BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique   CNM

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NCW   Nationaal Comite voor Wiskunde

BMS-NCM NEWS
—
No 88, May 15, 2012

Letter from the editor

> *Welcome to this May issue of our Newsletter! The next one is scheduled for September 15, 2012.*
> *Have a nice end of semester and nice (hot?) summer.*
>
> Regards,
> Françoise

Contents

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1   News from the BMS

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IMPORTANT ADVERTISEMENT
Electronic version of the Bulletin of the BMS

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We announce the transition to **the electronic version of the Bulletin.** More information will be available in the next issue of the Newsletter.

If you are interested, please contact Philippe Cara by e-mail (pcara@vub.ac.be with bms@ulb.ac.be in cc) before August 1, 2012 .

Thank you!

2   Meetings, Conferences, Lectures

2.1   May 2012

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Dynamics at the Academy
Thursday 24.05.2012

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See announcement at the end of this Newsletter

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CANT 2012 –
School and Conference on Combinatorics, Automata and Number Theory
CIRM Marseille - May 2012

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From 21st to 25th May 2012, the third edition of the summer school CANT will be organized in CIRM (Marseille). See the pages at the address

http://www.cant.ulg.ac.be/cant2012/index.html

Invited speakers

- Marie-Pierre Béal, Université Paris-Est Marne-la-Vallée, *Synchronized automata*

- Maxime Crochemore, King's College London, *Text redundancies*

- Mike Hochman, Hebrew University of Jerusalem,
  Symbolic dynamics, multidimensional subshifts, computability and arithmetic

- Jarkko Kari, University of Turku, *Cellular automata, tilings and (un)computability*

- Narad Rampersad, University of Winnipeg, *Repetitions in words*

- Christophe Reutenauer, UQAM Montréal, *Linearly recursive sequences and Dynkin diagrams*

Scientific committee
S. Akiyama, University of Niigata
J.-P. Allouche, CNRS, IMJ, Paris 6
J. Bell, Simon Fraser University
V. Berthé, CNRS, LIAFA
S. Brlek, UQAM, Montréal
K. Dajani, University of Utrecht
A. Frid, Sobolev Institute of Mathematics
J. Mairesse, CNRS, LIAFA
M. Rigo, University of Liège
B. Solomyak, University of Washington

2.2   June 2012

**1st Joint Conference of the
Belgian, Royal Spanish and Luxembourg Mathematical Societies
June 6-8, 2012, LIEGE**

On June 6-8, 2012, the BMS will co-organized a meeting (in Liège) with the Real Sociedad Matemática Española and the Luxembourg mathematical society.

The list of plenary speakers is as follows

- Pierre-Emmanuel Caprace (Un. catholique de Louvain)

- Gilles Godefroy (Directeur CNRS, Univ. Paris 6, Jussieu)

- Giovanni Peccati (Luxembourg University)

- Alvaro Pelayo (Washington Un. St. Louis)

- Julio Rubio Garcia (University La Rioja)

- Ana Vargas Rey (Un. Autonoma de Madrid)

- Michel Van den Bergh (U. Hasselt)

Scientific and organizing committee:
Françoise Bastin, Université de Liège, Belgium
Adhemar Bultheel, K.U.Leuven, Belgium
Stefaan Caenepeel, Vrije Universiteit Brussel, Belgium
Antonio Campillo López, University Valladolid, Spain
José Gómez Torrecillas, University of Granada, Spain

Martin Schlichenmaier, University Luxemburg, Luxemburg
Javier Soria de Diego, University Barcelona, Spain
Hendrik Van Maldeghem, Universiteit Gent, Belgium

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Parallel sessions are also organized. See the web page at

http://nalag.cs.kuleuven.be/BSL2012/

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Homotopical algebra and its applications
25-29 June 2012, Luminy (FRANCE)

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This international conference will be held to celebrate the 60th birthday of Yves Felix.

The confirmed plenary speakers include

- Greg Arone (University of Virginia)

- Octav Cornea (Université de Montreal)

- Emmanuel Dror-Farjoun (Hebrew University of Jerusalem)

- Soren Galatius (Stanford University)

- Tom Goodwillie (Brown University.

