IEEE Information Theory Society Newsletter

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President's Column

Elza Erkip

In my previous President's Column, I wrote that by the time you read this, it will be summer in the Northern Hemisphere. And what a summer! I hope everyone is safe during this unusually warm season.

We were lucky that our flagship conference International Symposium on Information Theory (ISIT) was in Vail, Colorado this year. While the temperatures were up during the day (outside and sometimes inside), we were able to enjoy cool Colorado evenings. One of the big highlights of this ISIT was the world premiere of "The Bit Player," the Information Theory Society's documentary about the life and work of Claude Shannon. The project was started in 2015 during Michelle Effros' Society Presidency as part of a broader outreach effort. It outlasted three Presidents (Michelle Effros, Alon Orlitsky and Ruediger Urbanke) and was completed earlier this year. The ISIT premiere also featured a Question and Answer Session with the writer, director and producer Mark Levinson and the actor John Hutton, and was followed by a champagne reception. The Society is working on a distribution plan for the movie, so stay tuned and continue to check your local theater listings!

In my last column, I also mentioned a few surprise award announcements would be made at ISIT. The first one was Andrea Goldsmith receiving the 2018 Aaron D. Wyner Distinguished Service Award. The announcement at the Awards Ceremony included a small puzzle consisting of the pictures of the more than 80 Jack Wolf ISIT Student Paper Award winners. Andrea has a long list of contributions to the society, and in particular it was through her leadership that the Jack Wolf ISIT Student Paper Award and the Student Committee were instituted.

The second surprise announcement was the winner of the 2018 Information Theory Society Paper Award, given to the three-part paper, "Information Transmission Using the Nonlinear Fourier Transform, Parts I-III," by Mansoor Yousefi and Frank Kschischang that appeared in the IEEE Transactions on Information Theory in July 2014. The formal presentation will be done at next year's Awards Ceremony.

There were two more surprise announcements during the banquet. Siddharth Bhandari, Mehran Elyasi and Prathamesh Mayekar received the 2019 Jack Keil Wolf ISIT Student Paper Award. Details of the winning papers can be found on page 3.

The final announcement that held all of us in thrall was the 2019 Claude E. Shannon Award. Erdal Arikan, who invented polar codes which revolutionized coding theory, was announced as the winner. Polar codes are not only theoretically elegant, but also practical. In less than a decade of their invention, polar codes were adopted by the 5G cellular standard for control channel. Erdal's work has already been recognized by many prestigious awards, including the 2018 IEEE Richard W. Hamming Medal. I am very happy that Erdal will now be adding our Society's most coveted prize to his list of accolades.

ISIT is home to the annual meeting of the Society Board of Governors. During this year's Board meeting, we had a special session on Society values with respect to sexual harassment. In June, U.S. National Academies released a report on sexual harassment of women in academia. The report observes that "the most potent predictor of sexual harassment is organizational climate—the degree to which those in the organization perceive that sexual harassment is or is not tolerated. This means that institutions can take concrete steps to reduce sexual harassment by making systemwide changes that demonstrate how seriously they take this issue and that reflect that they are listening to those who courageously speak up to report their sexual

(continued on page 4)

From the Editor

Salim El Rouayheb

This is the September issue of our society newsletter. I hope you have had a nice summer as you are reading this issue. First, congratulations to all the awards winners that were announced at ISIT in Vail past June. In this issue, we have news from the Conference on **C**hannels, **S**tatistics, **I**nformation, **S**ecrecy, **Z**ero-error **A**nd **R**andomness (CSISZAR) celebrating the 80th birthday of Imre Csiszár, followed by reflections by Imre Csiszár on his research years in information theory. The past few months have been very active with student events. We have two reports from the schools of information theory in North America and in Europe and a contribution from the Jack Keil Wolf ISIT Student Paper Awardees. We also have an update from the information theory e-print arXiv moderators and a contribution form 2018 Chapter of the Year Award, the IEEE Spanish chapter. In addition, you can find several other news and updates from our society.

As a reminder, Announcements, news, and events intended for both the printed newsletter and the website, such as award announcements, calls for nominations, and upcoming conferences, can be submitted at the IT Society website http://www.itsoc.org. Articles and columns can be e-mailed to me at salim.elrouayheb@rutgers.edu with a subject line that includes the words "IT newsletter."

The next few deadlines are:

Oct 10, 2018 for the issue of December 2018.

Jan 10, 2019 for the issue of March 2019.

Please submit plain text, LaTeX, or Word source files; do not worry about fonts or layout as this will be taken care of by IEEE layout specialists. Electronic photos and graphics should be in high resolution and sent as separate files.

Salim El Rouayheb

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Awards

Congratulations to the members of our community that have recently received recognition for their exceptional scholarly contributions.

ERDAL ARIKAN: The 2019 Claude E. Shannon Award

The Claude E. Shannon Award is the highest honor from the IEEE Information Theory Society. The award has been instituted to honor consistent and profound contributions to the field of information theory.

ANDREA GOLDSMITH: 2018 Aaron D. Wyner Distinguished Service Award

The Aaron D. Wyner Distinguished Service Award of the IT Society has been instituted to honor an individual who has shown outstanding leadership in, and provided long-standing, exceptional service to, the Information Theory community.

Information Theory Society Paper Award

The purpose of the Information Theory Paper Award is to recognize exceptional publications in the field and to stimulate interest in and encourage contributions to fields of interest of the Society.

The 2018 award winning publication is:

- M. Yousefi, F.R. Kschischang, "Information Transmission Using the Nonlinear Fourier Transform, I, II, III,", Jul. 2014

ALEX DIMAKIS: 2018 James L. Massey

Research & Teaching Award for Young Scholars Recognizes outstanding achievement in research and teaching by young scholars in the Information Theory community.

JINGBO LIU: 2017 Thomas M. Cover Dissertation Award

The IEEE Information Theory Society Thomas M. Cover Dissertation Award, established in 2013, is awarded annually to the author of an outstanding doctoral dissertation contributing to the mathematical foundations of any of the information sciences within the purview of the Society.

- J. Liu, "Information Theory from a Functional Viewpoint", Ph.D. Thesis, Princeton University, Dec. 2017

Jack Keil Wolf ISIT Student Paper Award

The IEEE Jack Keil Wolf ISIT Student Paper Award is given to up to 3 outstanding papers for which a student is the principal author and presenter. The award is based on the paper's technical contribution as well as the quality of its presentation. The prize was awarded to 3 papers this year:

- S.S. Bhandari, "Bounds on the Zero-Error List-Decoding Capacity of the $q/(q\text{-}1)$ Channel", *Proceedings of the 2018 IEEE International Symposium on Information Theory*, Vail, CO, USA, Jun. 2018

- P.P. Mayekar, P. Parag, H. Tyagi, "Optimal Lossless Source Codes for Timely Updates", *Proceedings of the 2018 IEEE International Symposium on Information Theory*, Vail, CO, USA, Jun. 2018

- M. Elyasi, S. Mohajer, "A Cascade Code Construction for (n, k, d) Distributed Storage Systems", *Proceedings of the 2018 IEEE International Symposium on Information Theory*, Vail, CO, USA, Jun. 2018

2018 Chapter of the Year Award

The Chapter of the Year Award recognizes a chapter that has provided their membership with the best overall set of programs and activities. The 2018 winner is the

- Spain Section Chapter: Gonzalo Vazquez-Vilar (Chair) and Josep Font-Segura (vice-chair)

FRANK R. KSCHISCHANG: 2018 Padovani Lecturer

The Padovani Lecture is held annually at the North-American School of Information Theory.

2018 Eduard Rhein Technology Award for Rajiv Laroia

Dr. Rajiv Laroia is the recipient of the 2018 Eduard Rhein Technology Award for his pioneering work on Flash OFDM as a forerunner of 4G Mobile Communications. Flash OFDM was the first packet-switched internet protocol (IP) based cellular wireless system. Flash is an acronym for Fast Low-latency Access with Seamless Handoff.

