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IISA Newsletter Summer 2017

JSM 2017 at Baltimore, Maryland USA



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Message from Sujit K. Ghosh, President of IISA

Dear Members of IISA (Bandhugan!):

Hope you are having a nice and enjoyable summer so far and it is my pleasure to reach out to you a second time with the summer edition of the IISA Newsletter. In my last article, I mentioned to you about learning from the past (so-called 'Prior') and now that I have 'sampled' (literally by the survey that the IISA Membership and Outreach Committee has carried out), I now have a little more informed 'posterior' knowledge about the IISA community. In this newsletter, you will find several very interesting articles written by the esteemed members of our community and I'd sincerely urge you to take some time out of your busy schedule, relax, and enjoy the summer by reading some of these stories.

2017: The Year of Celebration Continues

As you all know by now this is indeed a very special year for IISA and the Statistics community as we are celebrating the 25th year of IISA and the beginning of the 125th year celebration of the legendary and visionary statistician Professor P.C. Mahalanobis. The current India Chapter President, Ayanendranath Basu, has provided an eloquent biography of Prof. PC Mahalanobis, while in another article, one of our former IISA presidents, Dipak Dey, has generously provided reminiscences of the "Professor" and his impact in today's statistical science. The Indian Statistical Institute (ISI) has a year-long celebration which began on June 29th, 2017 and will continue throughout the year to June 29, 2018, leading up to his 125th birth anniversary. IISA also plans to join hands with ISI in celebrating the Statistical Sciences in the era of Data Science. To commemorate IISA's 25th Anniversary, we have included articles from three members, Naveen Narisetty, Veera Baladandayuthapani, and H.N. Nagaraja about their memories of IISA events throughout the past two decades. We hope you enjoy these articles!

The preparation for the 2017 Annual IISA Conference is in full swing and we hope each one of you will be able to attend and celebrate the silver jubilee in the beautiful city of Hyderabad. Members are encouraged to visit the conference website: <http://iisaconference.org/> for the latest updates and upcoming deadlines. The co-chairs of the Scientific Program Committee, Ansu Chatterjee and Isha Dewan, have been working tirelessly to put together a variety of exciting sessions and thanks to all of you who have submitted invited session proposals using the IISA conference web portal. A list of accepted invited sessions have been made available online. The local Organizing Committee led by Mahesh Iyer, who is currently the India Chapter Vice President, has

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Sujit Ghosh, IISA President

been working hard to secure additional economical accommodations near the conference venue and also securing sponsorships and external funding for students and junior researchers. The conference will also feature many other events, pre-conference short courses and workshops on December 27th, contributed sessions, panels and a tour of local attractions. Please register for the conference at your earliest convenience and take advantage of the early-bird reduced registration fees.

It also my pleasure to let you know the IISA executive board (EB) has decided to host the 2018 Annual IISA conference in Gainesville, Florida and further updates about the conference will appear on the IISA website and via future IISA Newsletters and email broadcasts. The co-chairs (aka 'the stat couple') of the local program committee, Somnath Datta (President Elect) and Susmita Datta have secured a venue for the conference. Want to know more details? Tune in at the IISA booth and reception event at the upcoming Joint Statistical Meeting (JSM) in Baltimore.

Speaking about JSM 2017, IISA will have a strong presence as main sponsors for two invited sessions, a topic contributed session, a contributed session and several SPEED poster sessions. A complete list of IISA sponsored activities is included with this Newsletter and also available online on the ASA website. I'd personally like to invite you all to the IISA General Body Meeting (GBM) and Reception in Baltimore to be held on Monday, July 31st at 6:00PM in room LaTrobe at the Hilton (headquarters) hotel. Announcements of upcoming events will be made at the GBM and we'd also like to hear your feedback. There will be a contributory IISA group dinner on Sunday, July 30th; please see our article on JSM 2017 for further details. We hope you can attend!

It is my great pleasure to mention that our Editor-in-Chief of the Newsletter, Chaitra Nagaraja, and the rest of the editing team has taken a keen interest in making the newsletter not only newsworthy but also a journal that features interesting and thought-provoking articles. In this regard, you will find an informative yet fun-to-read article submitted by one of our members, Srinivas Bhogle, who is well known to many of us for his thought-provoking blog (<https://bademian.wordpress.com/>). I encourage each of you to write an article to be published in our newsletter and for further information about the length and deadline of such articles, please contact Chaitra or IISA Secretary Soutir Bandyopadhyay (secretary@intindstat.org). OR you may also put up an interesting challenge problem for young

researchers...In this regard, let me ask you...are you aware of any probability distribution for a random variable X for which the expectation, $E(|X|^a)$ is not finite for all $a > 0$?

The IISA journal committee consisting of members of the EB of IISA (co-chaired by past president Soumen Lahiri and President Elect Somnath Datta) is continuing its hard work with publishers to launch a new official journal of IISA which will have a significant focus on the emerging area of 'Data Science.' The committee still anticipates that once all the necessary logistics and negotiations are in place the new journal will be launched early next year. Thanks for your patience as we work out the details.

In the midst of all of the above-mentioned celebratory activities, I am very saddened to report that we have lost one of our esteemed members last month, Professor Tapas Chandra. He was a faculty member at the Indian Statistical Institute in Kolkata and he passed away recently. An obituary has been kindly written by Subhashis Ghoshal (see later in this Newsletter). We have definitely lost a great human being and teacher (to many of us who took courses from him at ISI, Kolkata).

Finally, I'd like to reiterate, if you are interested in collaborating with scientists in India and elsewhere or if you are aware of scientists in India who are in need of statistical expertise, please feel free to contact me (by email: president@intindstat.org) or our secretary (by email: secretary@intindstat.org) and let us know about your thoughts and I promise that you will hear back from us!

Hope to see you at the Joint Statistical Meetings in Baltimore and other upcoming IISA co-sponsored events. Thanks for reading this far and as a special request, if you are attending the JSM at the end of this month, please visit the doodle poll (<https://beta.doodle.com/poll/gyd6yrqnsnwbbgd>) and volunteer your time at the IISA booth in Baltimore.

Sujit Ghosh (President, IISA)



Baltimore Convention Center

We have our usual meetings in addition to some exciting sessions coordinated by Veera Baladandayuthapani (University of Texas, MD Anderson Cancer Research Center), who is the IISA representative on the JSM Program Committee.

Meetings

IISA Executive Committee Business Meeting

Sunday, July 30th, 5:30 PM – 7 PM

Baltimore Convention Center Room (CC-333)

General Body Meeting and Reception

Monday, July 31st, 6 PM – 8 PM

Hilton Baltimore Hotel (H-Latrobe)
which is at 401 West Pratt Street

IISA Contributory Group Dinner

Sunday, Jul 30th, 7:30 PM - 9:00 PM

Lumbini Restaurant at 322 North Charles Street

For further details and online registration visit: <https://iisa-dinner-2017.eventbrite.com/>

Sponsored Sessions

IISA is a lead sponsor for the sessions marked with (*)

For more details, please visit <https://ww2.amstat.org/meetings/jsm/2017/>

Sunday, July 30th

Asian Initiative: Career Development and Leadership Skills Workshop*

9 AM – 10:30 AM, Session #214819, H-Key Ballroom 9

Chair: Amarjot Kaur, Merck

Modern Statistical Methods for Multi-Scale and Time Series Data*

4 PM – 5:50 PM, Session #69, CC-344

Chair: Subharup Guha, University of Missouri

Speakers: Sikamak Noorbaloochi, VA Health Care System; N. Rao Chaganty, Old Dominion University; Shirshendu Chatterjee, City University of New York; Arman Oganisian, University of Pennsylvania; Bu Hyoun Lee, Loyola University Maryland; Zeda Li, Temple University; and Jessica Rudd, Kennesaw State University

Statistical Methods for Complex Networks

4 PM – 5:50 PM, Session #43, CC-329

Organizer and Chair: Po-Ling Loh, University of Wisconsin, Madison

Speakers: Varun Suhas Jog, University of Wisconsin, Madison; Guy Bresler, MIT; Jiaming Xu, Purdue University; and Miklos Z. Racz, Microsoft Research

Sample Design

4 PM – 5:50 PM

Session #76, CC-345

Chair: Aref Dajani, U.S. Census Bureau

Speakers: Steven Pedlow, NORC at the University of Chicago; Gavin Corral, USDA NASS; Ying Li, NORC at the University of Chicago; Richard Sigman, Westat; Paul Zador, Westat; Holly Shulman, CDC; Yijun Wei