- Kathryn Hess (Ecole Polytechnique Fédérale à Lausanne)

- Mike Hill (University of Virginia)

- Jean-Louis Loday (CNRS - Université de Strasbourg)

- Serguey Merkulov (Stockholm University)

- Lionel Schwartz (Université Paris-13)

- Stephan Schwede (University of Bonn)

- Hirotaka Tamanoi (University of California Santa Cruz)

- Michael Weiss (University of Aberdeen)

Scientific committee:
Luchezar Avramov (University of Nebraska Lincoln)
Fred Cohen (University of Rochester)
Bill Dwyer (University of Notre Dame)
Benoît Fresse (Université de Lille 1)
Steve Halperin (University of Maryland)
Jean Lannes (Ecole polytechnique - Palaiseau)
Ulrike Tillmann (University of Oxford)
Burt Totaro (University of Cambridge)

Organizing committee:
Pascal Lambrechts, Université de Louvain
Institut Mathématique 2, chemin du Cyclotron B-1348 Louvain-la-Neuve (Belgique) - pascal.lambrechts@uclouvain.be
Jean-Claude Thomas, UMR CNRS 6093 - Université d'Angers,
Faculté des Sciences, 2bd Lavoisier, 49045 Angers Cedex - jean-claude.thomas@univ-angers.fr

2.3   August 2012

PADGE2012 - Conference on Pure and Applied Differential Geometry
August 27 to August 30, 2012,
Department of Mathematics, K.U.Leuven, Belgium

See the website: http://wis.kuleuven.be/Events/padge2012

3   PhD theses

Modeling external and internal drug exposure:
assessing their causal biomedical consequences
Laetitia Comté, University of Liège
May 09, 2012, University of Liège

Promotors: P. Gérard (ULg) and B. Vrijens (AARDEX group,Visé and ULg)

Summary

    The chapters of this thesis address several challenges identified here above. They were motivated by real problems, emerging from data gathered to answer important scientific questions. The thesis addressed in two main objectives:

- the estimation of drug exposure while capturing the salient features of electronically compiled drug dosing history data, and

- the estimation of the causal impact of varying patterns of drug exposure on treatment efficacy, i.e. the effect of the treatment as actually taken.

    In term of the first objective, in a first part, we review and propose different strategies to summarize the electronically compiled dosing history data of each patient. We depict therefore, by means of the proposed 26 summary variables, different aspects of adherence to a drug dosing regimen. Our primary goal is then to identify clusters of patients using the Hartigan K-Means Clustering method and the second one is to characterize those clusters by means of a subgroup of the 26 summary variables of dosing history data. As those 26 summary variables are redundant, we propose an algorithm based on multidimensional scaling theory to reduce the set of variables without losing key features of the data.

    In a second part, we compare once-daily and twice-daily dosing regimens for HIV-infected patients in terms not only of their adherence but also in term of pharmacological impact of the most common dosing errors made by patients. It is done by considering dosing histories as input of pharmacokinetic model which allow to consider a new and important aspect: the maintenance of drug concentrations within a therapeutically desirable range in order to prevent viral replication (Comté et al 2007).

    In term of the second objective, in a first step, linear and loglinear structural mean models (Robins 1994) are proposed to evaluate the clinical benefits after two months of a proton pump inhibitor prescribed to be taken as needed (on-demand regimen) to alleviate epigastric pain. The on-demand regimen is an extreme case of drug exposure selectivity as directly affected by clinical status. A new diagnostic approach to evaluate model assumptions is developed (Comté et al 2009).

    Finally, we focus on the causal impact of an estimate of internal drug exposure on viral load outcome during the initial phase of treatment, in order to assess the initial success of treatment (i.e. a viral load decrease for naïve HIV patients). The presence of time-varying prognostic factors (due to the longitudinal nature of the data) induces limitation of classical regression models. Indeed classical models attempt to parameterize the effects of early and late exposures within a single conditional mean model. However, assessing the effects of late exposures requires adjustment for the entire confounder history which is (partly) affected by the early exposures and then the corresponding analysis is subject to bias. SNMMs overcome this limitation by separately modeling the effect of the observed drug exposure at each time on future clinical outcomes, conditional on the history of drug exposures and confounders. We developed such models to assess the relationship among HIV-1-infected patients between the internal drug exposure and the kinetics of VL responses, adjusted for confounding by measured time-varying covariates (e.g. the occurrence of adverse events (AEs)) (Comté et al 2011).

Robustness analysis of clustering and classification techniques

Christel Ruwet, University of Liège

June 08, 2012, University of Liège

<u>Promotors:</u> G. Haesbroeck (ULg) and L.A. García-Escudero (UVA, Spain)

<u>Summary</u>
As mentioned in the title, the framework of this doctoral dissertation encompasses two different subjects: robust statistics on the one hand and classification and clustering techniques on the other hand.

