

# IISA Newsletter Fall 2013

# Visit our website: http://intindstat.org/

# **Board of Trustees**

Bovas Abraham, Univ. of Waterloo Hira L. Koul, Michigan State Univ. Kirti Shah, Univ. of Waterloo

# **Executive Board**

President: Cyrus Mehta, Cytel Inc. Past President: Nandini Kannan, Univ. of Texas President Elect: N. Rao Chaganty, Old Dominion Univ. India Chapter President: M.B. Rajarshi, Univ. of Pune, Treasurer: Subrata Kundu, George Washington Univ. Secretary: Sowmya R Rao, Univ. of Massachusetts

# JSM 2013 Program Committee:

Nalini Ravishanker, Univ. Of Conn. (2013 JSM Chair) Nilanjan Chatterjee, National Cancer Institute (Member) Sudipto Bannerjee, Univ. of Minnesota (Member)

# Message from Cyrus Mehta President, IISA

# Editors: Cyrus Mehta, Sowmya R Rao

Call for editorial volunteers... For more Info Contact Sowmya R Rao Sowmya.Rao@umassmed.edu



UC Riverside Campus, Riverside, CA

Welcome to the IISA Fall News letter. This issue contains a brief report on IISA activities at the Joint Statistical Meetings in Montreal, an update on IISA's lifetime membership drive, an introduction to the incoming IISA President, a list of IISA new lifetime members, newly elected ASA Fellows, other member news, a fascinating article describing the use of opinion polls for predicting the results of the Indian elections by Professor Rajeeva Karandikar, and announcements on future conferences & workshops.

IISA organized four Invited Sessions and three Contributed Sessions at JSM in Montreal, all of which were well attended. One of the invited sessions titled "International Efforts in Statistical Capacity Building: How You Can Help" merits further discussion as it is directly relevant to IISA's own mission of statistical outreach to students and young researchers in India. The session was organized by Professors Anil Gore and Vijay Nair. This is what Dr. Gore had to say: "As in many other countries, in India too there is a significant demand for qualified statisticians. A ballpark estimate of the number of graduates in statistics produced each year is 1500 M.Sc. and 10,000 B.Sc. Output of Ph.D. is likely to be very small. For recruiters in industry and business, the real crunch is shortage of experienced applied statisticians. Even in case of the fresh graduates, available in large numbers, there is the issue of quality and lack of relevant training. Of course reports have repeatedly appeared in media that a large fraction of graduates from Indian universities are simply unemployable. There is no reason to believe that situation

in statistics is any different from this general picture. However there is one additional challenge in statistics; it is also the opportunity to make a dent on the situation. It turns out that most statistics teachers have no experience of statistical consulting. Their interaction with users is virtually nil. Many drawbacks of statistics training can be traced to this.Obviously, promotion of interaction between users and teachers of statistics is my single point program to uplift quality of statistics education in India. I have proposed that the International Statistical Institute should launch a mentoring effort for this purpose. It will benefit statistics teachers not only in India but also many other countries."



About 75 people attended the IISA mixer. We honored Professor Kanti Mardia (winner of the 2013 Wilks medal), Professor J Sethuraman (winner 2013 Noether of award) and Professor Debashish Ghosh

(winner of 2013 Spiegelman award) with felicitations and gifts. IISA is proud of their achievements and happy to share in the reflected glory of their recognition by our profession. At the mixer I urged all those present to become life members of IISA. I am continuing to make this plea here. It only costs \$300, and once you've paid those dues you need no longer worry about your membership expiring. Life membership enhances the stability of our organization. Why should you become a life member? If you are just starting out on your career path, membership gives you access to senior colleagues who can mentor you, write letters on your behalf, make you aware of job opportunities

and offer sound professional advice. On the other hand if you are already well established in the profession, membership in IISA gives you the opportunity to help your younger



colleagues and a forum for outreach to India. No doubt someone helped you on your way up. Through IISA you will have a chance to give back. IISA members have many opportunities to meet each other and interact -- at JSM mixers, at the JSM-IISA help desk, and at IISA organized conferences.