Monday, July 31st

Modern Statistical Methods for Biological Discovery*

10:30 AM – 12:20 PM

CC-350, Session #156

Organizer and Chair: Sunil Mathur, Augusta University

Speakers: Kevin Dobbin, University of Georgia; Kimberly Siegmund, University of Southern California School of Medicine; Daniel Linder, Medical College of Georgia; Jie Chen, Augusta University; and discussant Varghese George, Augusta University

Contributed Poster Presentations— International Indian Statistical Association

2 PM – 3:50 PM

CC-Halls A&B, Session #246

Chair: Jessi Cisewski, Yale University

Speaker: Ramu G. Sudhagoni, The University of South Dakota

Tuesday, August 1st

SPEED: Biopharmaceutical Statistics, Medical Devices, and Mental Health*

10:30 AM – 12:20 PM

CC-323, Session #333

Chair: Abie Ekangaki, UCB Biopharma SPRL

Speakers: Ye Tan, Pfizer; Yang Xu, BioStat Solutions, Inc.; Feng Gao, Washington School of Medicine; Rima Izem, Food and Drug Administration; Darcy Hille, Merck; Haiying Lin; Caitlin I. Steiner, University of Virginia; Md Islam, North Carolina State University; David Friedenber, Battelle Memorial Institute; Jiawei Bai, Johns Hopkins University; John Bunker, RTI International; Song Fangda, The Chinese University of Hong Kong; Theresa Y. Kim, Maryland Population Research Center; Amanda Luby, Carnegie Mellon University; Zhuoran Shang, University of Minnesota; Rajarshi Dey, University of South Alabama

SAMSI-CCNS: Innovations and Challenges in Computational Neuroscience*

10:30 AM – 12:20 PM

CC-338, Session #312

Organizer and Chair: Sujit Ghosh, North Carolina State University and previously at SAMSI

Speakers: Zhengwu Zhang, Duke University; Yize Zhao, Weill Cornell Medicine; Ying Guo, Emory University; and Gina-Maria Pomann, Duke University

SPEED: Biopharmaceutical Statistics, Medical Devices, and Mental Health*

2 PM – 2:45 PM

CC-Halls A&B, Session #423

Chair: Jessi Cisewski, Yale University

Speakers: This is the poster presentation for SPEED session #333

Wednesday, August 2nd

Current Trends in Statistical Genomics*

8:30 AM – 10:20 AM

CC-303, Session #451

Organizer: Somnath Datta, University of Florida

Chair: Hyoyoung Choo-Wosoba, NCI and NIH

Speakers: Patrick Breheny, University of Iowa; Susmita Datta, University of Florida; Dan Nettleton, Iowa State University; Keith Shockley, NIEHS; Yijuan Hu, Emory University

New Innovations in Handling Incomplete Biomedical Data in the Era of Data Science*

2 PM – 3:50 PM

CC-313, Session #551

Organizer and Chair: Arkendu Sekhar Chatterjee

Speakers: David Ohlssen, Novartis; Dandan Xu, The University of Texas at Austin; Sujit K. Ghosh, North Carolina State University; Jeremy Gaskins, University of Louisville; and Laura Anne Hatfield, Harvard Medical School

Thursday, August 3rd

Recent Advances in High-Frequency and High-Dimensional Time Series

8:30 AM – 10:20 AM

CC-317, Session #604

Organizer: Scott Holan, University of Missouri

Chair: Jiaxun Chen, University of Missouri-Columbia

Speakers: Nalini Ravishanker, University of Connecticut; Jian Zhou, Worcester Polytechnic Institute; Jane Harvill, Baylor University; David Walker Puelz, University of Texas; Katherine Ensor, Rice University

Three Pillars of Successful Health Studies: Inclusion, Design, and Measurement

10:30 AM – 12:20 PM

CC-330, Session #664

Chair: Ruth Etzioni, Fred Hutchinson Cancer Research Center

Speakers: Nicholas Davis, NORC; Robyn L. Ball, Stanford University; Yan Wang, UCLA; Adriana Perez, University of Texas at Houston Health Science Center; James Dahlhammer, National Center for Health Statistics; Andrea Parks, International Justice Mission



Hyderabad International Convention Centre and Novotel

The 2017 IISA Conference, Statistics and Data Science for Better Life, Society, and Science, will be held at the Hyderabad International Convention Centre from December 28-30th, 2017. Ansu Chatterjee (University of Minnesota) and Isha Dewan (ISI, Delhi) are the Scientific Program Committee Chairs for the conference. Mahesh Iyer (Novartis) is the Chair of the Organizing Committee. Elsevier, the American Statistical Association, and Cytel are sponsors.

We will be celebrating 25 years of IISA at this conference with many exciting activities which include: (i) five plenary talks, (ii) over 50 invited sessions, panel discussions, contributed sessions, poster presentations, and student paper competition; (iii) pre-conference workshops and short courses on December 27th and (iv) sightseeing trips. For more details, please visit: <http://www.intindstat.org/iisaconference2017/>.

Plenary Speakers:

Donna Speigelman, Irène Gijbels, Sanghamitra Banerjee, Ian McKeague, and Malay Ghosh.

Special Invited Talks:

Debojyoti Sinha, Susmita Datta, Somnath Datta, Peihua Qiu, Gauri Datta, and Mariza de Andrade.

Bahadur Lecture:

Jayaram Sethuraman

Deadlines

August 15

Submissions due for Student Paper Competition (see <http://www.intindstat.org/spc>)

August 31

Abstract submission due for Contributed Sessions; applicants will be notified of acceptance of by September 15

August 31

Abstract submission due for Student Poster Competition

September 30

Abstract submission due for Invited Sessions

September 30

Nomination deadline for 2017 Young Investigator Awards, Theory and Applied (see <http://www.intindstat.org/awards>)

October 15

Early-bird registration ends

December 15

Regular registration ends

Prasanta Chandra Mahalanobis, 1893-1972

*By Ayanendranath Basu, ISI Kolkata and IISA India
Chapter President*



Prasanta Chandra Mahalanobis

Our country, India, had an established position in the ancient history of human civilization. The Indus valley civilization is among the oldest four civilizations of the world. The study of science and mathematics had also reached very high levels in India in old times, particularly in the Vedic age. The use of zero, for example, coming from the Indian community, is one example of the high levels of superior scientific study and practice in ancient India. In short, in the earlier part of the history of civilized people, India had a meaningful scientific presence.

As civilization progressed, however, India failed to retain its position in the world of science. In the middle ages, in particular, India had fallen far behind the western world in the study and pursuit of science. Indian society remained mired in backward practices and superstitions far too long to give science a reasonable chance. Modern India has overcome this to some extent, but it is fair to say that it has not recovered the position of its old glory.

Over the last one and a half centuries, modern scientific thought, study and research has generated a new field of science, which we now call "Statistics". The analysis of scientific data, in any discipline, has to follow proper statistical procedures to reach meaningful and valid conclusions. And it is a matter of great pride for all of us that whatever be the position of India in the global scientific map, the Indian scientists have deeply contributed at an international level to the growth of the theory and application of this new discipline of statistics. And the foremost personality who is responsible for this is Professor P. C. Mahalanobis. His theoretical contributions are

well known. Mahalanobis distance, for example, is a household name for every statistician. He worked hard to ensure the application of statistical methods in different real problems in many areas including national planning and anthropology. He was known to personally supervise crop cutting experiments and the subsequent analysis using sample survey techniques. But his greatest achievement has been in helping to perpetuate the culture of statistical learning and statistical thought in India. He has inspired generations of future statisticians who have carried on research in statistics and the application of statistical techniques to real problems in independent India. He founded the Indian Statistical Institute in 1931, which turned out to be one of the primary tools to achieve his objectives.

Prasanta Chandra was born on 29th June, 1893, in a liberal Brahmo family in Kolkata. His father's name was Prabodh Chandra. His mother Niradbashini was the younger sibling of the eminent Indian doctor Sir Nilratan Sircar. Prabodh Chandra's father Gurucharan, who had settled down in Kolkata from their old home in Bikrampur, was progressive enough even at that age to go against the social norms and marry a widow.

In 1912, Prasanta Chandra passed the B.Sc. examination from Presidency College, with honors in Physics. In 1913, he went to England for higher education at the University of London. Due to a change in circumstances he eventually enrolled in King's College, Cambridge, from where he graduated in 1915 with a Tripos in Physics.

Circumstances worked in favor of Prasanta Chandra being drawn towards statistics. At one point his homecoming was delayed somewhat because of the First World War and this gave him some time to spend in the Library of King's College, Cambridge. At this time, he laid his hands on some volumes of the *Biometrika* journal, edited by Karl Pearson. It is said that he was drawn to this new discipline so much that he bought a whole set of the journals and brought them with him to India. This single event may have had the most to do with the development of the discipline of statistics in India.