Rajiv Laroia was born in 1962 in Pune, India, and studied electrical engineering at the Indian Institute of Technology (IIT) in Delhi from 1980–85. He began his engineering career in Munich in 1985 at the Central Research and Development Labs of Siemens AG. He then moved to the University of Maryland, College Park, for his Master and Ph.D. degrees. Already during his Ph.D. studies, Laroia made outstanding contributions to voiceband telephone line modems by inventing precoding and shell mapping methods that were included in the V.34 standard.

Laroia joined the Math Center of AT&T Bell Labs in 1992, where he worked on OFDM-based cellular wireless systems. He developed Flash OFDM in the context of the evolution of wireless circuit-switched technologies to packet-switched technologies. Laroia recognized that supporting IP data required a new system design for two reasons, first—the intermittent, bursty, and high rate nature of packet communications and second—the unreliable nature of wireless links due to impairments and interference. He further recognized that an OFDM based air interface would provide the best platform because of its flexibility in assigning time and frequency resources.

Laroia founded Flarion Technologies in 2000, a company that led the transition of cellular networks to 4G data access systems based on OFDM. During his time at Flarion, he made numerous inventions that can be found in the 4G Long Term Evolution (4G LTE) standard. Flarion grew to over 250 employees and was acquired by Qualcomm in 2006. Today, Laroia continues to innovate to satisfy his restless entrepreneurial spirit. He recently cofounded the company Light that is developing revolutionary multi-lens and multi-sensor computational cameras.

Eduard Rudolph Rhein was born in 1900 in Königswinter and died in 1993 in Cannes. He was personally interested in LP (Long Play) vinyl audio recording for which he contributed a 1940s patent that specified a method for encoding a new groove with respect to a previously recorded groove. He was the creator and editor-in-chief of the popular "HörZu" publication in Germany from 1946–1964.

The Eduard Rhein Technology Award has been awarded annually since 1979. In recent years, the award ceremony has been held in the Hall of Fame of the Deutsches Museum in Munich. The 2018 Award is accompanied by a cash prize of 20.000 Euro.

President's Column *(continued from page 1)*

harassment experiences." The goals of the Board session were to discuss recent events in our Society and how we can improve our own organizational climate with respect to sexual harassment. I am happy to report that the Board approved a statement strongly condemning sexual harassment, which you can find on page 25.

Our discussion continued in a specially organized morning session, which was announced to all conference attendees. Participants of this session, many of whom were young researchers, suggested steps we can take to create a society free of sexual harassment, bullying, and discrimination. We discussed double-blind reviews to reduce bias in our publications, creating a conference code of conduct and an ombudsperson position. One of the suggestions was to conduct a survey of IT Society members to better understand the incidence of sexual harassment and bullying (recall that the results of a similar IEEE-wide survey was reported in the March Newsletter). Participants said that they would like to continue such discussions in future conferences, potentially in a time slot devoted to Plenary Talks.

After the Shannon Lecture, Urbashi Mitra invited all conference attendees to wear red and black ribbons to show our support of a community that embraces diversity: Applied, theoretical; industry, academic; geographic; and gender. Like Urbashi, "I wish to be part of an Information Theory Society that promotes the highest intellectual and professional standards." I hope you will join us and wear your virtual red and black ribbon to show our hope for such a society.

I am happy to hear from all of you; please feel free to contact me at elza@nyu.edu.

HELP US FIND A NEW NAME

The IEEE Information Theory Society is starting a new endeavor, a **Magazine** to replace the Newsletter. The magazine will provide tutorial style papers, that blend traditional areas with new directions and will aim to increase the visibility of the IT Society and reach out to new communities.

We accept entries until Sept. 22
The winner will gain our gratitude and maybe $200*

You can submit as many entries as you wish

Please submit your entries on:

https://goo.gl/forms/5flw68Mz4nKgNluH2

***Required W8 or W9 and subject to restrictions in : https://www.ieee.org/about/compliance/ofac/sanctions.html**

Conference on Channels, Statistics, Information, Secrecy, Zero-error And Randomness

Budapest June 4–5, 2018
An event celebrating the 80th birthday of Imre Csiszár

Imre Csiszár is one of the most prominent members of the information theory community. Apart from for his many important results, he is also well-known as co-author of the classic Csiszár-Körner book. He has been the recipient of the 1996 Claude Shannon Award and the 2015 IEEE Richard Hamming Medal, to mention only two of the most prestigious honors he received. The Rényi Institute of Mathematics, where Csiszár has been working since 1961, organized a two-day workshop on June 4–5, 2018 in Budapest, Hungary, to celebrate his 80th birthday.

The conference consisted of fifteen invited talks by distinguished members of the information theory community.

A tragic event preceded the conference: František Matúš, co-author of several papers with Csiszár, who was not only an invited speaker but also an active initiator of the conference, passed away in the middle of May. He had already been ill for some time but he accepted the invitation and we very much hoped to have him with us at the conference. It was terribly shocking to get the sad news about him less than three weeks before the conference started. In the timeslot that was scheduled for Fero's presentation, László Csirmaz gave a talk to his memory. Its title was "Fero Matús' Work on the Shape of the Entropy Region".

The fourteen other invited speakers were: Andrew Barron (Yale University), Thomas Breuer (FH Vorarlberg), Michelle Effros (Caltech), Péter Gács (Boston University), Elisabeth Gassiat (Université Paris-Sud), János Körner ("Sapienza" Universitá di Roma), Katalin Marton (MTA Rényi Institute), Milán Mosonyi (Budapest University of Technology and Economics), Prakash Narayan (University of Maryland), Igal Sason (Technion, Haifa), Flemming Topsøe (University of Copenhagen), Gábor Tusnády (MTA Rényi Institute), Sergio Verdú (Princeton University), Raymond Yeung (The Chinese University of Hong Kong). (Tusnády's talk was presented by his co-author György Michaletzky from Eötvös University.)

The conference was opened by deputy director Dezső Miklós, whose introductory words were followed by the reading of a greeting message from Péter Pálfy, director of the Rényi Institute, who could not be present because of just being on his way home from the US. Among other things his message mentioned Imre's early outstanding achievement at the Schweitzer competition as a university student. It is widely known that Hungary has a long tradition in mathematical contests and this competition organized for university students is the most prestigious one of all. Imre was the first of only six students in the seventy year history of this competition who received first prize four times in the years 1957–1960. The technical program started with Sergio Verdú's lecture, who gave a survey on "Imre Csiszár and Information Measures". The talk started with a show of photos of great mathematicians and physicists from Hungary, putting Imre's photo from the conference homepage in the middle and surrounding it with the others. At each new photo, Sergio asked

A conference photo made in the courtyard of the Rényi Institute after the last talk on June 5.

Kati Marton and Michelle Effros having a discussion in a break of the conference.

the audience to recognize and name the person in the picture. It was surprisingly more difficult than one would have expected. While recognizing John von Neumann, Alfréd Rényi and Paul Erdős was certainly a trivial matter for an audience in the Rényi Institute, and the Nobel laureate physicists Eugene (Jenő) Wigner and Dennis (Dénes) Gábor were also quickly named, I myself heard only one person in the audience (namely László Lovász) whispering the name of Rudolf Kálmán when his picture appeared and unfortunately no one recognized the early photo of Abraham Wald.

Many of the talks (it is perhaps just being overly careful not to say simply that every talk) gave further evidence of the strong influence Imre's work had on information theory and related fields. A complete list of talks of the conference can be found here: https://www.renyi.hu//conferences/csiszar80/program.html.

Imre Csiszár saying a few words at the conference banquet.

A high point of the celebration was the banquet Monday evening, where Sergio Verdú, János Körner, and Prakash Narayan were asked to say a few greeting words. All of them stressed how generous Imre always was. János recalled a story when he told him a problem Imre immediately liked but soon remembered that he had seen this already in a paper by Flemming Topsøe. They went to the library to check and Imre quickly found the paper that contained indeed the relevant result. The only detail he did not remember was the content of the sentence in the paper introducing the theorem. Namely, that the result was entirely due to Imre Csiszár.

Imre himself also said a few words at the banquet. He told us that the two most important things for him in life have always been his work and his family and he felt lucky that both gave him a lot of inspiration, joy and satisfaction.

I hope that those who participated in the conference will also remember it as a joyful event.

