host with ESA, HHIC) A business consulting case competition was co-hosted by SSAS, ESA, and HHIC for the students in all discipline to have an opportunity to solve the real-life consulting case for the start-up companies. The final 3 teams received the cash prizes.
Mar. 20 b2B Event With the corporation of Alumni office, the club invites the industrial professionals to have career panel discussion time along with the networking session.
April 1 SSAS End of Year Gala (Story of Murder and Mystery!) A big annual networking event with industrial professionals, professors and both undergraduate and graduate Statistical Science students. It is a formal event for an opportunity for all class to network mingle together.
April 23 STA261 Review Session

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FANG YAO

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2   Wong, R. K. W., Yao, F., and Lee, T.C.M. (2014). *Robust Estimation for Generalized Additive Models*. Journal of Computational and Graphical Statistics. DOI: 10.1080/10618600.2012.756816.

3   Li, L., Yao, F., Craiu, R. V., and Zou, J. (2014). *Minimum Description Length Principle for Linear Mixed Effects Models.* Statistica Sinica, to appear.

4   Müller, H. G., Wu, Y., and Yao, F. (2013). *Continuously Additive Models for Nonlinear Functional Regression.* Biometrika, 100, 607-622.

5   Acar, E., Craiu, R.V., and Yao, F. (2013). *Statistical Testing of Covariate Effects in Conditional Copula Models*. Electronic Journal of Statistics, 7, 2822-2850.

Algorithmic Trading with Limit Orders by A. Cartea & S. Jaimungal
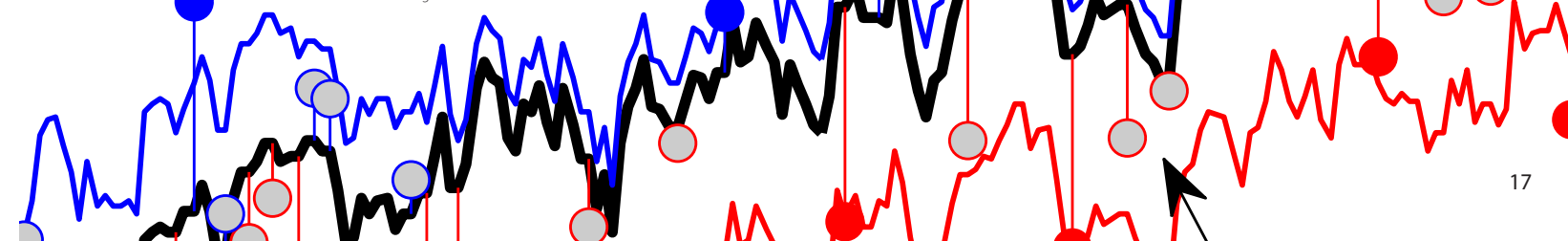
Department of Statistical Sciences Seminars 2013-14

September 19, 2013
Speaker: **Hongyuan Cao**, University of Chicago
Analysis of Sparse Asynchronous Longitudinal Data
Host: ZZ

September 26, 2013
Speaker: **Hua Liang**, George Washington University
Generalized Additive Partial Linear Models With High-dimensional Covariates
Host: NR

October 3, 2013
Speaker: **Yehua Li,** Iowa State University
Functional Principal Component Analysis of Spatial-Temporal Point Processes with Applications in Disease Surveillance
Host: FY

October 17, 2013
Speaker: **Anne-Sophie Charest**, Laval University
Statistical Disclosure Control and the Contributions of Differential Privacy
Host: JR

October 24, 2013
Speaker: **Joel Dubin**, University of Waterloo
Challenges in modeling longitudinal smoking cessation data, and a proposed approach for modelling multivariate longitudinal data from smoking cessation studies
Host: JR

October 29, 2013
Speaker: **Saharon Rossetl**
Isotonic Modeling: Methodology and Applications
Host: RS

November 7, 2013
Speaker: **Jessi Cisewski**, Carnegie Mellon University
Mapping the Intergalactic Medium using Lyman-alpha Forest Data
Host: JR

November 14, 2013
Speaker: **Xiao-Li Meng**, Harvard
Trivial Mathematics but Deep Statistics: Simpson's Paradox and Its Impact on Your Life
Host: Field Institute

November 15, 2013
Speaker: **Xiao-Li Meng**, Harvard
Who is crazier: Bayes or Fisher?
Host: Field Institute

November 28, 2013
Speakers: **Graduate Student Seminars**
• *Limit Order Books and Machine Learning*
• *On Bias Adjustments for Web Surveys*
• *Penalized dependence calibration in conditional copulas*
• *Self-Exciting Event Data in Finance*
• *Effective dimension reduction for sparse functional data*

January 16, 2014
Speaker: **Rebecca Nugent**, Carnegie-Mellon University
Solving the Identity Crisis: Large-Scale Clustering with Distributions of Distances with Applications in Record Linkage
Host: NR

January 22, 2014
Speaker: **Vova Vinogradov**
Host: AF

January 30, 2014
Speaker: **Dr. Aaron Smith**, Tutte Institute for Mathematics and Computing
Efficiency Bounds and Concentration Inequalities for Adaptive Samplers
Host: RS