Robust procedures try at the same time to emulate classical procedures and to produce results that are not unduly affected by contaminated observations or deviations from model assumptions. A basic example of robust estimator is the sample median that estimates the central tendency of a set of observations, as the sample mean does, but without being so vulnerable to changes in the observations. In order to measure the robustness of a estimator, tools have been developed. For example, the influence function measures the impact that infinitesimal contamination can have on the estimator while the breakdown point measures the amount of contamination that makes the estimator totally unreliable. Usually, the price to pay for protection against contamination is a loss in statistical efficiency.

Classification and clustering techniques try to find groups among observations. Grouping is one of the most basic abilities of living creatures; the simple fact of naming objects is already grouping. The main interest lies in the fact that the characteristics of a group as well as its differences from other groups can be used as a summary of the dataset. There exist a lot of techniques to construct objective partitions of the data. Classification procedures differ from clustering in at least one important point. A classification rule is set up on a dataset for which the memberships are known and this classification rule is then used to classify observations from another dataset. On the other hand, a clustering rule is set up without knowing the memberships of the observations. Nevertheless, classification and clustering procedures have a common ground; they are bound to misclassify some observations.

Firstly, the robustness and the efficiency of the error rate of the generalized and trimmed k-means clustering procedures are studied. It is shown that the error rate inherits the robustness properties of the procedure behind it. Moreover, the optimality (in the sense of reaching the smallest error rate) of these procedures is stated under balanced mixtures of homoscedastic and spherically symmetric distributions.

Then, a recent clustering procedure, the TCLUST procedure, is considered. Although this technique is assumed to be robust, no formal studies of its robustness have been carried out yet. It is shown that the classical level of robustness for procedures based on trimming, i.e. the trimming size, is reached when the dataset is suitable for a cluster analysis, i.e. when it is composed of several well separated clusters.

Finally, a robust procedure is introduced for classifying observations into ordered classes. Starting from the classical procedure, which is shown to be vulnerable to contamination, the idea behind the robust procedure is to downweight remote observations. Robustness and efficiency of this new method are studied and a diagnostic plot allowing to detect influential observations in a dataset is presented.

4   Miscellaneous

4.1   Prizes

The European Science Foundation (ESF) invites nominations for the European Latsis Prize 2012. The Prize, of a value of 100 000 Swiss Francs, **is awarded each year by the Latsis Foundation through the ESF to a scientist or research group in recognition of outstanding and innovative contributions in a selected field of research.** The research field for the 2012 Prize is:

Mathematics

The European Latsis Prize 2012 seeks nominations for outstanding contributions to research in mathematics. Nominations are encouraged from all parts of mathematics, both pure and applied. **The deadline for nominations is 15 July 2012.**

For more information:

http://www.esf.org/activities/european-latsis-prize-2012.html

4.2   From EMS

Dear Colleagues,

We are pleased to inform you that preparations for the 6th European Congress of Mathematics are going on: the list of plenary and invited speakers is complete, 15 satellite meetings are announced, offers of a sightseeing programme have been prepared.

Young mathematicians and mathematicians from economically less-favoured countries may apply for grants supporting participation in the 6th ECM. There are reductions of the conference fee for members of the EMS, Polish Mathematical Society and for students.

Please consult the Congress website www.6ecm.pl ¡http://www.6ecm.pl/¿ for updated information. The 6th ECM poster can be downloaded from the site.

The registration for the 6th ECM is now open and we cordially invite you to register. Electronic registration is done through a new Polish Mathematical Society conference services and payments website. You can access this website from the 6th ECM site at www.6ecm.pl ¡http://www.6ecm.pl/¿ or directly at the address pay.ptm.org.pl ¡http://pay.ptm.org.pl/¿ .

We are looking forward to seeing you in Krakow.

The Organizers of the 6th ECM

EMS Secretariat, Ms. Terhi Hautala
E-Mail: ems-office@helsinki.fi,
Phone: (+358) 9 1915 1503 Fax: (+358) 9 1915 1400

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# 5   History, maths and art, fiction, jokes, quotations . . .