More details (along with further photos) can be found on the conference website https://www.renyi.hu/conferences/csiszar80/.

Gábor Simonyi
member of the Organizing Committee

Alfréd Rényi
Institute of Mathematics, Hungarian Academy of Sciences

My Research Experience in Information Theory

Imre Csiszár, Rényi Institute of Mathematics, Hungarian Academy of Sciences

On the occasion of my turning 80, Editor Salim El Rouayheb invited me to share with IT Newsletter readers my research experience and views on IT. I am pleased to accept this honoring invitation.

My profession is Mathematics that has been my hobby since young age. At high school, I spent a lot of time solving the monthly problems of the Mathematical Journal (today Mathematical and Physical Journal) for Secondary Schools, most of my teachers tolerated my doing this also during classes. This journal, started in 1894, has much contributed to the abundance of good Hungarian mathematicians, for the size of the country.

At the university, Alfréd Rényi's lectures on IT have raised my interest in this subject. Rényi, the "outstanding mathematician who established Information Theory in Hungary" (cited from the dedication of the Csiszár-Körner book) presented IT as an exciting new field of mathematics that opened new avenues also in other mathematical disciplines. At that time (1959–60), remarkable applications of IT were already available in statistics, large deviations theory, ergodic theory, and to the central limit theorem, their majority very recent. Rényi believed that his information measures "of order alpha", now known as Rényi entropies and divergences, may be preferable to Shannon's in some such applications. As an ambitious young mathematician, I was also attracted by the apparently great growth potential of IT, and I decided to choose IT as research field.

After graduation, I joined the Mathematical Institute of the Hungarian Academy Sciences, now called Rényi Institute. Its friendly and quiet atmosphere has been a privileged sanctuary in the communist times, and also some international exchanges were allowed. Following Rényi's lead, my first works addressed generalized information measures and their application outside mainstream IT. A few years later I also experienced the beauty of mainstream IT, and became fascinated with the theory of fundamental limits of communication, now called Shannon theory. Thus, the latter became my main field, the previous one remaining a close second.

Unfortunately, Rényi passed away in 1970, but then the Institute already had a strong IT group. It was headed by me, other core members were Kati Marton and János Körner. During the golden period in the seventies and early eighties when multiuser IT has been developed, we were able to substantially contribute to its development, also cooperating with Rudolph Alhlswede's group in Bielefeld. Multiuser extensions of Shannon theory gave rise to single-letter characterizations of achievable communication rates for some simple multi-terminal models. Similar results were expected also for (a large class of) other multi-terminal models, but this holy grail has remained elusive. For example, no single-letter characterization is available for the capacity region of the so-called broadcast channel, the best achievability result known is still that of Kati from 1979. Failing to reach the holy grail, a

temporary recession followed. Some experts even claimed that IT was dead, hard to believe now, at a time of its unprecedented flourishing. The recession and other reasons caused the research interest within our IT group to diverge. I did continue to work on Shannon theory problems, enjoying rewarding collaboration with Prakash Narayan (University of Maryland), as well as to employ IT ideas in other fields, primarily statistics, privileged by excellent coauthors as Paul Shields (University of Toledo) and František Matúš (Prague).

What advice could I give to young information theorists? Certainly nothing about how to get rich. To those who chose academic research, an obvious advice is to select problems you find attractive, thus work on them and its progress cause satisfaction. A major driving force of research in IT has been its beauty, both for researchers of engineering and of mathematics background, going back to Shannon, electrical engineer as well as mathematician. These days when scientometric data are much overvalued, young researchers have to care also for citations. Surely, popular topics tend to attract more citations, and best of all is to initiate a new direction that becomes popular. Success in terms of citations is hard to predict, technically deep results are often outperformed by easily understood simpler ones. At any rate, diversity is much preferable to a single narrow topic.

For researchers in their most productive years it may be a question whether it is worth to spend a large amount of precious time on writing a book. Surely, a good book much benefits the community, but my experience suggests a positive answer also from the author's point of view. I have spent, with János as coauthor, several years on writing an IT monograph, and this has greatly benefited our research (Kati substantially contributed to the new results in the book). Systematic work on this project has called our attention to important issues left open in the literature, and has helped to develop efficient methods that work for a large class of problems. Examples included the method of types, as well as "image size characterization" and "entropy characterization".

Finally, a few words about the IT Society. I highly appreciate that this engineering society welcomes also mathematicians, like me. I have always enjoyed its friendly atmosphere, the company of scientists devoted to the same wonderful discipline as I am. The Society has recognized my research with prestigious awards. I want to emphasize that I never experienced any kind of discrimination as minority by profession or by nationality. Neither did I see any race or gender discrimination. But not potentially affected I am not in a position to determine whether improvements in those respects are needed or not. I am, however, seriously concerned by recent developments that go as far as questioning the honor and good will of respected members of the Society who have done valuable service to it. I sincerely hope that these unfortunate developments will be forgotten, and our Society, as well as the science of IT, will continue to flourish as before.

Students' Corner: Let the Student Paper Award roll!

Compiled by Mine Alsan and Rawad Bitar

The IEEE Jack Keil Wolf ISIT Student Paper Award is presented every year at the International Symposium on Information Theory (ISIT). It is a great honor for any student researcher working in the field to have their paper short-listed for the award. The list of papers that were selected as finalists this year can be found here. Pursuing the tradition, we invited the finalists and award winners to write about their experiences regarding the research progress leading up to their papers, the preparation of their talks at ISIT, and the attendence to the symposium in general. Below are the responses we received.

The Student Corner is open to contributions by student and postdoc members of the IT Society. Please encourage your students to contribute on student-related issues. For any questions, comments, or ideas for the column, you can contact minealsan@gmail.com or rawad.bitar@rutgers.edu.

Max-Product for Maximum Weight Matching—Revisited

Mario Holldack[1] *(holldack@thi.cs.uni-frankfurt.de)*

When I started my master's thesis, my supervisor Georg Schnitger suggested I study the seemingly simple task to "find out what belief propagation *actually* is", however this task has remained the main research topic of my Ph.D studies under his supervision. What is belief propagation (BP)? There are many answers to this question. BP is a decoding procedure for LDPC codes. BP is a heuristic for the computation of marginal probabilities given a joint distribution of multiple random variables. BP is a message-passing algorithm for factor graphs, and if the graph is a forest, BP is a dynamic program. Furthermore, BP is a distributed optimization algorithm for the maximum weight matching problem in complete bipartite graphs (Bayati, Shah, Sharma 2008). This last description of BP raised our attention.

The maximum weight matching problem in complete bipartite graphs is computationally easy; yet the best known upper bound on the convergence time of BP for this problem is

[1]Mario Holldack is a finalist for the paper: Mario Holldack, "Max-Product for Maximum Weight Matching—Revisited", Proceedings of the 2018 IEEE International Symposium on Information Theory, Vail, CO, USA, Jun. 2018.

given by $O(n^3 \cdot w_{\max}/\varepsilon)$ operations, where n is the number of nodes in each layer of the bipartite graph, $w_{\max}$ is the largest edge weight, and $\varepsilon > 0$ is the gap between the weight of best and the second-best solution. How many operations are necessary if the edge weights are chosen by an adversary? In other words, does the worst-case running time really depend on the ratio between $w_{\max}$ and ε? This ratio might be exponentially large in the number of input bits!

First, I studied the "behavior" of BP on a very simple complete bipartite graph, the $K_{2,2}$ graph which is just a cycle on four nodes. Soon, I realized that I was able to "trick" BP into suboptimal local solutions by exploiting its "greediness". I noticed that this trick can be generalized to larger cycles, and finally to complete bipartite graphs. This proved that the $w_{\max}/\varepsilon$ ratio does indeed yield the worst-case convergence time: $\Omega(n^3 \cdot w_{\max}/\varepsilon)$ operations are required. However, even for these adversarial inputs, BP finds the maximum weight matching as an intermediate result after relatively few iterations. Therefore, looking into lower bounds for approximate maximum weight matchings—using similar techniques—was a natural consequence. It turned out that considering multiple cycles at the same time was the key idea. Applying basic number-theoretical lemmas concluded the reasoning.