When he finally returned to India, Prasanta Chandra joined the Presidency College as a faculty in the department of Physics. However, he kept spending a lot of time in doing research in statistics. He was strongly encouraged by Acharya Brajendra Nath Seal in this pursuit. But Prasanta Chandra did not confine himself to just doing research in statistics. For the development of the discipline in the country, he set up the Indian Statistical Institute. If Prasanta Chandra is the architect of the development of the discipline of statistics in India, this Institute has been its primary vehicle.

Prasanta Chandra's own personal research was of a very high standard. As mentioned before, the D2 statistic attributed to him is used by statisticians all over the world. He gave great importance to applied research as well. He did statistical analysis of the anthropometric measurements of the Anglo-Indian community of India. He used statistical

methods in analyzing and predicting rainfall and floods. He encouraged the use of large-scale sample survey methods in applied work. The journal *Sankhyā*, founded by him, is one of leading statistics journals of the world. The structure of the second five-year plan of independent India was also prepared by him.

Prasanta Chandra and his wife Nirmal Kumari were both very close to Rabindranath Tagore. Prasanta Chandra's grandfather Gurucharan was a friend of Debendranath Tagore, Rabindranath's father. Rabindranath's elder son Rathindranath was a contemporary of Prasanta Chandra. Rabindranath had great affection as well as great respect for Prasanta Chandra, even though the latter was more than thirty years his junior. Prasanta Chandra was the first reader of the letter which Rabindranath had written while relinquishing his Knighthood in protest against the Jallianwala Bagh massacre. Both Prasanta Chandra and Nirmal Kumari had been Tagore's companions in a few of his visits abroad. Throughout the lifetime of Prasanta Chandra, Tagore remained a great inspiration.

Prasanta Chandra has received many awards and honors in his lifetime, both in India and abroad. It is a long list. At home, he was felicitated with the Deshikottama award of Visva Bharati in 1961. The Government of India gave him the Padma Vibhushan award in 1968.

Prasanta Chandra passed away on 28th June, 1972, one day before his 79th birthday.

Reminder

JSM 2018 will be held in Vancouver, Canada from July 28th through August 2nd. The timeframe for submitting invited session proposals is July 18th through September 6th, 2017 using the online system on the ASA website at <https://www2.amstat.org/meetings/jsm/2018/submissions.cfm>.

If you are interested in IISA sponsoring your session, please contact Snigdhasu Chatterjee (University of Minnesota, chatt019@umn.edu) who is the IISA representative on the Program Committee.

Celebrating IISA's 25th Anniversary

By Naveen Narisetty, University of Illinois at Urbana-Champaign



Naveen Narisetty at the 2014 IISA Conference in Riverside

It is with my heartfelt appreciation and gratitude that I write this article to celebrate 25 glorious years of the International Indian Statistical Association (IISA). I first learned about IISA during JSM 2013 in Montreal and immediately registered as a student member. I volunteered at the IISA desk in the following JSMs which gave me an opportunity to meet many wonderful statisticians. I attended the 2014 conference in Riverside with the support of IISA, where I made a lot of friends and met some of my current collaborators. A memorable experience in Riverside was visiting the beautiful statue of Mahatma Gandhi, whose dedication and love for humanity provide constant inspiration in my work. The photo taken there stands as a reminder that the goal of my work is to benefit society.

I received my PhD from the University of Michigan in Spring of 2016 and soon had another opportunity to be under the IISA roof as I was invited to speak at the 2016 IISA conference in Corvallis which turned out to be an exceptional experience. The broad variety of research presented, the presence of so many stalwarts in our field from across the world, and the nature of personal level interactions at the conference made it clear that I would return to IISA conferences for years to come. Another distinct feature of the IISA conferences is that there is a special interest taken to highlight young researchers with dedicated awards and sessions. Now that I am working as a faculty member at the University of Illinois at Urbana-Champaign, the experience of attending the conferences motivated me to take an active role in IISA. As

a first step towards this, I am organizing an invited session at the upcoming IISA conference in Hyderabad.

As I embarked on my academic journey in the US several years ago, there is no doubt that IISA has played an active role in helping my career progress. On behalf of all the young statisticians, I thank IISA for the wonderful work and support. I look forward to being increasingly involved with the activities of IISA as it is a mutually beneficial process. I have noticed that there is a tremendous interest in Statistics and Data Science among the youth in India, yet there is not enough infrastructure and channel of support to fulfill this huge demand. I see this as an opportunity for all of us at IISA to contribute further in this direction of capacity building.



Will it be a good monsoon year?

*U. N. Sinha, Retired scientist at Bangalore's National Aerospace Laboratories
Vidyadhar Y. Mudkavi, Head of CSIR's Fourth Paradigm Institute
Srinivas Bhogle, Honorary scientist at CSIR's Fourth Paradigm Institute*



Credit: [Indian Express](#)

We ask this question every year in India: Will it be a good monsoon year?

Speculation typically starts in April, and the anxiety grows rapidly as we approach the end-weeks of May. There are the official forecasts from the India Meteorological Department (IMD), and, in recent years, also forecasts from other players such as Skymet Weather, Potsdam Institute for Climate Impact Research (PIK), and South Asian Climate Outlook Forum (SASCOF).

The answer everyone wants to hear is that it will be a 'normal' monsoon.

India's long-period average (LPA) rainfall, during the summer monsoon months of June through September (JJAS), over the past 50 years, is about 90 cm. This means that if you gather all the JJAS monsoon rainfall in a heavenly bucket and pour it all over India, there would be a water column 90 cm high everywhere in the country. We define this to be the 'normal' figure.

If the prediction is within $\pm 5\%$ of the LPA, the rainfall is defined to be normal. If it is a further $\pm 5\%$ away from the LPA, then it is either 'above normal' or 'below normal'. And if the deviation is more than $\pm 10\%$ from the LPA then it is either 'excessive' or 'deficient'. 'Deficient' rainfall is more worrisome, and there is then talk of a 'bad' or 'failed' monsoon.

Even a normal rainfall could be bad news: there could be individual regions with very high or very low rainfall, or the rainfall may not be evenly spread across the four monsoon months. Good techniques for monsoon prediction are therefore vitally important, and we must ideally develop such

techniques in India itself because the rest of the world isn't impacted and doesn't really care.

How does one predict rainfall? The best way would be to solve the equations of the underlying physics and dynamics - which, surprisingly enough, are well-known and well-validated. But these equations are treacherously non-linear: they require tremendous computing power, they don't give straight-forward answers, and predictions usually become completely unreliable when you look sufficiently far ahead. The eminent mathematicians Vladimir Arnold and Edward W. Lorenz (also known for his 'toy' weather prediction equations) said that no prediction can be trustworthy after a week or 10 days.

Why? What happens? Here's an informal explanation. Predictions using very complicated non-linear equations usually have an 'orderly' component and a 'chaotic' component. Over time, the chaos overwhelms order, and, beyond a certain threshold, it is all chaos. It is ridiculous to expect predictability from this point onwards...unless we have much more prior information and insight.

The other way to predict rainfall is by empirical means. This is a classical statistical approach: we use a regression equation in which the amount of rainfall is the dependent variable, and there are a host of (hopefully independent and informative) predictors.

This is how monsoons have been predicted for over a century (IMD is attempting a dynamical or mathematical approach for the first time this year). Over all these years some predictor variables dropped off, and some new variables came in. Some predictors grew in impact, others diminished in impact. The story kept evolving.

One of these predictor variables: El Niño Southern Oscillation (ENSO), or simply 'El Niño', has, during the last 10-15 years, acquired superstar status, becoming the Sachin Tendulkar or, now, Virat Kohli, of the prediction game. El Niño is about a greater warming of the waters in the Pacific Ocean a few months before the monsoon onset. It has been observed that rainfall can be scarce in El Niño years. The 'opposite' (greater ocean cooling) is La Niña, which is believed to bring in abundant rain. That's why Indian scientists, and Indian media even more, love La Niña and hate El Niño.

This love affair, however, has only modest justification if you look at real numbers. The El Niño/La Niña phenomenon – when it happens; it is not an annual event - accounts for only about 33% of the total variation in the monsoon prediction system, which is indicative, but unlikely to be statistically significant. In fact, we've quite often had good rains in El Niño years, and bad rains in La Niña years.