We are a collegial organization whose goal is to work together for mutual benefit. The more our membership grows the more influence we can have within the American Statistical Association. For example IISA is invited to the annual meeting of the Committee of Presidents of Statistical Societies (COPSS) precisely because we have attained a critical mass. Through COPSS IISA can influence important policy decisions that affect us. Thanks to the efforts of previous IISA Presidents at these COPSS meetings, IISA is now guaranteed two Invited Sessions at each year's JSM. Given the fierce competition for Invited Sessions this is an indication of the respect shown to our organization by ASA. So, if you are not yet a life member, please sign up by going to www.intindstat.org and providing your credit card information.

We had a very successful drive for new life members at JSM. I would like to thank Girish Aras, Rao Chaganty, Sneha Gulati, Amarjot Kaur, Hrishikesh Kulkarni, Chitra Nagraja and Naveen Nanisetty, Mallikarjuna Rettiganti (plus any others that I've forgotten) who sat at the IISA help desk with me at JSM, passing out information, conversing with IISA members and encouraging non-members to sign up. We signed up at least 10 new life members in this manner. Over the course of the year our membership drive has resulted in 19 new life members bringing the **total count of life members to 402**. We will keep up the membership drive. Please join me in welcoming the new life members listed in Member News.

Since this will be my last Newsletter as IISA President, let me express my gratitude to all of you for your support, and my heartfelt thanks for the privilege of serving as your President. The President elect, Professor N. Rao Chaganty, Old Dominion University



will take over from me on January 1, 2014.

Professor N. Rao Chaganty is an alumnus of the Indian Statistical Institute (ISI). After obtaining his B. Stat (Hons) and M. Stat from ISI,

he joined the Department of Statistics at Florida State University, where he obtained his PhD degree under the guidance of Dr. Jayaram Sethuraman. He joined the Department of Mathematics and Statistics at Old Dominion University (ODU) as a faculty member immediately after his graduation. He is currently the statistics program director at ODU. He has been an active member of IISA, and served as the treasurer of the association from year 2000 to 2008. Please join me in welcoming Professor Chaganty as the new IISA President.

Cyrus Mehta (President, IISA)

### **New ASA Fellows**

IISA congratulates lifetime members Dr. Madhu Mazumdar, Dr. Dabeeru C Rao and Dr. Ananda Sen on their recent election as Fellows of the American Statistical Association.



#### Madhu Mazumdar,

Weill Cornell Medical College, New York, New York

For excellence in leading biostatistical collaborative efforts with major impacts on treatment in oncology and orthopedic surgery;

for efficiency in developing and reforming multiple biostatistics units; for outstanding mentoring of biostatisticians, clinical faculties, and research fellows; and for substantial editorial review work ensuring quality reporting of statistical results in clinical journals.

#### Dabeeru C. Rao,

Washington University School of Medicine, Saint Louis, Missouri For lifetime а of distinguished contributions advancing to and promoting statistics in human genetics and for contributions to training biostatisticans and statistical geneticists.





Ananda Sen, University of Michigan, Ann Arbor, Michigan For outstanding r e s e a r c h contributions in reliability, e x e m p l a r y le a dership in the

dissemination of statistical practice in the medical sciences, mentorship of junior clinical researchers, and service to the profession.

# **IISA Comittee for JSM 2014**

The IISA Committee for the 2014 JSM, to be held in Boston, consists of Dr. N. Rao Chaganty, Old Dominion Univ. (Chair), Dr. Sowmya R. Rao, University of Massachusetts, and Dr. Amit Bhattacharyya, Glaxo Smith Kline.

Preparations are underway for JSM 2014 in Boston, August 2-7, 2014. The theme of the conference is "Statistics: Global Impact- Past, Present, and Future." Members and friends of the International Indian Statistical Association (IISA) are encouraged to start making plans for Topic-Contributed (TC) sessions to be sponsored by IISA for JSM 2014. These sessions consist of a collection of contributed talks or discussions that share a common topic. The sessions are 110 minutes in length. There are three format options for a Topic-Contributed paper session: (a) Five papers; (b) Four papers and one discussant; (c) Three papers and two discussants (This last format is not recommended and it should be reserved for rare instances where the second discussant is truly a vital part of the session.) Session organizers are advised to start contacting potential speakers early on and should submit their proposals to Dr. Rao Chaganty, IISA Program Chair for JSM 2014 via email: rchagant@odu.edu