Then I had to turn a pile of pages filled with handwritten calculations and drawings into a convincing research paper. Surely, one major challenge was the ISIT space limit of five pages. Identifying and communicating the essential ideas while omitting minor details is a hard job. I am very grateful for the detailed discussions and the feedback I got during that time. When I received the reviews, I was happy that all the effort had paid off, and I was even more happy when I was informed that my paper had been selected for the finalist session of the IEEE Jack Keil Wolf ISIT Student Paper Award. It seems that we were able to add another answer to the initial question "What is belief propagation?".

Good Ideas are Generally Simple

Siddharth Bhandari[2] (siddharthbhandari.engg@gmail.com)

The question we answer in the current work was introduced to me by Prof. Jaikumar Radhakrishnan. We started working on it around August 2017, when I had completed a year of my PhD program. Our goal was to prove zero-error capacity bounds for the $q/(q-1)$ channel at list sizes larger than $1.58q$, which was state-of-the-art then, obtained by Chakraborty, Radhakrishnan, Raghunathan and Sasatte in 2006. The first result in this direction was obtained by Fredman and Komlós in 1984 in their seminal work on perfect hashing families, followed by Körner in 1986 and then CRRS in 2006.

What enchanted me about the question, and still does, was the elegant combinatorics it presented. This made it easier for me to keep labouring since I believed that all we needed was one clever idea and that it would be simple. Of course, we tried a plethora of approaches before we stumbled upon the correct one. However, thanks to Prof. Radhakrishnan's insight it was clear what the deficiency in the probabilistic argument of CRRS was, and so our attacks were more focused. After sieving through some algebraic approaches and failed attempts to create a different probabilistic experiment, the correct idea presented itself. In hindsight, it seems like a simple idea, one of derandomization, which is prevalent in computer science. We ended up performing an argument akin to that of CRRS but on a pseudorandom space.

However, even after some back of the envelope calculations convinced us of the idea, it took a while to refine it into a rigorous proof. As is usual of the probabilistic method, we went through iterations of definitions of random variables until we found one with which the idea could be executed cleanly. We proved some interesting lemmata along the way. One of them deals with how we can combine two samplers on small spaces to obtain a sampler on a bigger space. Another lemma, which seems of independent interest, is about a variant of the classical Coupon Collector process which we called the phased Coupon Collector. Putting everything together the result looks sophisticated, however, its backbone remains simple. This I suspect is a common theme in theoretical research.

I was delighted on hearing that our work has been short-listed for the IEEE Jack Keil Wolf ISIT Student Paper Award. This ensured that I carefully examined the various elements of my presentation from the audience's point of view. I received precious suggestions from Prof. Prahladh Harsha and Prof. Jaikumar Radhakrishnan. Overall, I think short presentations are an opportunity to get the audience interested in one's work. It is better not to rush and ensure that every last detail is mentioned; it works much better if just the main ideas are elucidated upon. And it doesn't hurt to throw in a joke in between.

Overall, I had a joyful experience at ISIT 2018. The talks were generally polished and illuminating. Thanks to the diversity of topics covered at ISIT, I was able to acquaint myself with areas which I was not cognizant of and collect some interesting ideas and questions.

[2]Siddharth Bhandari won the award for the paper: S.S. Bhandari, J. Radhakrishnan, "Bounds on the Zero-Error List-Decoding Capacity of the $q/(q$-1) Channel", Proceedings of the 2018 IEEE International Symposium on Information Theory, Vail, CO, USA, Jun. 2018.

2018 North-American School of Information Theory

Alex Sprintson, Anoosheh Heidarzadeh, Jean-Francois Chamberland-Tremblay, Krishna Narayanan, and Vickie D. Winston

The 2018 North-American School of Information Theory (NASIT) was held at the campus of Texas A&M University in College Station, Texas May 20–23. The school, offered for the eleventh time, is one of the major educational events in the broader fields of information and coding theory. The main goal of the school was to provide the students and postdoctoral research fellows the opportunity to learn from and interact with some of the top researchers in the fields, present their own research in poster sessions, and expand their professional networks by getting to know their peers from other institutions.

The school was attended by more than 70 participants from 30 academic institutions. The school was supported by the National Science Foundation (NSF), IEEE Information Theory Society, Center for Science of Information (CSoI) and by the Padovani fund. Due to the generosity of the sponsors, the vast majority of students received a travel grant to attend the school.

The school started with a hands-on machine learning workshop led by Prof. Alex Dimakis and one of his graduate students, Murat Kocaoglu, from the University of Texas at Austin. They provided an introduction to deep learning and TensorFlow. The students have actively participated in the interactive activities and learned how to design, build, train, and test their neural networks. The TensorFlow framework was also covered in the crash course presented by Josh Gordon from Google.

Prof. Olgica Milenkovic, from the University of Illinois, Urbana-Champaign spoke about using DNA macromolecules for data storage and computing. The talk covered DNA synthesis systems, third generation sequencing devices and DNA editing techniques as well as new theoretical developments in tagged sequence alignment and sequence reconstruction. Dr. Milenkovic's talk set an example of how one can leverage tools and ideas from very different disciplines such as coding theory and biology and combine them together so as to find promising solutions to critical real-world problems such as data storage and computing.

Prof. Rajesh Sundaresan, from the Indian Institute of Science, presented a tutorial on the application of belief propagation (BP) algorithms for solving combinatorial optimization problems. Focusing on the assignment problem, which is a well-known optimization problem, Dr. Sundaresan discussed the key ideas for solving this problem using the BP algorithms, including looking for structural symmetry as well as finding an involution invariance, which can be applied to many other optimization problems such as matching, edge cover, and the traveling salesman problem to name a few.

The talk by Prof. Yury Polyanskiy, from the Massachusetts Institute of Technology, surveyed novel tools and techniques required for the design and analysis of massive multiple-access radio networks which are expected to be a key element of the emerging Internet of Things (IoT) architectures. These techniques, which can find applications in many other communication scenarios, have unique characteristics such as defining the probability of error per user instead of globally for all users, scaling the number of users proportional to blocklength and forcing users to employ exactly the same codebook.

The Padovani lecture was given by Prof. Frank Kschischang from the University of Toronto. Dr. Kschischang provided a comprehensive introduction to lattices and their applications in various areas of communication. Dr. Kschischang's talk covered both fundamentals of lattices as well as deep connections between lattices and linear codes. He also covered several applications of lattices in the field of wireless communication. The Padovani Lecture is one of the awards given by the IEEE Information Theory Society and generously sponsored by Roberto Padovani. Dr. Kschischang

was officially recognized for this award at the IEEE International Symposium on Information Theory in Vail, Colorado in July 2018.

Prof. Naftali Tishby, from the Hebrew University of Jerusalem, presented a novel theory of large-scale learning with deep neural networks (DNN). Based on the correspondence between deep learning and the information bottleneck framework, Dr. Tishby argued that for large-scale DNN the mutual information on the input and the output variables for the last hidden layer provide a complete characterization of the sample complexity and accuracy of the network. Among other results, Dr. Tishby's talk provided a different perspective to analyze machine learning algorithms using techniques from statistical physics.

The school included a poster session that gave students the opportunity to present their research to peers and obtain valuable feedback. Overall, the school has provided a supportive environment and the foundation for building a career in information theory and related fields. In fact, two of the 2018 speakers, Alex Dimakis and Yury Polyanskiy, have attended NASITs in the beginning of their careers and have stated that attending the school was an invaluable opportunity for them.

Insightful talks and presentations were accessible to both beginners and advanced students. The participants reacted positively in shared comments about 2018 NASIT. Notably, Vipal Gupta from the University of California, Berkeley, found the topics to be very diverse stating that, "Obviously not all of the topics (were) directly related to my research, but the content of each … (got) me interested in that line of study." Ardhendu Tripathy from Iowa State expressed his appreciation for a great choice of speakers. And, Angie Forero, from the University of Campinas, Brazil, expressed what many other students communicated: "All was great!! The organization was perfect, the lectures and the speakers (were) well-prepared, (and) the venue was very comfortable and adequate."