We're therefore puzzled by the undue prominence given to El Niño in the Indian media. Think about it this way: the monsoon is an amazingly powerful, highly persistent, and unbelievably ubiquitous phenomenon capable of colossal fury and ferocity. It is like an awesome parade of elephants running amok with majesty and authority. How much can a solitary variable influence its staggering march?

Indeed, this is what creates hope for the forecaster. The monsoon is really big; and really orderly. It therefore seems eminently feasible to predict the monsoon rainfall for the limited Indian region for periods ranging up to a month (rather than just 7-10 days), especially if we play with averaged data...that always holds the promise of greater order and predictability.

We will now recount a story that we find fascinating. But, before that, let us (again informally) explain how we do rainfall prediction. We'll only talk of the dynamical (not empirical) route because that's where we expect to do big and interesting things in the future.

We've already talked of the equations used to predict rainfall. These equations are complex and daunting, and can only be solved numerically. To kick off the computing, we need to know the initial values of the input variables (relating to heat, moisture, temperature, wind velocity, radiation, boundary layers etc., etc.). This data is now easy to obtain with the proliferation of satellites, sensors and weather agencies around the world (we can, e.g., get the data from National Centers for Environmental Predictions, or NCEP, in USA).

Let us start! Let us, say, obtain the initial values as of 00:00 hours on 1 July 2006 and kick off the number crunching. We will crunch across 256 latitudes, 512 longitudes and 18 vertical levels, to cover the 'entire' atmosphere around the globe, and very quickly 'time-march' to capture the picture at 00.15 hours. After this first iteration, we have our estimate of the likely rainfall in these 15 minutes, and new computed values that become our next set of input variables. We plug in these computed values and begin crunching for the next time-step of 15 minutes. The second iteration gives us the rainfall estimate for the period 00.15 to 00.30 (which we add to the first estimate) and the next set of input variables. This way we keep time-marching, cumulating our rainfall estimate and refreshing the input variables. After 96 iterations (which, depending on the computing power, can be completed in seconds or minutes) we have advanced by a full day! We continue our forward march! When we finish marching forward by a month, we will have our rainfall estimate for the month (often expressed as a daily average; e.g., 10.75 mm/day).

It is not advisable to base the monthly rainfall prediction on just one computation. An established practice, therefore, is to create an 'ensemble' of 4-5 computations, using different sets of initial conditions, and obtain 4-5 estimates of the monthly rainfall. By averaging these 4-5 estimates we get a value for the whole month that seems 'safer'.

Starting 2006, one of the authors (Sinha) led an annual exercise to predict the monthly July rainfall. The prediction was made by running the Varsha code on the Flosolver computer. Flosolver was developed by India's Council of Scientific and Industrial Research (CSIR); Varsha grew out of NCEP's T-80 atmospheric global circulation model. The Flosolver-Varsha computing engine received generous funding from several Indian national agencies such as New Millennium Indian Technology Leadership Initiative (NMITLI), championed by Department of Science and Technology (DST), and Ministry of Earth Sciences (MoES).

Why July? Chiefly because the monsoon is 'best behaved' in July, and July also receives the

highest rainfall among the monsoon months. The approximate split of the 90 cm in the JJAS months is: June 18cm, July 30 cm, August 25 cm and September 17 cm; so the average daily July rainfall is 10 mm.

Year after year, Varsha's rainfall prediction for July was communicated to IMD, which is India's official rainfall forecaster. Generally speaking, Varsha's prediction agreed reasonably well with the observed July monsoon rainfall...till 2013! That year Varsha's July prediction was just below 7 mm/day while the observed rainfall was about 10 mm/day.

It would have been easy to dismiss the 2013 failure as "one of those bad years". It would have been even easier to offer sufficiently convincing explanations about the "innate underlying treachery" of non-linear equations. But these would be excuses, and no one is ever truly appreciative of good or bad excuses.

We needed to do better; we needed to return to the drawing board.

The first guess was that the ensemble size wasn't large enough. Could it be that averaging over just 4-5 predictions wasn't capturing all the inherent variation? So, we labored hard and long to create an ensemble of 24 predictions for July 2013. But the average over the larger ensemble did not change. It was still about 7mm/day.

This was a puzzle...we'll investigate that in a moment. But first we explain how we generated our 24-prediction ensemble for the month of July. As before, we 'time-marched' forward by a month (in actual practice, it is helpful to go forward by about 40 days to get some extra cushion if required...and then discard the poor end predictions), with initial values at 00:00, 6:00, 12:00 and 18:00 hours (for which NCEP has the data), for six days: 28, 29, 30 June, and 1, 2, 3 July of 2013. That gave us our $6 \times 4 = 24$ predictions. Note, in passing, that our "July monthly forecast" actually started on 4 July, and briefly spilled into August, but that shift is not hard to fix.

Let us return to our puzzle: Why did our July 2013 predictions average to 7mm/day, and come

nowhere close to the actual 10mm/day? We decided to look at each of our 24 predictions individually, and see if there was something unusual happening anywhere. And then we found something truly intriguing: Our July 2013 prediction using the input variables as at 12:00 on 29 June 2013 was 10.02 mm/day. But when we next used input variables as at 18:00 on 29 June 2013 – just 6 hours later – our July 2013 prediction dropped to 7.08 mm/day!

Curious, very curious! We had just pushed everything forward by six hours, but nothing else had changed. Surely this small push shouldn't alter our monthly rainfall prediction by too much, if at all? For more reassurance, we checked our computation again. There were no errors and no confusion. But the value still dropped suddenly by some 30%. How? Why? And the story doesn't end here. When we advanced by six more hours and kicked off the time-march using the input variables as at 00:00 hours on 30 June 2013 we got 7.07 mm/day. So this time absolutely nothing changed after six hours. Curiouser and curiouser, as Alice might have said.

Clearly this was the chaotic behavior in our non-linear equations announcing itself loud and clear. In a deterministic world, small perturbations in the input lead to small perturbations in the output. But such good behavior breaks down in a chaotic world where we are confronted with 'sensitive dependence to initial conditions', and the unexpected consequences of the 'butterfly effect' ("the flapping of a butterfly's wings in Brazil can cause a tornado in Texas").

Is this chaotic, non-linear world completely ill-behaved? No! Our first value of 7.08 mm/day reappeared almost instantly as 7.07 mm/day. It was persistent!

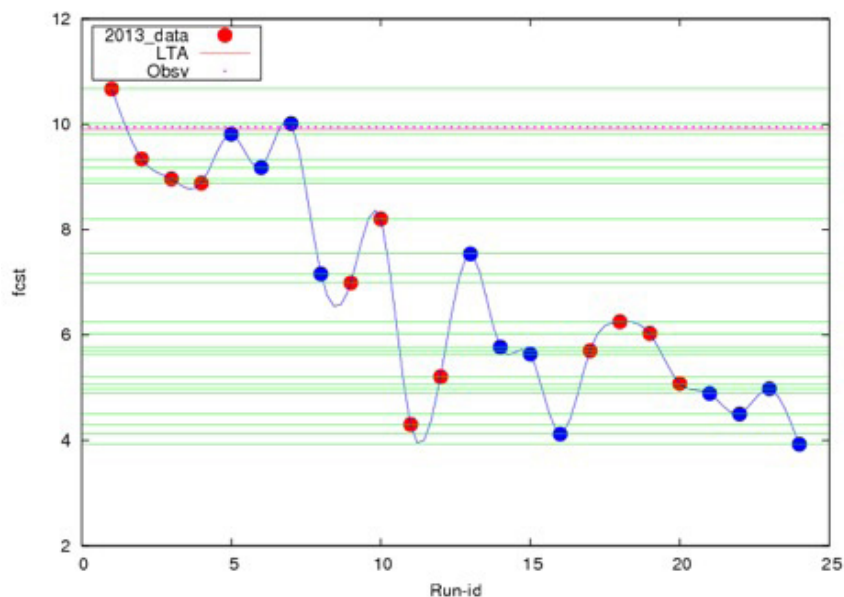


Figure 1: The 24 candidate predictions for the monsoon rainfall in early July 2013. (Note: LPA and LTA are used inter-changeably.)

Puzzled, but excited, we looked at all our July 2013 predictions (in mm/day) starting with input variables as on 28 June, 00:00 hours, and advancing the input variables by six hours, to get: 8.96, 8.76, 8.82, 9.58, 8.92, 10.02, 7.08, 7.07, 8.02, 4.10, 5.01, 7.51, 5.59, 5.57, 4.00, 5.86 and so on.