# **New Lifetime Members**

Pandurang M Kulkarni, Eli Lilly Company Sanat K. Sarkar, Temple University Bibhas Chakraborty, Columbia University Saonli Basu, University of Minnesota Nandini Dendukuri, McGill University Amrik Shah, Biogen Idec Vipin Arora, AbbVie Inc Pralay Senchaudhuri, Cytel Inc. Sinjini Mitra, Fullerton University Chaitra Nagaraja, Fordham University Ofer Harel, University of Connecticut Girish Aras, Amgen Inc. Madabhushi Raghavachari, Rensselaer Polytechnic Institute Pradeep Singh, Missouri State University Ajit C Tamhane, Northwestern University Bob Rodriguez, SAS Institute Prabir Burman, University of California at Davis Kalimuthu Krishnamoorthy, University of Louisiana at Lafayette

# Member News (continued)

### Funding Opportunities at the National Science Foundation

From Prof. Sujit Ghosh

It is a pleasure to let you know that I have recently joined as one of the program directors (aka rotators) in the Statistics Division of Mathematical Sciences (DMS) within the directorate of the Mathematical and Physical



Sciences (MPS) at the National Science Foundation (NSF). I hope it would bring plenty of funding opportunities for statisticians. In addition to the usual solicitations from the core Statistics program within DMS there are many other NSF programs that many of you may find worth submitting proposals. In particular, you may want to subscribe to the ASA community on funding opportunities: http://www.amstat.org/careers/efs.cfm which includes latest information on many external funding opportunities available from several federal and other organizations. For more details about NSF funding opportunities, please do not hesitate to contact me or any other program directors at NSF. My contact information at NSF can be obtained by clicking the following link http://www.nsf.gov/funding/pgm\_summ.jsp?pims\_id=5556&org=dms

• Narinder Kumar, an IISA member was elected member of the International Statistical Institute.

http://www.isi-web.org/news/714-isi-memelc-2013-02

• Abhyuday Mandal, an IISA member was elected member of the International Statistical Institute. http://www.isi-web.org/images/news/ ISI%20Membership%20Elections%202013%203rd%20 round.pdf

• Dr. R. Prabhakar Rao organized a oneday National workshop on "Recent Advances in Economic Data Analysis "to celebrate International year of Statistics on February 23, 2013 at Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, Andhra Pradesh, India. • Professor Sujit Ghosh, Co-Director of Graduate Program, Department of Statistics, North Carolina State University (NCSU) received the 2013 Thammasat honorary plaque award. He met with the rector (aka chancellor) of the Thammasat University (TU) in Bangkok. The MOU between his university and TU will be extended for another 5 years. Since the establishment of this MOU in 2008, he has visited TU at least 4 times, presented various short courses, invited talks and most importantly served as the doctoral dissertation advisor of four PhD students from TU, three of whom have visited NCSU over the last 4 years for at least six months each.

#### Young Researcher Awards of the International Indian Statistical Association

IISA is seeking nominations for the two Young Researcher Awards for 2013. The awards will honor one outstanding researcher in theory and one in applications. The recipients should have been born no earlier than January 1, 1968, and must have demonstrated significant contributions in research (theory and methodology, or applications). In order to be eligible for the award, the candidate must be a member of IISA at the time of nomination.

Nominations should contain (a) a cover letter explaining the significance of the research contributions of the candidate, and specifying the area in which they are to be considered (theory and methods, or applications) (b) an updated CV, and (c) at least two letters of support. They should be sent to Mouli Banerjee, (moulib@umich. edu) on or before February 15, 2014, via e-mail (preferably as a PDF file, but doc files are also fine). The awards will be presented at the 2014 IISA Conference at Riverside, CA, July 11-13, 2014 and will involve plaques and cash prizes.

The Award is co-sponsored by IISA and Statistical Methodology (the official journal of IISA).

# Opinion polls in the Indian context

# Rajeeva L. Karandikar

Chennai Mathematical Institute, Chennai, India

# Introduction

In this article I am going to describe my experiences in conducting and analyzing opinion polls in India over the last 15 years.

Let me begin with some facts about Indian political reality. India has parliamentary democracy, with the country being divided into 543 constituencies - in each constituency, a candidate is elected to the Lok Sabha (also called lower house) on the basis of first past the post basis (Candidate getting highest number of votes in a constituency gets elected). A party or an alliance of parties having support of majority of members of the 543 member Lok Sabha names the Prime Minister and forms the government.