The school was organized by Profs. Krishna Narayanan, Jean-Francois Chamberland, Anoosheh Heidarzadeh, and Alex Sprintson from Texas A&M University as well as Prof. Alex Dimakis from the University of Texas, Austin. Helping to pull it all together, there was a team of hard-working student volunteers and dedicated administrative support from Vickie Winston. The support of NASIT's Advisory Board, which includes Prof. Henry Pfister of Duke University, Prof. Emina Soljanin of Rutgers University, and Prof. Aylin Yener of Penn State, helped make 2018 NASIT a valuable experience.

Videos and presentation slides are available at the school website: shannon.tamu.edu.

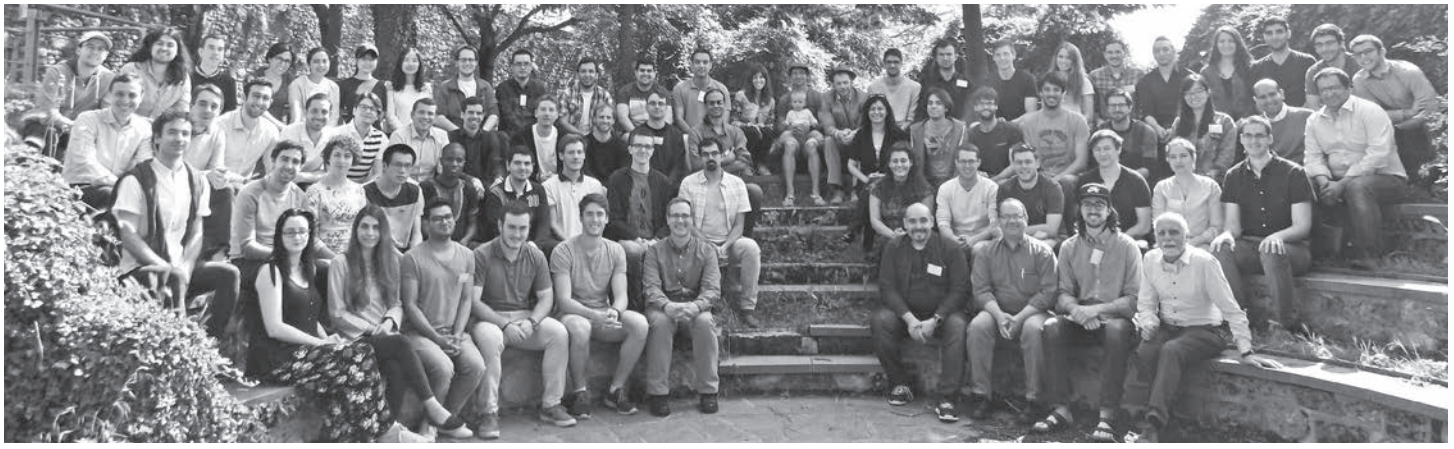
2018 European School of Information Theory

Enrico Paolini, Gianluigi Liva, and Georg Böcherer

The 2018 European School of Information Theory (ESIT 2018) was held from May 7th to May 11th in Bertinoro, Italy, a medieval village located on the hills of the Emilia-Romagna region, immersed in a typical Italian landscape, and known as the "Balcony of Romagna" due to its location on top of a hill from which the sight reaches the Adriatic Sea. The school venue was the University Residential Centre of Bertinoro (Ce.U.B.), a property of the Roman Curia managed on free loan by the University of Bologna. The venue is a historical place, already mentioned in documents dating back to 995 AD; over the centuries it has been under the reign of Emperor Frederick I Barbarossa, of the Malatesta family from Rimini, and eventually of the Roman Curia, being the Bishop's residence for about four centuries.

ESIT 2018 was attended by 85 persons, among which 73 young researchers (mostly PhD students, but also a few PostDocs) from 16 different European and extra-European countries (Algeria, Belgium, Denmark, Egypt, France, Germany, Israel, Italy, Netherlands, Russia, Serbia, Spain, Sweden, Switzerland, UK, USA), the organizers, Paul de Kerret (one of the organizers of the 2019 edition), and one baby. A T-shirt with the ITSoc logo was given to each attendee.

The school featured six exciting 3-hour tutorial lectures by six distinguished speakers, as well as two poster sessions during which students had the opportunity to present and discuss their own research in Information Theory. Tutorial lectures were given by Prof. Emre Telatar ("Information theory and statistics"), Prof. János Körner ("Information theory in disguise"), Prof. Olgica Milenkovic ("New problems in coding theory and computing driven by macromolecule-based data storage"), Prof. Marco Chiani ("Introduction to random matrix theory and its applications"), Prof. Richard Wesel ("Incremental redundancy"), and Prof. Moe Z. Win ("Foundations of network localization and navigation"). Poster sessions were lively and characterized by very fruitful interaction and discussions between students, often involving senior



attendees. The social program included a welcome reception on Sunday, May 10th, in the evening, a social dinner in a famous "hostaria" in Bertinoro, as well as several optional activities during Wednesday afternoon. The most attended activity was a wine tasting organized in a local cellar.

On Friday, May 11th, in the afternoon, after the conclusion of the school the venue hosted a meeting of the ITSoc Italy Section Chapter. During the meeting Prof. Navin Kashyap (ITSoc Distinguished Lecturer) gave a seminar titled "The communication complexity of secret key generation".

The organizing committee, composed of Enrico Paolini (University of Bologna, Italy), Gianluigi Liva (German Aerospace Center, Germany), and Georg Böcherer (Huawei, Paris) would like to thank the IEEE Information Theory Society for generous financial support, all lecturers for their beautiful presentations, and all young attendees for their vibrant participation. They would also like to acknowledge support received by Italian company SITAEL spa, valuable advices by Prof. Gerhard Kramer and by the organizers of the previous edition in Madrid. We all look forward to the next edition in the French Riviera!

The Information Theory e-print arXiv has New Moderators

In 2004 the IT Society supported an effort to have a new subject category in information theory on arXiv. The subject category was cross listed between the computer science subject domain and the mathematics subject domain and it received the acronyms cs.IT = math.IT.

In the past 14 years the information theory category saw a phenomenal growth and nowadays the number of posted articles exceeds 200 submissions a month. The total number of submissions in past years on cs/math.IT has been as follows:

2004	41	2009	962	2014	2007
2005	331	2010	1256	2015	2428
2006	365	2011	1360	2016	2595
2007	614	2012	1614	2017	2788
2008	790	2013	1956		

Nowadays (in terms of submissions) cs.IT is the 4th most active section out of 40 sections within the subject category of computer science and math.IT is the third most active section out of 32 sections within the subject category of mathematics.

Based on a rough count from about two years ago we estimate that about 2/3 of all papers published in the IEEE Transactions of Information Theory were first posted as Preprint on arXiv. In this way arXiv helps tremendously to disseminate new results in information theory in a timely manner.

arXiv.org started in August 1991 when mainly areas of physics and mathematics were covered. Nowadays it is a highly-automated electronic archive covering many subject areas. Since 2 years there exist also a new subject category of electrical engineering. arXiv is operated by the Cornell University Library with guidance from the arXiv Scientific Advisory Board. arXiv has obtained in the past generous support among others from the National Science Foundation and Simons Foundation.

Even though many processes on arXiv are fully automated, each subject category has in the back- ground 1–2 moderators who help to re-categorize papers which do or do not belong to cs/math.IT for reasons of content. Since the beginning of cs/math.IT in 2004 we, Joachim Rosenthal and Madhu Sudan, had been serving as moderators. Starting this year, Venkatesan Guruswami and Muriel Medard will take over as new moderators. We are thrilled to leave cs.IT/math.IT in such capable hands.

It is our hope that cs.IT and math.IT will keep helping the information theory community in the future as it has already done in the past.