Stefan Banach: remarkable life, brilliant mathematics / Biographical materials edited by *Emilia Jakimowicz* and *Adam Miranowicz*, (third edition) Gdańsk: University Press, 2011 (xiv+184 p.), hard cover, ISBN 978-83-7326-451-5, US$23.00.
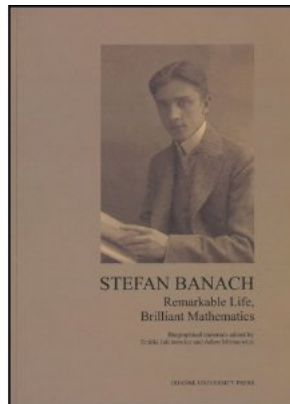
Several papers and books exist on Stefan Banach's life and work. To name just one example: *Through a reporter's eyes: The life of Stefan Banach* by Roman Kaluza (translated and edited by Ann Kostant and Wojbor Woyczynski. Boston: Birkhaüser, 1996). The present book was originally published in 2010 and it now sees its 3rd edition which is also distributed by the AMS. It is an addition to what exits already, but it is not really a full-hearted biography. Like the subtitle rightfully says, it is a collection of biographical material.

Let me quickly go through the different chapters. The first chapter *A remarkable life* by E. Jakimowicz is an account of Banach's life. For a better understanding of the subsequent chapters, it might be a good idea to give a summary.

Banach's origin is already a complicated matter. His father Stefan Greczek was a military, but not married to his mother Katarzyna Banach. Because of lawful regulations and a shortage of income, they could not marry so that the child Stefan Banach (born on 30 March 1892) was entrusted by its mother in the care of Franciska Płowa and her niece Maria Puchalska who owned a laundry business in Krakow. Before his mother left Krakow, his father promised her to look after his son's well being and that he would not reveal the name of his mother. A promise he kept. That is why Stefan Banach never knew his mother but had a friendly relationship with his father. His father married and remarried later so that Banach had several half brothers and sisters. Banach was raised in a family with reasonable income and reputation, but not of an academic kind. However Juliusz Mien, a Frenchman living in Poland was a good friend of the family. He was a photographer (hence the many pictures of Banach as a child) but he also translated poetry. He was the one who learned Banach to speak French fluently. Banach went to grammar school, and unlike some geniuses, he was a good student until in 1910, just before his final exams he lost interest and just passed only because he was backed up by the school priest. From 1911-13 he studied at the Lvov Polytechnic and got a diploma. In those days Lvov was a cultural and scientific center in Poland. Without formal lessons, Banach studied mathematics on his own, sharpening his knowledge by intensive discussions with his math-loving friends. When WWI broke out, Banach was exempt from military service because he was left-handed and had poor vision in his left eye. He was "discovered" by Hugo Steinhaus who overheard two young man sitting on a bench in the park discussing the Lebesgue integral. These youngsters turned out to be Banach and Otto Nikodym. Steinhaus invited them to his house and posed some problems he had been thinking of. Banach came back the next day with the solution, and this has lead to his first mathematical publication in 1919. A year later, Banach married Łucja Braus. From that time on things went smoothly for him. Banach as appointed assistant at the Lvov Polytechnic. The story of his PhD goes as follows. Banach, being very productive and publishing important mathematical results was urged to pass his PhD exam. However, he constantly postponed it with the argument that he had yet to find a much more important result. So he was trapped and asked to come to the dean's office where some people wanted to ask some questions about his work. Banach went and answered the questions without being aware that this was his PhD commission taking the exam.
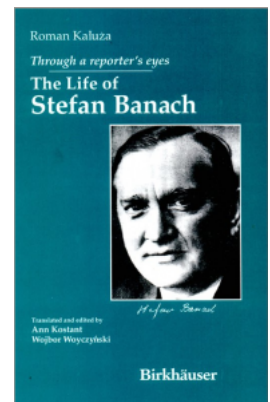
In 1922 he was appointed professor at the Jan Kazimierz University (now Lviv University in Ukraine). His mathematical fame was constantly rising. He also started writing textbooks mainly for the money. He was regularly in need because of the poor health of his wife needed expensive treatment and he was also an extensive visitor of coffee shops. The Scottish Café in Lvov became a legendary place. It hosted everyday sessions of the local mathematical community, not visited by student. Stanislaw Ulam, was one of the few exceptions, since he was invited as a brilliant student. The café had marble table tops on which one could write,…and which could be wiped. Many proofs got lost that way. Some that nobody could reconstruct afterwards. So it was an excellent idea of Banach's wife to buy a hard cover notebook that could be asked by any of the visitors. It contained problems posed and the prize awarded for a solution

(e.g. a bottle of wine or 100 gram of caviar). The book became a mathematical relic and is now available in facsimile. It can be found on the web together with a translation[1].