These numbers aren't random, there is perceptible persistence. There is a marked

tendency to cluster around two or three bands or intervals. For example, there is some clustering around 7 mm/day; so, there was indeed a significant probability that our random ensemble of 4-5 predictions would average to 7 mm/day. And, since the predicted values kept dropping (2013 was indeed curious!), our ensemble using all the 24 predictions also averaged to about 7 mm/day. But we must note that there was also a cluster of predictions hovering quite close to the observed 10 mm/day mark! What, then, is the story that these numbers trying to tell?

The most obvious story or message is: Don't average blindly, and averaging over larger ensembles may

not get you any closer! Averaging can in fact be counter-productive because it masks some real information that could otherwise have been discovered. We could for instance have picked the 10.02 mm/day prediction that would've exactly matched the observed value.

The less obvious, but more important, story or message is: Each prediction we compute is valid (born out of honest computing without fixes), and a potentially winning candidate. That's how non-linear equations behave: they have multiple solutions which are all valid!

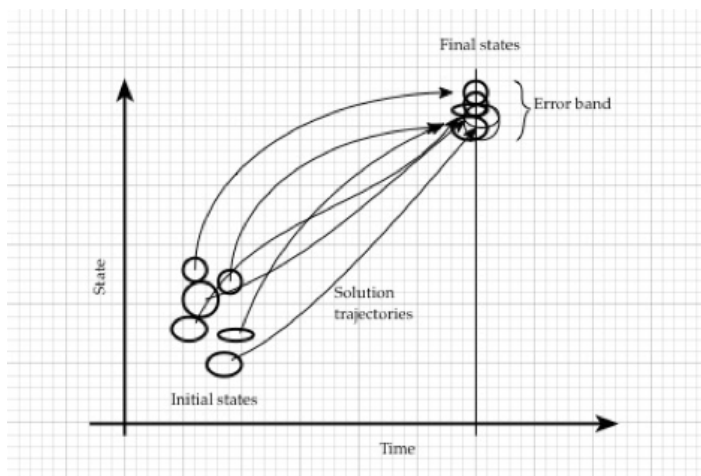


Figure 2: Deterministic solution.

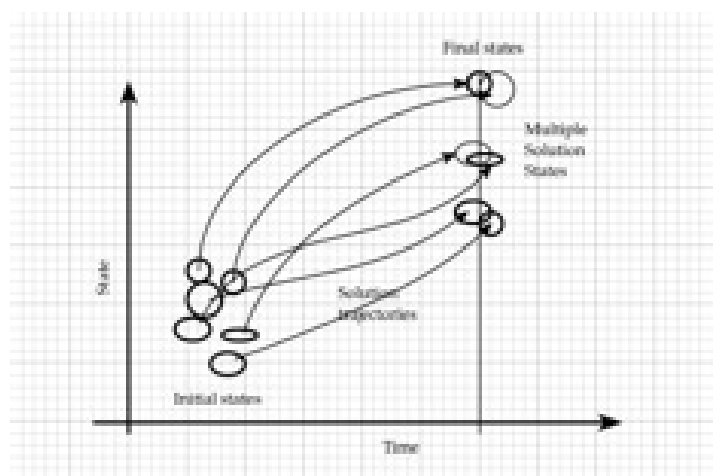


Figure 3: Chaotic solution. A chaotic system can have multiple solutions.

To investigate further, we immersed ourselves into a massive hindcasting adventure. We generated ensembles for every year from 2000 to 2016. In practically every instance we found a significant clustering around 2, 3 or at most 4 values. For some years, the correct prediction was staring you in your face; other years were trickier. Even for 2002 – the biggest prediction nightmare in recent times – our prediction didn't do as badly as some others.

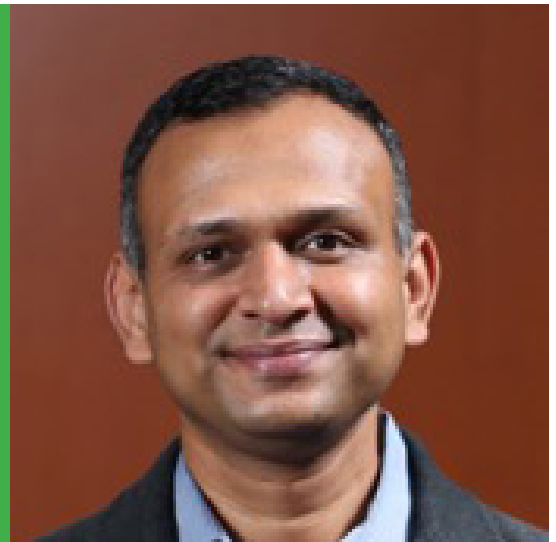
What, then, is the secret? If our predictions fall into two or three candidate clusters or bands, how do we pick the correct band? We think that the solution lies in some very innovative data visualization techniques. For many months now, teams at CSIR's Fourth Paradigm Institute (CSIR-4PI) are working on visualization constructs - and devising a set of rules, based on these constructs, to make the most robust monsoon rainfall prediction for the month of July. Over time, these rules, which today involve visual

judgment, will be automated. This journey should take the project into the realm of artificial intelligence (AI) which is clearly the wave of the future. But that adventure is only just starting, and it would be premature to say anything more at this stage.

But what we can certainly say, nay assert, right now, is that the paradigm is poised to change. For far too long it has been: model first, data later. Every time our prediction isn't good enough – which, sadly, is often enough – we chose to tweak the model. That balm provides some brief relief, but soon the pain surfaces somewhere else. This has to change; In future, the data – not the model – must drive the prediction. When the fundamental equations to predict weather are known, when the computing power and prowess is growing phenomenally, and when the data-gathering ecosystem is growing exponentially in size and reliability, there simply cannot be any better way to conquer this formidable challenge.

Happy 25th, IISA!

By Veera Baladandayuthapani, University of Texas, MD Anderson Cancer Center



Veera Baladandayuthapani

It is my distinct pleasure to contribute to IISA's silver anniversary issue. I've been associated with IISA over the last decade or so in various capacities and I've thoroughly enjoyed my experiences so far. My first tryst with IISA was the biennial conference in Cochin in 2006, when I was a newly minted assistant professor, having jointed MD Anderson a few months earlier. To see such a large congregation of statisticians from India (and all over the world), the diversity of research topics and groups spread across India was indeed an illuminating experience. I was particularly impressed by how close-knit the profession was, the uniqueness of the conferences in terms of social interactions and the energy of the office bearers. Subsequently, I was invited to be a newsletter editor and I remember compiling my first issue in Fall 2008 (and continuing until 2011). It was an invigorating experience, indeed, getting visibility with the IISA members; them sharing their professional achievements and accolades; and allow-

ing me the opportunity to compile the showcase newsletter. My only claim to fame was to change the formats—from a threadbare black-and-white Latex format to one with some color (exploiting some of my architect wife's skills!). I see it has grown strength-to-strength and the current newsletter editors are doing an outstanding job!

I've seen IISA grow into a vibrant association with a presence of its own. I served on the program committee for the conference in Pune in 2015 and it was a stellar program with an outstanding lineup of speakers. It was also my distinct honor to be awarded the Young Investigator Award that year—which truly counts as one of the most memorable professional achievements in my career. I currently serve as the IISA representative on the JSM Program Committee. I would highly encourage junior researchers to actively participate since it gives them visibility; liaison with some of leaders in the field; and an opportunity to shape the program for one of the premier statistics confer-

ences.

I also try to attend as many IISA conferences as possible. For me, attending IISA conferences is such a happy nexus – seeing familiar faces, chatting over a cup of tea and biscuits, the tinkling in the eyes of students (esp. from Indian institutes) and camaraderie between fellow statisticians. I could go on and on....

Here's to many more years, IISA!

Congratulations to the IISA Members Becoming 2017 ASA Fellows!