Joachim Rosenthal and Madhu Sudan
Past Moderators of math.IT and cs.IT

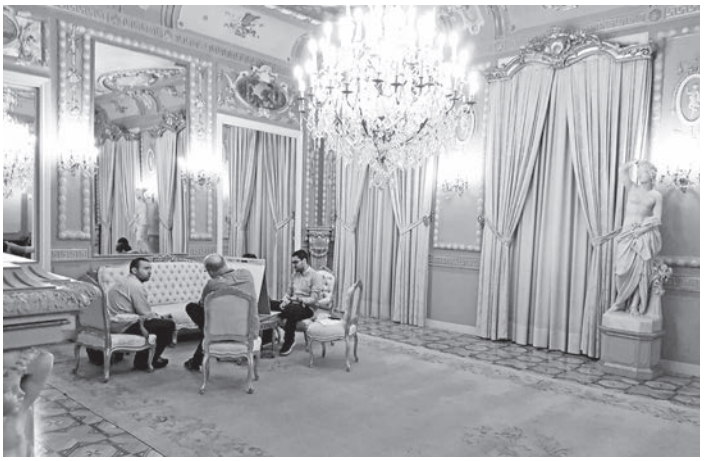
From the Field: IEEE Spain Information Theory Chapter

Gonzalo Vazquez-Vilar, Josep Font Segura

The IEEE Spain Information Theory Chapter received the 2011 and the 2017 IEEE Information Theory Society Chapter of the Year Awards for contributions to information theory research and education. These successful achievements are the result of a continuous effort to create a solid information theory community in Spain by promoting and organizing several events.

Some of these events include the 2013 IEEE Information Theory Workshop (ITW) that took place in the lively city of Sevilla, and the 2016 IEEE International Symposium on Information Theory (ISIT) hosted by the beautiful city of Barcelona. We are not presenting the details about these two major events here, as the reader probably enjoyed them first-hand. More recently, students from European institutions had the opportunity to share their ongoing research within the walls of a 17th century palace. It was during the 2017 European School of Information Theory (ESIT), held at the headquarters of the Spanish Royal Academy of Engineering in Madrid and attended by researchers from 15 different countries, Spain, France, and the UK being the most represented ones. The school featured four three-hour plenary lectures given by four experts in various information theory topics: Daniel J. Costello Jr. (University of Notre Dame) on "Spatially coupled LDPC codes: From theory to practice," Marco Dalai (University of Brescia) on "Channel reliability: From ordinary to zero-error capacity," Aslan Tchamkerten (Telecom ParisTech) on "Fundamental limits of asynchronous communication," and Ram Zamir (Tel Aviv University) on "Information-theoretic signal processing."

In addition to these international events, the regular chapter activities include a biannual technical meeting, the Spanish Workshop on Signal Processing, Information Theory and Communications (SIC). In this event, scientists from different universities of Spain meet to present the last advances in their research, attend tutorial talks in topics related to information theory and communications, and promote new collaborations. The SIC workshop has an important role for the IEEE Spain Information Theory Chapter to consolidate (and grow) the information theory community in Spain. Several of the talks in this workshop have an information theoretic



basis, helping to produce synergies across the research communities in signal processing, communications and information theory. As an example, the next SIC workshop will take place in the city of A Coruña in mid-September, and it will feature talks by Iñaki Esnaola (University of Sheffield), John Thompson (The University of Edinburgh), and Michèle A. Wigger (Telecom ParisTech). A central part of this workshop is the afternoon session, in which Ph.D. students and post-doctoral researchers present their recent work in a poster session stimulating interaction.

The list of events hosted in Spain is notably long given the small size of the IEEE Spain Information Theory Chapter, which is formed by only 30–40 members. Certainly, we will continue to foster the solid growth of the information theory community in Spain, strengthen the collaboration with signal processing and communication researchers, as well as explore synergies with emerging fields.

Chair: Gonzalo Vazquez-Vilar (Universidad Carlos III de Madrid)

Vice-chair: Josep Font-Segura (Universitat Pompeu Fabra, Barcelona)

From the EiC of the Transactions

Alexander Barg

The IEEE Transactions on Information Theory is the main journal of the Society, and many readers of this Newsletter are, or will be, authors of papers submitted to it. At the same time, I believe that the evaluation process of manuscripts from submission to publication has never been explained in these pages (certainly, until recently I was not familiar with many details). The purpose of this note is to inform the authors of the steps and persons involved in the evaluation of their manuscripts.

The Editorial Board is formed of Editor-in-Chief, Executive Editor, and Associate Editors in different areas of information theory covered by the Transactions. The current associate editors and their areas are listed on the inside front cover of each issue. They are also listed online at http://ece.umd.edu/trans-it/.

The same website contains Information for Authors which gives detailed instructions on preparing a paper for submission, suitability of manuscripts for the Transactions, basic criteria for acceptance, and similar information.

As most of you will know, submission of the paper is done online through Scholar One system that we have been using for a number

of years. Once the paper is submitted, it goes through administrative checkup to ensure that it satisfies the basic requirements (such as the presence of the manuscript, author details, etc.). No evaluation of the contents is done at this point. Once the checkup is completed, the paper enters the queue of Executive Editor (currently Prof. Igal Sason of the Technion—Israel Institute of Technology, Haifa, Israel). The main function of the Executive Editor is the assignment of the papers to Associate Editors and follow-up communication with them. At the rate of roughly 20 submissions a week, this requires some time every week (or every day) of the year[1]. The Executive Editor has the power of rejecting submissions without assigning them to an AE; this is done when the paper is clearly unsuitable for the Transactions for reasons of topical mismatch or the lack of an analytical component. If so, the EE will decline to consider this submission, often suggesting alternate venues where it could be a better fit. Every fast-reject decision is copied to the EiC who checks its validity. When in doubt, the EE consults with the EiC before rejecting.

The EE is appointed by the Board of Governors of the Society and serves in this role for 18 months. Upon completion of this term, the EE becomes the new EiC, and the previous EiC leaves the stage. This recent arrangement reduces the load, and also helps the EE to prepare for the EiC role. The EiC is in overall charge of the Transactions. The EiC and EE must complement each other technically so as to span a broad range of topics covered by the Transactions. The two interact daily, and I was fortunate to work under EiC Prakash Narayan, and to have Igal as EE for my EiC term. This close cooperation is a sine qua non, and hence a new EE is identified by the Nominations and Appointments Committee in consultation with the current EE who, as the next EiC, must work hand-in-hand with the successor EE. (The current EiC is also involved in this consultation.)

Once the paper is assigned to the AE, (s)he invites reviewers to prepare reports. This is not as easy as it sounds because convincing experts (you) to agree sometimes takes a while and may even involve a gentle follow-up email from the EiC. I would like to use these pages to issue an appeal to all of you: If you are invited to review a paper, please do answer immediately, and if you have agreed to review, please do write a timely report. Trivial as it sounds, this is the main reason for delayed editorial decisions, and it is not possible to phrase this better than was done by Paul Halmos: "Zero or infinity. Do the job now or do it never, and, in either case, say which, *now*." Of course, you will decline some review requests, but please maintain a healthy proportion of accepts (by the way, your reviewer history such as accept/decline, number of days in review, is saved on Scholar One and is available to the AEs).

Upon receiving the referee reports, the AE takes a decision. The options are to accept as is, revise and resubmit, or reject. The AEs often write detailed decision letters, effectively contributing another (open) review. The revision is required when the AE either anticipates acceptance and requests improved or more detailed presentation or when the technical arguments are unclear, and the authors are given the benefit of doubt. The AE has the power to go against reviewers' recommendations, and in the case of an adverse decision, provides detailed arguments that justify it. Every final AE decision is copied to the EiC, and I (honestly) read all of them and browse through all the reviews to make sure that the decisions are substantiated, well-formulated, and provide the authors with constructive feedback even in the cases of adverse decisions.

The Transactions also has an Executive Editorial Board, appointed by the EiC (no, the EE is not a member of the EEB). They serve in advisory roles, and are called upon by the EiC in complex cases which require collective experience and wisdom. Their names appear online and in every printed issue.

Once the paper is accepted for publication, the authors are requested to submit the final files. The AE checks them again to make sure that the final minor remarks of the reviewers are accounted for, and approves publication. The paper is then moved to the production portal, and the authors are notified about the posting of their yet unedited paper online on Early Access and the assigning of a DoI. You should now consider your paper published and write an email to your Department Chair about the same. The DoI constitutes a reference to the publication, it will never change, and it may be entered in your CV, grant reports, and the like. Once the paper is edited, IEEE prepares galley proofs and sends them to the authors. This is your last chance to make small changes, correct typos, update references, acknowledgments of support, and the like. Shortly after that the paper appears online in its final form.