Stefan Banach

Around WWII, Lvov became Soviet-German battleground. When the city was captured in 1939 by the Soviets, many intellectuals were deported. Banach was saved, maybe because of his strongly communist inclined friend Stanislaw Mazur. From 1941 till 1944 the Germans invaded Lvov and executed 22 professors. The chemist Rudolf Weigl from the bio-faculty experimented with lice to produce a typhus vaccine. The Germans wanted him to increase the production and many mathematicians and other intellectuals were saved because by feeding the lice with human blood, they became necessary for the production. Banach and his son Stefan Jr. were among them. When in 1944 the Soviets regained the city, the population was deported during an ethnic cleansing. Banach's wife and son were sent to Wrocław. Shortly after the war, Banach died on 31 August 1945 from lung cancer.

The second chapter contains several *Letters* (originals reproduced with English translations) between Banach and Ulam. Quite emotional is a letter written by Banach's father of 30 October 1943 in which he reveals the truth of what had really happened and why he was raised in a foster family.

Chapter three contains *Recollections* mostly by several people from the family. One is from his son, Stefan Jr. (1922-1999) who was a neurosurgeon, others are from grandchildren in the family, colleagues and friends.

S. Domoradzki, Z. Pawlikowska-Brozek and M. Zarichny give in chapter 4 a list of items related to Banach that they have collected from the archives of the university. It is basically an enumeration of the items with a couple of lines describing the contents of each one.

A brief and really smooth introduction to the main mathematical achievements of Banach even accessible for a non-mathematician are described by J. Musielak in chapter 5: *Banach's opus scientificus.*

Chapter 6 on *Stefan Banach and Lvov mathematical school* by K. Ciesielski and Z. Pogoda is an English translation of a paper published previously. It repeats some material of the first chapter and adds a bit of mathematics.

Similarly, chapter 7 about *The Scottish book* is a translation of a paper by M. Kordos, that describes 6 problems from the book. Three of them have been solved, the other three are still open.

Banach monument Krakow

R. Duda describes in the next chapter the lifespan of *The new Scottish book.* Banach's wife had brought the original Scottish book to Wrocław and E. Marczewski took the initiative of starting a new book in the tradition of the original one. Steinhaus entered the first problem in 1946, being the one entering the last problem in the previous book 5 years earlier. It continued for over 40 years till the last two problems were entered in 1987.

Besides these chapters, the book has ample illustrations, photographs and reproductions of original letters and documents.

Even though this is the third edition, there are some flaws in the typesetting and production of the book. For example, the ISBN number on the back cover and on the bibliographic page in front differ and differ both from the number on the AMS webpage. At several instances, I could find some typos, for example, on page 156: $25 + 1 = 33$ where it should be $2^5 + 1$. Sometimes LaTeX typesetting commands pop up (because they are missing a backslash). Also Lvov is written in different ways: Lvov (Russian), Lviv (English), Lwów (Polish),...[2] Most disturbing however is that near the end of the book the order of the pages is mixed up. One successively finds pages 1-160, followed by 181-184, then 165-179 and 161-164, and finally 185. Since this affects the references, the bibliographic notes, the name index etc., all things to which is often referred in the text, this is highly annoying.   Adhemar Bultheel

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[1] kielich.amu.edu.pl/banach/e-scottish-book.html
[2] The German name is Lemberg.

DYNAMICS AT THE ACADEMY

Thursday 24.05.2012

Program 24.05.2012

10:00-10:45: **P. De Maesschalck** (UHasselt), *Periodic orbits in the plane near common slow-fast cycles.*

11:00-11:45: **P. De Leenheer** (University of Florida), *On models of social balance.*

12:00-12:45: **G. Samaey** (KULeuven), *Macroscopic simulation and bifurcation analysis of multiscale systems: numerical aspects.*

Lunch

14:00-14:45: **A. van der Schaft** (UGroningen), *On the mathematical structure of balanced chemical reaction networks.*

15:00-15:45: **P. Bonckaert** (UHasselt), *Analytic saddles, renormalization and Bruno numbers.*

During lunch sandwiches and drinks will be offered by the organization. Confirmation of participation is not necessary but would be appreciated (**freddy.dumortier@uhasselt.be**).

More information, including abstracts, is available at **http://www.kvab.be.**

Everyone is cordially invited.

P. De Leenheer and F. Dumortier.

Royal Flemish Academy of Belgium for Science and the Arts

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