Saonli Basu, *University of Minnesota*

James A. Bolognese, *Cytel Inc.*

Sat N. Gupta, *University of North Carolina at Greensboro*

Snehalata V. Huzurbazar, *West Virginia University*

Sandeep Menon, *Pfizer Inc.*

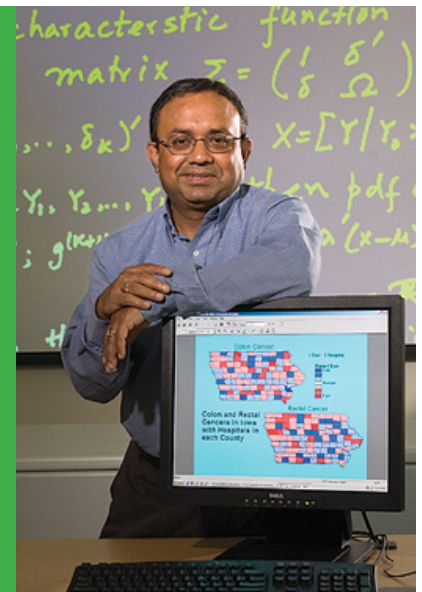
Anindya Roy, *University of Maryland Baltimore County*

Rajeshwari Sridhara, *US Food and Drug Administration*

Anuj Srivastava, *Florida State University*

On His 125th Birth Anniversary, Reminiscence of Prasanta Chandra Mahalanobis and His Impact in Today's Statistical Science

By Dipak K. Dey, University of Connecticut and Editor-in-Chief of *Sankhyā*



Dipak K. Dey

Brief Bio:

Prasanta Chandra Mahalanobis (born June 29, 1893, in Calcutta (now Kolkata), India —died June 28, 1972, Calcutta), was instrumental in formulating India's strategy for industrialization in the Second Five-Year Plan (1956–61). Born to an academically oriented family, Mahalanobis pursued his early education in Calcutta. After graduating with honors in Physics from Presidency College, Calcutta, in 1912, he moved to England to study physics and mathematics at the University of Cambridge. Just before Mahalanobis left the university in 1915, he was introduced to statistics by one of his teachers. When he returned to India, he accepted a temporary position teaching physics at Presidency College (now Presidency University), and he became a professor of physics there in 1922. However, his interest in statistics had evolved into a serious academic pursuit, and he applied statistical methods to problems in anthropology, biology and meteorology. On December 17, 1931, he established the Indian Statistical Institute (ISI) in Calcutta.

As a Statistician, Mahalanobis is most known for the development of a measure of comparison between two data sets which is known as the Mahalanobis distance. He also introduced innovative techniques for conducting large-scale sample surveys and calculated acreages and crop yields by using the method of interpenetrating sub sampling. He devised a statistical method called fractile graphical analysis, which could be used to compare the socioeconomic conditions of different groups of people. He also applied statistics to economic planning for flood control. With the objective of providing socioeconomic statistics, Mahalanobis established the National Sample Survey Organization in 1950 and also set up the Central Statistical Organization to coordinate statistical activities in India. He was also a member of the Planning Commission of India from 1955 to 1967. The Planning Commission's Second Five-Year Plan encouraged the development of heavy industry in India and relied on Mahalanobis's mathematical description of the Indian economy, which later became known as the Mahalanobis model.

Mahalanobis held several national and international portfolios. He served as the chairman of the United Nations Sub-Commission on Sampling from 1947 to

1951 and was appointed the honorary statistical adviser to the government of India in 1949. For his pioneering work, he was awarded the Padma Vibhushan, one of India's highest honors, by the Indian government in 1968.

My Days at ISI:

After graduating from Ballygunge Government high school, I joined the ISI, Kolkata, in 1970, as a Bachelor of Statistics (Hons.) student. The Institute is located on the Barrackpore Trunk (B.T.) Road and I moved to the Boys' hostel in 203 B.T. Road. The academic campus is located on 205 B.T. Road and Mahalanobis used to stay in 'Amrapali' on 204 B.T. Road. The campus was very green and impressive but B.T. Road was hardly what it looks like now. It was narrow, really narrow. Traffic jams were an everyday affair. The neighborhood around ISI also looked very different from now. There was hardly any concrete structure around ISI.

At the young age of 17 when I joined ISI, some elements of the fabric of ISI looked bizarre to me. Soon after I joined with bunch of my fellow students, we were told that we had one of the largest libraries in

Asia with many books and journals in Mathematics, Statistics, Economics and many other subjects. We were also told that there was a computer center with mainframe computing (Honeywell 480). Perhaps that was the first computer in India for civilian use. Soon after I realized that, ISI had three types of people: students like us, Professor Mahalanobis (he used to be known as simply the Professor) and everyone else who were all workers. Surprisingly, we students also found that there were only around 150 students combining B. Stat. and M. Stat. and approximately 400 professors and research scholars in ISI. Also besides Statistics, there were various units, e.g., Anthropometry, Biometry, Chemistry, Computer Science, Economics, Geological Science, Human Genetics, Plant science, Physics, Psychometry, Sociology, Zoology and so on.

The whole affair seemed to me like a small town that was attempting to be self-sufficient and self-reliant, which seemed to be quite odd to us students. Why on earth should there be so many units and we had to take so many courses outside statistics? Of course that became clear when I was in B. Stat 4th year and I had a course called "Application of Statistics to Sciences".

Is Statistics a Branch of Probability?

In one of the fine winter morning in 1971, suddenly Professor came to our statistical methods class. He gave a nice presentation on applications of Statistics with lots of examples followed by a lecture on probability. Then the question came: Is Statistics a branch of Probability? We were told to write our answers on a piece of paper, which were collected by Professor at the end of class. We found that was a small survey and realized much later the value of that question. Actually it was a kind of tricky question. In my perspective, Statistics is primarily a branch of applied Mathematics, which tries to make sense of data in the real world whereas, Probability is primarily a theoretical branch of Mathematics, which studies the consequences of events. Both subjects are important, relevant, and useful. But they are different, and understanding the distinction is crucial in properly interpreting the relevance of analytical evidence.

Statistics as a Key Technology:

At the 125th American Statistical Association Meeting, Mahalanobis gave a speech entitled, "Statistics as a key technology", which was echoed at the 1971 convocation in ISI, Kolkata. In his speech, Mahalanobis highlighted that the need of reliable statistics is as great or even greater today for the rapid economic growth of all countries. In his talk, he emphasized the strong need of applications of mathematical statistics and probability to real world problems. Mahalanobis mentioned, "Science can advance only through a careful accumulation of facts and observations and critical study of their inter-relations which have their foundation in nature itself and which cannot be changed or upset by any human authority however high". This lecture motivated many of us in the era of development of statistical sciences through cross-disciplinary and interdisciplinary research.

ISI and Sankhyā:

Perhaps the two most important contributions by Mahalanobis, other than his scientific papers, were setting up the ISI and the founding of the journal Sankhyā. The ISI began life in around 1920 as an unofficial group working on statistical problems in Presidency College. It soon acquired the name of the Statistical Laboratory and was located in Mahalanobis's room in the Physics Department. It was formally registered on 28 April 1932 as a non-profit distributing learned society under the Societies Registration Act XXI of 1860. Basically through the 1920s and up to 1931 almost all statistical work done in India was done by Mahalanobis. However, after setting up the ISI, as Director and Secretary on 17th December, 1931, he started building up the Institute with new appointments. For example, in December 1932 Mahalanobis offered R. C. Bose a part-time post at the

Indian Statistical Institute and S. N. Roy was appointed a few months later. Today, ISI has centers in Delhi, Chennai, Bengaluru, Hyderabad, Mumbai, and the northeast center at Tezpur and an experimental station at Giridih in Jharkhand. They all operate at different educational and research levels.

The other major achievement of Mahalanobis was the founding of the statistics journal Sankhyā in 1933 as a publication of the Indian Statistical Institute. I quote from Mahalanobis's own words, "Those of us who are actively engaged in starting this journal are doing so because of our interest in statistics and our belief that a journal devoted to statistics will be useful in India. ... The spirit and outlook of 'Sankhyā' will be universal, but its form and content must necessarily be, to some extent, regional. We shall keep

the special needs of India in view without, however, restricting the scope of the journal in any way. We shall naturally devote closer attention to the collection and analysis of data relating to India, but we shall try to study all Indian questions in relation to world problems. A research journal serves that narrow borderland which separates the known from the unknown, and it is not always possible to see clearly the lines of future developments. We shall, therefore, invite papers of all kinds appraising them only on the basis of observational accuracy and logical reasoning..."

Mahalanobis in Today's Big Data Era:

Digital data are increasingly changing the shape of our world. In an era with a plethora of cheap, vast data in which buzzwords such as Big Data, data analytics, and data mining have been integrated into the common vernacular, it is worth noting that Mahalanobis distance is still of paramount importance in various statistical problems, e.g., sparse reduced rank multivariate regression, high dimensional factor analysis model, clustering and classification. Functional Mahalanobis distance is being used for outlier detection, influential diagnostics, etc.

In recent years, Mahalanobis distance is being heavily used in computer vision. A common usage in computer vision systems is for comparing feature vectors whose elements are quantities having different ranges and amounts of variation, such as a 2-vector recording the properties of area and perimeter. Learning for large margin nearest neighbor classification and learning use a Mahalanobis distance based dynamic time warping measure for multivariate time series classification as well. Furthermore, applications of the Mahalanobis distance metric for data clustering and classification in pattern recognition and in machine learning are being used extensively. As a final example, financial applications of Mahalanobis distance are also playing major role in portfolio analysis.