For a nationwide opinion poll at the time of Lok Sabha elections the objective is to predict the number of seats for (major) political parties in the Parliament. Which party or a pre-election alliance of parties will get the maximum number of seats in the house and will this number be more than the majority mark? Same applies to an opinion poll at a state level at the time of state legislature election.

Just to get an idea of the numbers involved: total no of eligible voters in India (during last Parliamentary poll in 2009) was 716,985,101. The actual votes polled (2009) was 417,159,281.

Let p be the proportion of voters in India that prefer a party **A** to other parties /candidates. If we have a random sample of n voters and  $\hat{p}_n$  denotes the proportion of voters in the sample who prefer **A** to other parties / candidates in the sample, then

$$\sqrt{\frac{n}{p(1-p)}}(\hat{p_n}-p)$$

has standard normal distribution for large n. Thus it follows that

$$P\left(\left|\frac{\sqrt{n}(\hat{p_n}-p)}{\sqrt{p(1-p)}}\right| > 2.58\right) \sim 0.01$$

and thus with n = 4000, we can see that for all p P( $|(\hat{p}_n - p)| > 0.02) \sim 0.01$ .

$$P(|(\hat{p_n} - p)| > 0.01) \sim 0.01.$$
 (1)

and thus if n = 16000, we can conclude that for all p

$$P(|(\hat{p}_n - p)| > 0.01) \sim 0.01.$$
 (2)

Thus if we get a nationwide sample of size 16000, we can estimate p within 1% with 99% probability.

The fact that accuracy of estimate depends upon the sample size and not on the sampling fraction  $\frac{n}{N}$ is something that public at large finds difficult to digest. Thus most people are surprised when I tell them that a sample size of 16000 can do wonders even though the number of eligible voters is well above 400 million.

If we have a random sample of size 4000 from a constituency with just two candidates, assuming that the winner has 52% or more support, equation (1) implies that with 99% probability, the winning candidate will have majority support in the sample as well. Hence if we simply declare the candidate getting majority support in the sample as the winner, we will be right with 99% probability. If there are more than two candidates and if the gap between the winner and the runner up is at least 4%, it can be seen via simulation that a random sample of size 4000 will give us the winner with 99% probability.

Assuming we have got a random sample and opinions of the voters included in the sample, we can get good estimates of vote percentages for major political parties. However, the public interest as well as the interest of the media is in seat forecast and not in vote percentage forecast. And it is easy to see that the seats depend not only on the vote percentages but on the distribution of the votes across constituencies. If we could get a random sample of say 4000 from each of the 543 constituencies, we will be able to correctly predict the winner in constituencies were the margin of victory (gap between winner and runner candidates) is over 4% - the candidate securing highest number of votes in the sample is the winner with over 99% probability.

However this would require a sample of over 2,100,000 voters and this would be very expensive. Moreover since it is to be done in at most a week's time, this would require huge manpower. Getting trained and reliable manpower to accomplish such a task is very difficult if not impossible. So we have to find an alternate method.

Let us start with examining the opinion polls conducted elsewhere in the world. In the US, at the time of election, the entire focus is on the Presidential election with winner-take-all in each state. There is election for house of representatives which is like the election to Lok Sabha in India, but that takes a back seat. Moreover, typically the polling is done in US by randomly generating telephone numbers and calling them. Even with the recent growth in number of telephone connections in India, the spread is still lopsided and an opinion poll by this method will lead to a sample that would be biased towards, rich, educated, urban population. So this is ruled out.

Indeed, the Indian system is similar to (indeed derived from) the UK model. So when I got involved the first time, I had examined in depth the methodology used in UK (I interacted extensively with Prof Clive Payne, who had at that time been analyzing polls for BBC for over 2 decades). We concluded that the methods will not work in India. For one, in India the socio-economic profile of a constituency is not available - the census data is organized at district level and not at parliamentary constituency level. Moreover, there is a major difference between voter behavior in UK and in India. If we denote by  $\rho$  the proportion of voters who changed their vote from one election to the next (typical gap of 5 years between elections, sometimes could be less in case of mid-term election), then experts believe that  $\rho$  is small in UK while in India  $\rho$  is believed to be rather high. In view of these two differences, the methodology used in UK is not workable in India.