To actually appear in the printed volume, the paper needs to be again approved, this time by the EiC, and assigned to an issue. This involves some delay, but please see FAQs below. The EiC also creates the Table of Contents and provides it to IEEE. The EiC interacts daily with IEEE, particularly with Lisa Jess who provides Scholar One support and Megan Hernandez who administers the production portal. It is not possible to overstate the help that we get from them!

I hope that this note contains some useful information. Please do reach out to me with questions. If there is enough material, I promise to write a follow-up column. In the meantime, here are some answers.

FAQs

1) *My submission is delayed beyond reasonable, why are you not doing anything to speed up the decision?* We do, both through automatic and personal reminders to reviewers. The EE and EIC also monitor the system for excessive delays. I follow up with personal letters, phone calls, even text messages (yes!). Thus, if you have difficulty contacting the AE, please seek the help of the EiC. If there are force majeure circumstances, the EiC moves the submission from the current AE to a new one, with a request for expedited handling. Delays do occur, but the good news is that our average sub-to-online pub time is currently at a reasonable 13 month number. Also, please remember: We are all referees and authors—so please do submit your referee reports on time.

2) *My paper was accepted and appears on Early Access for 5 months. Why are you not scheduling it to a printed issue?* The main reason is that the reduction of the sub-to-pub time has increased the queue of papers ready for print (no good deed goes unpunished). This increase has resulted in a longer wait. We also operate under the annual page limit budgeted with IEEE, and it is the responsibility of the EiC to spread the counts more or less evenly, or the December issue will be half the usual size because of reaching the limit. Finally, the

[1]As you will have calculated, we receive about 1K submissions per year, and publish about a half of them.

electronic publication, discussed above, suffices for many if not all practical purposes.

3) *My Dean told me that the impact factor of the Transactions is below what is expected on my promotion dossier. Any comments?* We are aware of this issue, but the remedy isn't immediate (although the IF went up from 2016 to 2017, and currently stands at 2.19). The main effort at this point is concentrated on increasing the cross-disciplinary appeal of the Transactions, and there are other initiatives. One quick fix: when you submit the final version of your accepted paper, please replace all arXiv and conference references with references to the Transactions, whenever possible. Every citation counts, and so does every click on IEEExplore!

4) *The AE is plain wrong in rejecting my paper. What do I do?* Contact the AE, presenting your (technical!) arguments. If not satisfied by the outcome of this exchange, contact the EiC. One of his/her functions is to consider such appeals and adjudicate the [final] decision on the submission, possibly involving external experts, consulting the Executive Editor and EEB, etc. If you need to write a strongly-worded email, please direct it to the EiC. They undergo psychological training and will not be offended.

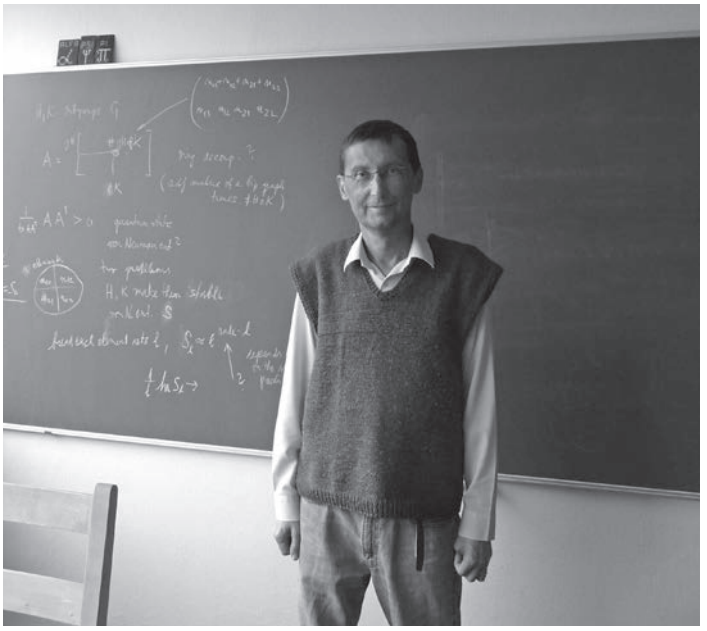
5) *I like/dislike/do not receive the printed issues. Will the Transactions become fully electronic?* All the stars point in this direction, although as of now there is no definite plan.

In Memoriam: František Matúš (1961–2018)

Imre Csiszár, Rényi Institute of Mathematics, Hungarian Academy of Sciences, Budapest

Milan Studený, Institute of Information Theory and Automation, Czech Academy of Sciences, Prague

František Matúš ("Fero"), mathematician and highly regarded contributor to Information Theory, passed away on May 17, 2018. He was born in 1961 in Poprad, Slovakia (then Czechoslovakia), and studied mathematics at the Technical University of Prague, graduating in 1984. He received the CSc title, theretime equivalent of PhD, from the Institute of Information Theory and Automation of the Czechoslovak Academy of Sciences (UTIA) in 1989. He has remained with UTIA during his scientific career, after two years with a Humboldt Research Fellowship at the University of Bielefeld, Germany. He was head of the Department of Decision-Making Theory of UTIA and Deputy Chairman of the Board for several years, as well as member of the mathematical panel of the Czech Science Foundation (2009–2013).



Fero's early works include his most cited paper [1], joint with J. Flusser. Fero addressed Radon projections already in his thesis, in [1] finite Radon transform is employed to image processing. The majority of his early works (15 papers) are about conditional independence structures and related subjects as graphical models, axiomatization of functional dependence, relation to algebraic independence, etc. His expertise in matroid theory has been effectively used in this work.

My[1] first closer contact with Fero happened when both of us attended a meeting in Bielefeld, and Fero helped me to find a garage to fix my damaged car so that I could drive home. We then became friends and later we wrote 9 papers of information-geometric flavor, on I-projections, exponential families, and their closures, etc. culminating in [2] about minimization of general entropy functionals subject to moment constraints, dispensing with standard regularity conditions. I have enjoyed collaboration with Fero for his deep insights and utmost care for mathematical precision and generality. He did have also other papers on related subjects, such as [3] with N. Ay about distributions that maximize I-divergence from an exponential family.

Fero's most significant contributions to Information Theory are likely his deep results about the so-called entropy region, or about those linear inequalities that always hold for the Shannon entropy of discrete random variables. The first such inequalities, not implied by those of Shannon were found by Zhang and Yeung [4]. Via ingenious polymatroid techniques, Fero constructed many such inequalities, and in his second most cited work [5] he showed the existence of infinitely many (independent) ones. The recent work [6] with L. Csirmaz also establishes

[1]First person refers to I. Csiszár

deep structural properties of the entropy region, also refuting the so-called four-atom conjecture. Some results about the entropy region have been extended to quantum entropies (with coauthors) in [7].

In addition to mathematics, Fero also loved music, mainly jazz but classical too. He has composed, as well, had several jazz compositions. At some mathematical meetings, where a piano was available, such as Information Geometry and Applications in Liblice, 2016 (Czech Republic) and the Algebraic Statistic Workshop in Oberwolfach, 2017 (Germany), he gave informal concerts. His playing the piano attracted participants to listen, and at the end Fero received long-lasting applause.

František Matúš left this world too early, after fighting for years with a serious disease. He never gave up, continued working and hoped for recovery. Sadly, it happened otherwise. He will be missed by his colleagues, even more by his family. He is survived by wife Jana and son Vladislav.

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IEEE Information Theory Society Board of Governors Meeting

Location: Catamaran Resort, San Diego, USA

Date: 11 February 2018

Time: The meeting convened at 1:00pm PST (GMT-7); the meeting adjourned at 7:20pm.