In conclusion, I take this opportunity of conveying to the readers that Mahalanobis's work will remain immortal to our and next generation of statistical scientists. His influence on interdisciplinary research will exist forever.

New Lifetime IISA Members

James Bolognese, *Cytel, Inc.*

Gulab Singh Bura, *Banasthali University*

Isha Dewan, *ISI, Delhi*

Abhik Ghosh, *ISRU and ISI, Kolkata*

Anumolu Goparaju, *Annamalai University*

Naresh Chandra Kabdwal, *Banasthali University*

Varun Kumar, *Independent SAS Consultant, Reini Technology Private Limited*

Nabakumar Jana, *NIT, Meghalaya*

Pritam Ranjan, *Indian Institute of Management, Indore*

Mahendra Saha, *Central University of Rajasthan*

Ramalingam Gangai Selvi, *Tamil Nadu Agricultural University*

V.N. Sreeja, *Sree Krishna College*

Gajendra Kumar Vishwakarma, *IIT (ISM) Dhanbad*

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IISA Memories from 1998

By H.N. Nagaraja, The Ohio State University

H.N. Nagaraja, Kanti Mardia, Ram Tiwari, Amarjot Kaur, and Subir Ghosh at the 2016 IISA Conference at Oregon State University.

Many of us know that IISA evolved into existence due to the pioneering spirit of our Canadian colleagues. The chronological listing of IISA presidents shows the leadership role taken by them (see, e.g., the IISA Spring Newsletter, <https://www.intindstat.org/pdfs/IISAsp17.pdf>). One significant role IISA has played in the lives of its members and other statisticians is through the organization of periodic conferences. My first interaction with IISA was through such a conference held on the campus of McMaster University, Hamilton, Canada in 1998. Professor Sri Gopal Mohanty was the IISA president at the time and Professor Balakrishnan was the program chair. It was held in October as the leaves were turning golden and the sunny days were cozy; and the campus was very welcoming. I still remember taking a picture of a golden tree on the McMaster campus showing the bright autumn afternoon, and would have produced it along with this write-up, at least to show that it is not fake news. I hope to it share in a future IISA Newsletter if the Editors will be kind enough to find space for it.

The conference was also a wonderful occasion to meet many well-known statisticians of Indian origin. Having attended many such IISA conferences since then, I can say without any doubt that the McMaster conference was the most successful one in bringing together many distinguished statisticians in one place. It was also unique that many of these participating distinguished researchers were honored with the title of honorary fellows. To the best of my memory, it has been the only IISA conference where such an activity took place.

As a Masters student at the University of Mysore, I had enjoyed immensely studying from the books on Stochastic Processes by Professors Narahari U. Prabhu (Cornell U), and U. Narayan Bhat (Southern Methodist U). It was a great pleasure to meet them there; I think it was the first time I met Professor Prabhu. He was to become the IISA president starting January 1999 and asked me whether I could serve

as the Secretary. Having been impressed by the energy and enthusiasm generated at the conference, it was an easy decision to accept and join the IISA team. Looking back, it was also a wonderful decision as it enriched my professional life, and brought me in close contact with many dedicated IISA members (e.g., at the JSM IISA desk, there is still time to sign up for the Baltimore JSM) and nonmember statisticians over all these years. I have also earned the friendship of many IISA members as well. For a sample, here is a picture from the latest IISA conference from the Oregon State University campus.

Professor Prabhu, I thank you for believing in me, and showing me through your vision, simplicity, and efficiency, that the IISA experience is worth it. Professor Bhat has also served IISA in various capacities and we could nurture our friendship all these years. Fond memories, IISA!

(Readers interested in Professor Prabhu may want to visit <https://www.orie.cornell.edu/orie/news/upload/Thank-you-Cornell-Thank-you-America-NUP-4-25-14.pdf>.)

Member News

N. Balakrishnan

Distinguished University Professor of Statistics at McMaster University, N. Balakrishnan was awarded an Honorary Doctorate Degree from the National University of Athens in Greece.

Dipankar Bandyopadhyay

Dipankar Bandyopadhyay was promoted to Full Professor with tenure in the Department of Biostatistics, School of Medicine at Virginia Commonwealth University. Furthermore, he was elected as the Council of Section Representative for the Biometrics Section of the ASA; he starts on January 1st, 2018.

Moulinath Banerjee

Moulinath Banerjee, Professor of Statistics and Biostatistics at the University of Michigan, was elected to be a Fellow of the Institute of Mathematical Statistics this year, "for [his] influential contributions to the theory of non-standard asymptotics and shape-restricted inference."

Rabi Bhattacharya

Rabi Bhattacharya retired from the Department of Mathematics at The University of Arizona. The CIMAT-UA Research Workshop in March was followed by the RABI Fest, in honor of Bhattacharya.

Aloka G. Chakravarty

Aloka G. Chakravarty was recently selected as the Deputy Director of the Office of Biostatistics in the Center for Drug Evaluation and Research (CDER) at the US Food and Drug Administration. She is the first Asian to be selected into this impactful position.

Girish Chandra

Girish Chandra, a Scientist in the Division of Forestry Statistics at the Indian Council of Forestry Research and Education, has been nominated for the 2017 Cochran-Hansen Award, which is given by the International Association of Survey Statisticians (IASS). The selected paper is titled, "Ranked Set Sampling Approach for Estimating Response of Developmental Programs with Linear Impacts Under Successive Phases" and was coauthored by Rajiv Pandey (Indian Council of Forestry Research and Education) and Dinesh S. Bhoj (Rutgers University). The winner of the prize will be announced at the World Statistics Congress Meeting in Morocco this year.

Shibasish Dasgupta

Shibasish Dasgupta recently joined the Global Data Insight & Analytics team at Ford Motor Private Limited as Lead Statistician.

Abhirup Datta

A paper by Abhirup Datta, Assistant Professor of Biostatistics at the Bloomberg School of Public Health at Johns Hopkins University, won the ASA Outstanding Application Award. The paper, "Nonseparable dynamic nearest neighbor Gaussian process models for large spatio-temporal data with an application to particulate matter analysis" was coauthored with Sudipto Banerjee, Andrew O. Finley, Nicholas A. S. Hamm and Martijn Schaap and was published in the *Annals of Applied Statistics* (Vol. 10(3), 2016).

Sujit K. Ghosh

Sujit K. Ghosh, Professor of Statistics, was nominated for a 2017 Outstanding Global Engagement Award at North Carolina State University.

Amanda Golbeck

Amanda Golbeck, Associate Dean for Academic Affairs at the Fay W. Boozman College of Public Health at the University of Arkansas for Medical Sciences, recently published a book *Equivalence: Elizabeth L. Scott at Berkeley* (CRC Press, 2017).

Adityanand Guntuboyina

Adityanand Guntuboyina, Assistant Professor of Statistics at the University of California, Berkeley, won an NSF Career Award for his project titled, "Nonparametric function estimation: Shape constraints, adaptation, inference and beyond."

Sat N. Gupta

Sat N. Gupta, Professor of Statistics at the University of North Carolina at Greensboro, received the Sankhyiki Bhushan Award from the Indian Society of Agricultural Statistics and the Senior Research Excellence Award across the University of North Carolina Greensboro faculty. Furthermore, Gupta and his coauthors Engels, Austin, McNichol, Fencel, and Kazi won the 2016 AORN Journal Writers Contest for their paper, "Pressure Ulcers: Factors Contributing to Their Development in the OR" (Vol. 103(3), 2016).

Snehalata V. Huzurbazar

Snehalata V. Huzurbazar has accepted a new position as Professor and Chair of the Department of Biostatistics at West Virginia University.

S. Rao Jammalamadaka

S. Rao Jammalamadaka (J.S. Rao), Professor of Statistics and Applied Probability, received the Outstanding Graduate Mentoring Award from his institution, the University of California, Santa Barbara.

Debashis Mondal

Debashis Mondal was promoted to Associate Professor with tenure at the Statistics Department at Oregon State University.

Vijay Nair

Vijay Nair has retired from the University of Michigan and moved to Wells Fargo Bank as the Head of Statistical Learning and Advanced Computing Group in the Corporate Model Risk Organization. He will continue to be affiliated with the University of Michigan as the Donald A. Darling Professor Emeritus.

Azizur Rahman

Azizur Rahman, Senior Lecturer in the School of Computing and Mathematics at Charles Sturt University, recently published a book with Ann Harding, *Small Area Estimation and Microsimulation Modeling* (CRC Press, 2016).