February 11, 2014
Speaker: **Dr. Arash Amini**, University of Michigan
Pseudo-Likelihood Methods For Community Detection In Large Sparse Networks
Host: RS

February 13, 2014
Speaker: **Dr. Daniel Roy**, University of Cambridge
Computational Foundations of Bayesian Inference and Probabilistic Programming
Host: RS

February 25, 2014
Speaker: **Dr. Lizhen Lin**, Duke University *Shape Constrained Regression Using Gaussian Process Projections*
Host: RS

February 27, 2014
Speaker: **Dr. Tamara Broderick**, UC Berkeley
Feature Allocations, Paintboxes, and Probability Functions
Host: RS

March 13, 2014
Speaker: **Veronika Rockova**, The Wharton School, University of Pennsylvania
EMVS: The EM Approach to Bayesian Variable Selection
Host: NR

March 20, 2014
Speakers: **Graduate Student Seminars**
• *Structural Change Detection For Regression Quantile with Non-Stationary Errors*
• *MCMC methods for Bayesian Logistic Regression on Breast Cancer Data*
• *Nonstandard analysis and its application to Markov process*
• *Pricing and Hedging of Variable Annuities on Mixed Fund under Levy Processes*
• *Regularized Partially Functional Linear Model*
• *Power loss caused by using non-optimal weights in meta-analysis*

March 27, 2014
Speaker: **Jingchen Liu**, Columbia University
Statistical Inference for Diagnostic Classification Models
Host: RC

April 3, 2014
Speaker: **Ben Taylor**, University of Lancaster
Bayesian Inference and Data Augmentation Schemes for Spatial, Spatiotemporal and Multivariate Log-Gaussian Cox Processes in R
Host: RC

PUBLIC LECTURE SERIES

International year of 2013 Statistics

Statistics: the new sexy?
ROB TIBSHIRANI PROFESSOR
DEPARTMENTS OF STATISTICS AND HEALTH RESEARCH AND POLICY STANFORD UNIVERSITY

SEPTEMBER 12 @ 4:00 pm McLennan Physical Labs RM103

Robert Tibshirani is a Professor in the Departments of Statistics and Health Research and Policy at Stanford University. He was a Professor at the University of Toronto from 1985 to 1998. In his work, he develops statistical tools for the analysis of complex datasets, most recently in genomics and proteomics. His most well-known contributions are the LASSO method, which proposed the use of L1 penalization in regression and related problems, and Significance Analysis of Microarrays. He has also co-authored three well-known books: *Generalized Additive Models*, *An Introduction to the Bootstrap*, and *The Elements of Statistical Learning*, the last of which is available for free from the author's website, and is widely considered to be the best introductory text on machine learning. Tibshirani received the COPSS Presidents' Award in 1996. Given jointly by the world's leading statistical societies, the award recognizes outstanding contributions to statistics by a statistician under the age of 40.

Computationally Intensive Biology Problems
ROBERT GENTLEMAN SENIOR DIRECTOR
BIOINFORMATICS AND COMPUTATIONAL BIOLOGY GENENTECH, INC.

October 10 @ 4:00 pm McLennan Physical Labs RM103

Robert Gentleman was a statistics Professor at the University of Auckland in the mid-90's, where he and his colleague Ross Ihaka developed **R**, an open-source statistical programming language for data analysis and graphics (www.r-project.org). **R** is now ubiquitous, used in applications that go beyond drug discovery to the financial sector and defense. Gentleman later moved to Harvard and the Dana-Farber Cancer Center. Most recently he was at the Fred Hutchinson Cancer Center leading the Bioconductor project, www.bioconductor.org, which he started in 2001 to develop open-source tools for bioinformatics and computational biology. In September 2009, Gentleman joined Genentech as senior director of bioinformatics and computational biology.

Smart Use of Smartphones and other Mobile Devices to Improve Health
SUSAN MURPHY PROFESSOR
H.E. ROBBINS PROFESSOR OF STATISTICS AND PROFESSOR OF PSYCHIATRY, RESEARCH PROFESSOR, INSTITUTE FOR SOCIAL RESEARCH, UNIVERSITY OF MICHIGAN

NOVEMBER 21 @ 4:00 pm McLennan Physical Labs RM103

Susan Murphy's research concerns how to best to operationalize the sequential clinical decisions necessary for effectively managing chronic disorders and for achieving and maintaining behavior change. These treatment designs, called dynamic treatment regimes, operationalize the sequencing and individualization of treatments and thus provide the means to use data to directly inform their development. Her research concerns the development of new clinical trial designs and data analysis methods to inform dynamic treatment regime development (called treatment policies in computer science and engineering). Her clinical trial and treatment designs are being used to develop adaptive interventions in depression, alcoholism, treatment of ADHD, substance abuse, HIV treatment, obesity, diabetes, autism and drug court programs.

For more information about this lecture series visit our website **www.utstat.utoronto.ca**

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UNIVERSITY OF TORONTO

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