# Model for voting behavior

So what we need to do is to build a model for voting behavior - not of individual voters but at the level of constituencies. Indeed, if C denotes the list of constituencies and P denotes the list of parties, and  $y_{ij}$  denotes the proportion of votes for *i*<sup>th</sup> party in the *j*<sup>th</sup> constituency, then we need a model that would give us an estimate for

 $\{y_{ij} : i \in C, j \in P\}.$ 

Then we would be able to predict winners in each constituency and thereby get a forecast for the party position in the Lok Sabha.

To build a model, let us note some features of the Indian reality. We have already stated that socioeconomic profile of constituencies is not available and thus cannot be incorporated directly in the model. Also, while socio-economic factors do influence voting behavior, groups with similar socioeconomic background vote differently in different states- even in neighboring states: one can identify several pairs of constituencies with similar profiles in, say, Karnataka and Tamilnadu but in Tamilnadu the regional parties - DMK, AIADMK dominate and the national parties - Congress and BJP have marginal presence whereas in Karnataka the national parties dominate. Thus there is hardly any national effectthe state is an important factor.

Let  $x_{ij}$  denote the proportion of votes for  $i^{th}$  party in the  $j^{th}$  constituency in the previous election and let  $z_{ij} = y_{ij} - x_{ij}$  denote the *swing* in the  $i^{th}$  constituency for the  $j^{th}$  party.

As a first step we assume that the swing  $z_{ij}$  is constant as *i* varies in a state. Or one can refine it and assume that the swing is constant over a region in a state (the region could be a geographic region within a state, such as Vidarbha in Maharashtra or a political region such as rural Bengal in West Bengal).

Let *S* denote the states and *R* denote regions. For a state *s* and a region *r* let us denote by  $\bar{x}_{is}$ ,  $\bar{x}_{ir}$  the proportion of seats in the previous election in the state *s* and region *r* respectively for the party *i*. The quantities  $\bar{y}_{is}$ ,  $\bar{y}_{ir}$  are defined analogously for the upcoming election and the swing across a state/ region is defined by

$$\bar{z}_{is} = \bar{y}_{is} - \bar{x}_{is}$$

$$\bar{z}_{ir} = \bar{y}_{ir} - \bar{x}_{ir}.$$

Finally, if  $s_j$  denotes the state and  $r_j$  denotes the region to which a constituency j belongs, our model can be written as

$$y_{ij} = x_{ij} + \alpha_s \bar{z}_{isj} + (1 - \alpha_s) \bar{z}_{irj} + \text{ error.}$$

Here  $\alpha_s$  is a number between 0 and 1 and is chosen based on political perception of how strong is the regional effect in the state. For example, in Andhra Pradesh, with Telangana agitation at the forefront, we would choose geographic regions, with Telangana, Rayalsima, as regions and choose  $\alpha_s$  close to 1, say 0.05.

Note that (3) can be thought of as a regression model. The absence of any nationwide effect translates to the model not having any intercept.

We have already ruled out large sample in each

constituency. However, in each state or a large enough region, we should have enough sample size so as to estimate vote percentages for major parties in each state and region. This and the model helps us estimate  $y_{ii}$  as follows:

Based on the sample survey we estimate  $\bar{y}_{is}$ .  $\bar{y}_{ir}$ namely percentage of votes for a party in every state and every region. Denoting the estimated values by  $\hat{y}_{is}$  and  $\hat{y}_{ir}$ , we have the estimated swing in region r and state s for  $j^{th}$  party being

$$\hat{z}_{is} = \hat{y}_{is} - \bar{x}_{is}$$

$$\hat{z}_{ir} = \hat{y}_{ir} - \bar{x}_{ir}.$$

and then the estimated vote percentage for  $i^{th}$  party in the  $j^{th}$  constituency  $\hat{y}_{ii}$  is given by

$$\hat{y}_{ij} = x_{ij} + \alpha_s \hat{z}_{isj} + (1 - \alpha_s) \hat{z}_{irj} + \text{ error.}$$
 (4)

# **Design of Survey**

What we can hope for is that in the survey, we have large enough sample size in each of the states- say with 20 or more constituencies. If we have a sample size of about 45,000 nationwide, then in a cluster of 20 constituencies we can expect to have 1600 samples and this is adequate to give a reasonable estimate of percentage of votes for major parties in a state, or in a geographic sub-region of a state provided it has 20 or more constituencies. As explained above, our model would then give estimates of percentage of votes for major parties in all constituencies.