Shubhasis Ghoshal

Shubhasis Ghoshal, Professor of Statistics at North Carolina State University, has been invited to present the IMS Medallion Lecture at JSM 2017 in Baltimore this year. His talk, "Coverage of Nonparametric Credible Sets," will be held on Tuesday, August 1st from 8:30 AM – 10:20 AM in room CC-310 (at the Baltimore Convention Center).

J. N. K. Rao

A conference "Contemporary Theory and Practice of Survey Sampling – A Celebration of Research Contributions of J. N. K. Rao" was held in Kunming, China from May 24 to May 27, 2017. J. N. K. Rao is a Distinguished Research Professor at Carleton University, Ottawa, Canada. Fourteen plenary talks and several invited talks were delivered during the four day conference. The conference was organized on the occasion of Rao's 80th birthday. Details of the conference may be found at www.raoconference2017.com. An invited session was also organized at the Statistical Society of Canada Annual Meetings, Winnipeg, Canada from June 11 to 14, 2017 to celebrate Rao's 80th birthday.



J.N.K. Rao

Obituary for Tapas Kumar Chandra (1952—2017)

By Subhashis Ghoshal, North Carolina State University with assistance from Tapas Samanta, Indian Statistical Institute, Kolkata.



Professor Tapas Chandra (courtesy of Mr. Prasenjit Das)

We are deeply sorrowed by the untimely and sudden death of Professor Tapas Kumar Chandra, on June 19, 2017, in Kolkata, following a head injury he obtained after falling from a local bus. Professor Chandra had a spectacular academic record and was a very well-known statistician in India. He was born in the small industrial town of Chittaranjan, West Bengal, on 4th May, 1952, to Professor Pratap Chandra Chandra and Abharani Chandra. Both his parents had illustrious academic records. Professor Chandra grew up in Kolkata, where his family had their ancestral home in the northern part of the city. From the very young age, his brilliance was noticed by everyone around him. He was directly admitted to Class III in the Oriental Seminary, a notable school in Kolkata where Rabindranath Tagore got his first schooling. He completed high school at Scottish Church Collegiate School and joined the prestigious Presidency College as an undergraduate majoring in statistics. He graduated with the honor of batch-topper in the entire Calcutta University. Then he obtained a Master of Statistics from the Indian Statistical Institute, Kolkata, and decided to pursue a research career in statistics. He got his Ph.D. degree in Statistics in 1981 from the Indian Statistical Institute under the tutelage of the legendary scholar Professor Jayanta Kumar Ghosh. Shortly after getting his Ph.D. degree, he joined the faculty of the Indian Statistical Institute as a Lecturer. He was promoted to full professor in 1991. He retired from the Institute only last month at the age of 65.

Professor Chandra made remarkable contributions on asymptotic expansions for limiting chi-square variables like the log-likelihood ratio test statistic under both null and contiguous alternative hypotheses. This work later turned out to be extremely important in his study of higher order power comparison of likelihood ratio test, Wald's test and Rao's test. It was known that all these tests have the same asymptotic power up to the first order. In his study, Professor Chandra showed that a conjecture made by C. R. Rao, that Rao's test has higher local power than the other two, essentially holds in the one-parameter case if the asymptotic sizes of these tests are adjusted to match in the second order. Another important work of Professor Chandra is the introduction of the notion of deficiency to compare tests with the same Bahadur-Cochran efficiency. The notion is based on large deviation theory and Professor Chandra became a leading figure on using large deviation theory in statistics. His collaboration with Professor Raghu Raj Bahadur, who pioneered the use of large deviations in statistics, made a significant impact. Later in his career,

Professor Chandra's interest shifted towards probability theory, especially on law of large numbers-type results, following significant new breakthroughs obtained in the mid-eighties. He was extremely passionate about proving such results under minimal conditions, removing integrability and independence assumptions as much as possible. He introduced a notion called "Cesaro uniform integrability", a significant weakening of the condition of uniform integrability used to weaken the condition identical distributions, and observed that a law of large numbers can be obtained using this weaker form. Other related work of his in this area are on extensions of Marcinkiewicz-Zygmund strong law, Borel-Cantelli lemmas and complete convergence of ordinary and weighted averages under various dependence settings.

Professor Chandra was a passionate teacher, with a classical formal approach. His deep involvement with articulated details made him realize that many textbooks did not adhere to the standard of rigor he liked to, which must have prompted him to write several textbooks: (a) *A First Course in Asymptotic Theory of Statistics* (1999), (b) *A First Course in Probability* (with D. Chatterjee) (2001), and (c) *Fundamentals of Probability Theory* (with S. Gangopadhyay) (2017), all of which were published by the Narosa Publishing House, New Delhi. The second of these became a quite popular textbook and he wrote two more editions of it. In addition, he also published two more specialized books: (d) *The Laws of Large Numbers*, Narosa Publishing House (2012) and (e) *The Borel-Cantelli Lemma*, Springer Briefs in Statistics (2012).

Professor Chandra is survived by his wife Dipali Chandra and son Tathagata.

Professor Chandra's death is a personal loss to me. He was my teacher, my co-author and a joyful good friend. Most importantly, I learned to be thorough in mathematical derivations and appreciate the importance and the beauty of rigor through interactions with him. Conversations with him at the lunch table, or with a cup of tea almost always led to some interesting thought provoking discussions, since he usually found some interesting questions about results we dealt with everyday, but overlooked some details about their conditions or methods of proof. I cannot imagine that I will not see him again. He will certainly be missed.

Upcoming Conferences and Workshops

Joint Statistical Meetings

July 29-August 3, 2017

Baltimore Convention Center, Maryland, USA.

<https://ww2.amstat.org/meetings/jsm/2017/>

Scope and Importance of Statistics

Public Outreach Lecture by Prof. Mohammadali Farooqui

Ravishankar Shukla University, Raipur, India

August 20, 2017

Opening Workshop for Mathematical and Statistical Methods for Climate and Earth Systems Program

August 21-25, 2017

SAMSI, North Carolina, USA

<https://www.samsi.info>

Opening Workshop for Quasi-Monte Carlo and High-Dimensional Sampling Methods for the Applied Mathematics Program

August 28-September 1, 2017

SAMSI, North Carolina, USA

<https://www.samsi.info>

International Genetic Epidemiology Society Meeting

September 9-11, 2017

Queens' College Cambridge, UK

<http://www.geneticepi.org/iges-2017/>

Young Statisticians Conference 2017—Modeling Our Future

September 26-27, 2017

Mantra Twin Towns, Australia

<http://ysc2017.com.au>

Workshop on Trends and Advances in Monte Carlo Sampling Algorithms (Part of the Quasi-Monte Carlo and High-Dimensional Sampling Methods for the Applied Mathematics Program)

December 11-15, 2017

SAMSI, North Carolina, USA

<https://www.samsi.info>

Statistical Methods in Finance 2017

December 16-19, 2017

Chennai Mathematical Institute, India

<http://www.cmi.ac.in/~sourish/StatFin2017/>

2017 International Indian Statistical Association Conference—Statistics and Data Science for Better Life, Society, and Science

December 28-30, 2017

Hyderabad International Convention Centre, India

<http://www.intindstat.org/iisaconference2017/>

PCM 125: International Conference in Statistics and Probability

January 2-4, 2018

International Statistical Institute, Kolkata, India

<http://www.isid.ac.in/~pcm125spconf/>

12th International Conference on Health Policy Statistics

January 10-12, 2018

Charleston Marriott Hotel, South Carolina, USA

<http://ww2.amstat.org/meetings/ichps/2018/index.cfm>

2018 IISA Annual Conference

May 17-20, 2018

University of Florida at Gainesville, USA

Details will be posted on <http://www.intindstat.org>

ICSA 2018 Applied Statistics Symposium

June 14-17, 2018

Hyatt Regency New Brunswick, New Jersey, USA

<http://www.icsa.org/icsa/events/june-14-17-2018-icsa-2018-applied-statistics-symposium>

ICSA 2018 ICSA China Conference

July 2-5, 2018

Hyatt Regency Qingdao, Shangdong China

<http://www.icsa.org/icsa/events/july-2-5-2018-2018-icsa-china-conference>

Workshop on Mathematical Finance Indian Institute of Science Education and Research

July 12-17, 2018

Pune, India

<https://sites.google.com/site/mathematicalfinance2018/home>

ICSA 2019 Applied Statistics Symposium

June 9-12, 2019

Raleigh Convention Center, North Carolina, USA

<http://www.icsa.org/icsa/events/june-9-12-2019-icsa-2019-applied-statistics-symposium>



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