So the aim is to get a sampling scheme that gives proper representation to all states / sub-regions. In India, the data on voters is organized as follows. We have a list of constituencies (where contiguous constituencies come together) and then in each constituency we have a list of polling stations (once again adjacent booths coming together) and then for each booth we have voters list, with neighborhoods forming clusters. Given this fact, we have chosen to undertake multi-stage circular random sampling - first choose (say 20%) of the constituencies, then pick 8 booths and then in each booth pick 50 voters - at each stage the choice is via circular random sampling, also known as systematic sampling.

In this to pick say 108 out of 543 constituencies, we randomly pick a number between 1 and 543, say 378 then beginning with 378, we include every 5th constituency: we generate the list 378, 383, :::, 543, 5, 10, :::, 370. We repeat the process for picking booths and then get voters list for the selected booths to pick the respondents, once again using circular random sampling. The investigators are asked to go door to door and get the response from the selected voters.

Experience has shown that this methodology gets us a sample that is fairly representative of the population on various socio - economic parameters such as caste, religion, education, income etc.

A question remains on the estimation of standard deviation of the error in (4) (from which we can obtain the estimate of standard deviation of  $y_{ij}$  using the sample size at state level and regional level). Extensive backtesting has shown that the model (4) has a large error variance. The empirical data suggests a standard error of about 4 to 8 percent for the estimate of  $y_{ij}$ , depending upon the sample size involved.

# Vote to seat conversion

Once we have the estimates  $\hat{y}_{ij}$  we can proceed to estimate the seats for various parties as follows.

Suppose, we have only two parties and  $\hat{y}_{14} = 0.51$ ,  $\hat{y}_{24} = 0.49$  and  $\hat{y}_{17} = 0.54$ ,  $\hat{y}_{27} = 0.46$  (and all estimates have a standard error of 0.08). Now based on our data, we can say that party 1 will very likely win in constituency 7, but we can't say so for constituency 4- all we can say is that party 1 is more likely to win than party 2 in constituency 4. We need to take this into account while making seat estimates. Our approach: the best case scenario for party 2 in constituency 4 is that while it is marginally ahead, a sample of the specified size throws up a deficit of 0.01. The probability of such an event is approximately equal to (here Z denotes a standard normal variate)

$$P(Z > \frac{0.01}{0.08}) = 0.45.$$

Thus we assign party 2 in  $4^{th}$  constituency a win probability of 0.45 and party 1 in  $4^{th}$  constituency a win probability of 0.55. On the other hand, noting that

$$P(Z > \frac{0.04}{0.08}) = 0.31$$

we assign party 2 in 7<sup>th</sup> constituency a win probability of 0.31 and party 1 in 4th constituency a win probability of 0.69. Once we have estimates for probability of win in all constituencies for all parties, we can add the probabilities across constituencies to get an estimate of number of seats for a party.

# Some observations

Any opinion poll can at best measure the mood of the country as a whole while for actual results, only those who vote matter. This creates a question mark on any prediction based on opinion poll. Moreover, in India voting intentions are volatile and so even if the opinion poll accurately measure the mood of nation at the time of the poll, the mood could change when the voting day approaches.

An exit poll addresses these two issues but now randomization of respondents is diffcult to achieve. One can at best choose booth via randomization but one has to leave the choice of respondents to the investigator. Over the last 7 years, we have mostly resorted to day-after poll - given the gap between the voting day and counting day, we collect data by interviewing voters a day after they have voted and still come out with a projection for the Lok Sabha or Vidhan Sabha before actual counting beings. We have been fairly successful with this strategy, often getting much closer to the actual result then the other surveys.



### Conference On Research Innovations in Statistics for Health, Education, Technology, and Society

Friday, July 11- Sunday, July 13, 2014 Riverside Convention Center, Riverside, California, http://2014iisa.intindstat.org/

The conference will address advancements in the fields of Statistics, Biostatistics, Probability, and their application areas by bringing together national and international researchers, professionals, educators and students from academia, industry, government, and research institutes, to discuss the major issues and challenges, and share the latest developments. The 2014-IISA is co-sponsored by the American Statistical Association (ASA).

The conference features two plenary speakers: Nicholas P Jewel, University of California, Berkeley and Katheryn Roeder, Carnegie Mellon University and four special invited speakers: Marc Suchard, University of California, Los Angeles; Mark van der Laan, University of California, Berkeley; Sudipto Banerjee, University of Minnesota; William DuMouchel, Chief Statistical Scientist, Oracle Health Sciences. Invited sessions include many confirmed distinguished researchers, a mix of seasoned and new professionals. If you wish to present your work at 2014-IISA, please contact the program committee chair Dr. Nilanjan Chatterjee at chattern@mail.nih. gov. Rooms are available at special rates for conference participants at:

- Riverside Marriott 3400 Market Street, Riverside, CA 92501 Tel: 1 (951) 784-8000 http://marriottriversidedowntown.com
- The Mission Inn Hotel and Spa 3649 Mission Inn Ave, Riverside, CA 92501 Tel: (800) 843-7755 http://www.missioninn.com/

Riverside is the home of UCR: University of California, Riverside and its Department of Statistics, http:// www.ucr.edu and http://statistics.ucr.edu.

Riverside Convention Center is located in downtown Riverside and is about 4.5 miles from UCR.

The nearest airport is the Ontario International Airport (ONT) about 25 miles from the Convention Center and conference hotels. Los Angeles International Airport (LAX) is about 70 miles and John Wayne Airport (SNA) is about 40 miles from downtown Riverside.

#### **IISA Sponsored Conferences**

**Future of the Statistical Sciences Workshop** London, England **November 11-12, 2013.** http://www.statistics2013.org/introduction-to-thefuture-of-statistical-sciences-workshop/

Ordered Data Analysis, Models and health Research Methods: An International Conference in Honor of H. N. Nagaraja for His 60th Birthday will be held at The University of Texas at Dallas, Richardson, TX, USA March 7th - 9th, 2014.

http://faculty.smu.edu/ngh/hnnconf.html.

National Conference on Statistics, Mathematics and their applications Nagpur, India January 3-4, 2014 http://iscnagpur.ac.in/statistics/cosma.htm Institute website is: http://www.iscnagpur.ac.in/

### **Other Conferences**

NC-ASA Symposium October 12, 2013. http://www.stat.ncsu.edu/events/2013\_NC-ASA

International Conference on Operations Research for Data Analytics and Decision Analysis in conjunction with the 46th Annual Convention of Operations Research Society of India (ORSI) Kashmir

October 21-23, 2013.

http://ifors.org/web/orsi-international-conferencein-kashmir/

#### Northeast Training Program on Statistical Data Analysis Kolkata, India

November 26-30, 2013 http://www.isical.ac.in/~biru/netp.pdf

# International conference on "Role of Statistics in the advancement of Science and Technology"

organized by the Department of Statistics, University of Pune on the occasion of "Diamond Jubilee Year of the Department of Statistics" & "The International Year of Statistics".

# Pune, Maharashtra, India December 16-18, 2013

http://stats.unipune.ac.in/brochure.pdf Contact e-mail address: stats.unipune@gmail.com Statistics 2013 International Conference: Socio-Economic Challenges and Sustainable Solutions CR RAO Advanced Institute of Mathematics, Statistics and Computer Science, University of Hyderabad Campus, Hyderabad, India December 28-31, 2013 http://www.statistics2013-conference.org.in

International Conference on Reliability, Optimization & Information Technology Faridabad. India 6-8 February, 2014 http://icroit2012.org/about-conference/

### 11th International Conference on Ordered Statistical Data

Bedlewo, Poland June 2nd to June 6, 2014. http://bcc.impan.pl/14OrderStat/

#### The third IMS Asia Pacific Rim Meetings

Howard International House Taipei, Taiwan June 30 (Monday) - July 3 (Thursday), 2014. http://www.ims-aprm2014.tw/

For more information, contact the program chairs: Byeong U. Park (bupark@stats.snu.ac.kr) and Feifang Hu (fh6e@virginia.edu).

### Australian Statistical Conference/IMS Annual Meeting Sydney, Australia

**7-10 July, 2014.** 

#### Courses

# Design and Analysis of Clinical Trials - Theory and Application

Organized by Cytel Inc. and department of statistics, University of Pune

Pune, India January 3rd, 2014 http://www.cytel.co.in/workshop Applied Predictive Analytics offered by CrowdANALYTIX http://www.statistics.com/applied-pa/