Meeting Chair: Elza Erkip

Minutes taken by: Stark Draper

Meeting Attendees: Alex Acero#, Jeff Andrews, Sasha Barg, Suhas Diggavi, Alex Dimakis, Stark Draper, Michelle Effros#*, Yonina Eldar#, Elza Erkip, Christina Fragoulli, Andrea Goldsmith#, Stephen Hanly, Michael Langberg#, Matt LaFleur#, Pierre Moulin, Prakash Narayan, Krishna Narayanan, Alon Orlitsky, Salim El Rouayheb#, Anand Sarwate#, Emina Soljanin, Daniela Tuninetti, Rüdiger Urbanke, Emanuele Viterbo, Aaron Wagner, Tsachy Weissman*, Michelle Wigger, Greg Wornell, Aylin Yener, Wei Yu.

(Remote attendees denoted by *, non-voting attendees by #.)

Business conducted between meetings: There were no votes conducted by email between the Oct. 2017 Information Theory Society (ITSoc) Board of Governors (BoG) meetings and this meeting.

At 1:00pm local time, ITSoc president Elza Erkip called the meeting to order. She started by reviewing the agenda.

Motion: A motion was made to approve the agenda. The motion passed.

Motion: A motion was made to approve the draft minutes of the Oct. 2018 ITSoc BoG meeting. The motion passed.

1) **President's Report:** Elza presented the President's report. This is the 70th anniversary of Shannon 1948 paper and, while the Society is moving into a more senior role, 70 is the new 40, so it stays young at heart! Thanks were made to Michelle Effros, who served as senior past president last year. Elza recognized Michelle's years of service and the many roles she played. Elza then welcomed Helmut Bölcskei, to the presidential cycle and reviewed the

presidential suite. Elza recognized Daniela Tuninetti's service as ITSoc Treasurer. Daniela concluded her term at end of 2018 and will be presenting her final report today. Elza recognized retiring BoG member Ubli Mitra, and welcomed back four re-elected BoG members: Stephen Hanly, Vincent Poor, Aylin Yener and Wei Yu. She also welcomed back Daniela in her new role as elected BoG member. Tsachy Weissman was welcomed to the BoG as a new member. Elza thanked Michael Langberg for his three years of service as ITSoc Newsletter editor. Elza thanked Dave Neuhoff, who most recently served as external nominations committee chair. Ubli Mitra will be chairing that committee going forward.

A number of ITSoc members received IEEE Awards this year. Two received IEEE Medals. The first was Nambi Seshadri, who received the IEEE Bell Medal, and Erdal Arikan, who received the IEEE Hamming Medal. IEEE technical field awards were awarded to Peter Shor (IEEE Sumner Award) and Nicolas Laneman (IEEE Tomiyasu Award).

Elza then looked forward. The Shannon documentary is nearing completion. An in depth report was to follow later in the meeting. She quickly reviewed progress on the two possible new ITSoc publications, a special topics journal and a magazine. More details on both will be presented later in the meeting, with votes on the appointment of the respective steering committees to be held. The special topics journal will, pending BoG approval in this meeting, shortly move to the Phase I proposal stage. For the moment the (shortly to be approved) magazine steering committee is recommending pausing the magazine approval process to allow IEEE consideration of the special topics journal to occur first.

Elza next reviewed ongoing outreach efforts regarding which the BoG will hear today: the children's book, the "Information Theory Hall of Fame" videos, and Webex inited seminars.

Elza then pointed to an IEEE-level review of the Society, scheduled to happen later this week, with a report on the Society to be presented at the ISIT Vail BoG meeting. She also mentioned a number of discussions at the IEEE and Society levels regarding diversity and inclusion. Elza will present a statement from the IEEE that the BoG can choose to adopt later in the meeting. There have also been grassroots movements to produce an ITSoc statement that would contribute to a conference code-of-conduct, and also to form a Society-level ad-hoc committee on diversity and inclusion. Discussion of both will follow in this meeting.

Elza next brought a few motions to the BoG's attention regarding appointments to various service roles.

Motion: To approve Aaron Wagner as new Treasurer of ITSoc. The motion was moved and seconded. The motion passed unanimously.

Motion: To approve Salim El Rouayheb as the new editor of the ITSoc Newsletter The motion was moved and seconded. The motion passed unanimously.

Motion: To approve a steering committee for the Journal on Selected Topics in Information Theory (JSTIT) consisting of Jeff Andrews (Chair), Robert Calderbank, Muriel Médard, Vincent Poor, Rüediger Urbanke. The motion was moved and seconded. The motion passed unanimously.

Motion: To approve a steering committee for the Information Theory Magazine consisting of Wojciech Szpankowski (Chair), Dan Costello, Christina Fragouli, Ubli Mitra. The motion was moved and seconded. After a discussion, summarized below, the motion carried.

The BoG discussion surrounded a recommendation by Wojciech to hold off, for now, the appointment of a final member of the steering committee. Wojciech hopes that, once the steering committee is convened, the initial members can jointly identify an additional candidate that could provide a diversification of research interests complementing the initial composition. The BoG raised the question of whether increased geographic diversity should also be considered in the formation of the steering committee(s), and perhaps inclusion of a representative from industry. The duration of the committee was also asked about. Indeed, one task of both steering committees is to define their own charters (then to be presented to the BoG) which would set guiding principles and would also specify logistical considerations such as duration of tenure.

Finally, Elza asked Rudi to discuss nominations to fill an open slot on the Nominations and Appointments (N&A) Committee. Elza clarified that this nomination is a holdover from last year and so is being handled by Rudi. Rudi discussed how one Society goal is to increase geographic diversity in the composition of our committees. As the N&A Committee is the "mother" of all other committees, having geographic diversity on the N&A Committee is especially important. Two candidates were presented for the BoG's consideration: Prof. Jong-Seon No (of Seoul National University) and Prof. Raymond Young (of the Chinese University of Hong Kong). Voting will be conducted online.

2) **Treasurer's Report:** The Treasurer's report was deferred till later in the agenda due to flight delays.

3) **Nominations and Appointments (N&A) Committees:** Nominations and Appointments (N&A) Committee Chair Alon Orlitsky began by reviewing the composition of the N&A committee. As was previously noted N&A needs one additional member. Alon then reviewed the composition of the Fellows Committee. Aylin Yener was a member of this committee but has been appointed to the IEEE-wide Fellows committee and so she has asked to be recused from the ITSoc committee for a year. Antonia Tulino has agreed to join the committee for a three-year term. Alon next reviewed the shift-register pipeline of the Editor-in-Chief (EiC) and Executive Editor (EE) of the Transactions. The current EiC Prakash Narayan and EE Sasha Barg nominated Igal Sason of the Technion to be the next EE. Alon reviewed Igal's CV. The BoG asked what the process is for nominating the EE. Prakash was at the meeting and reviewed the criteria he and Sasha considered: technical capabilities, service, areas of expertise that complement the current EE (the

future EiC), and sounding out candidates on their interest to take on the position. He and Sasha then make a recommendation to the N&A Committee. There was a discussion of complementing the current process with an open call, e.g., perhaps through the Newsletter.

Motion: There was a motion to confirm Igal Sason as the new EE of the Transactions. Coming from a committee a second was not needed. The motion passed unanimously.

4) **Membership Committee:** On behalf of Committee chair Helmut Bölcskei Elza made the report of the Membership Committee to the BoG. Elza first reviewed the ITSoc Distinguished Lecturers program. Each year five new lecturers are appointed for a two year period. This year Marco Dalai, Amos Lapidoth, Vincent Tan, Sennur Ulukus, and Aaron Wagner were appointed. All have committed to give at least one lecture over the next two years. Elza also reviewed the set of continuing lecturers. Elza then turned to the Schools Subcommittee. Aylin Yener has chaired this committee for many years and Elza thanked her for her service. She then nominated a new chair.

Motion: To confirm Stark Draper as chair of the Schools Subcommittee. The motion passed.

Elza then turned to the Outreach Subcommittee. She thanked outgoing chair Aaron Wagner and nominated a new chair.

Motion: To confirm Vincent Tan as chair of the Outreach Subcommittee. The motion passed.

As came up in earlier meetings, and was raise by the IEEE in the last Society review, Elza reminded the BoG that the IEEE wants Societies to establish better connections with young professionals in industry. The officers and the N&A committee have been looking for an ITSoc member in industry to play two roles. In the first role he/she would serve on the ITSoc Membership Committee. In the second he/she would serve as the ITSoc representative on the IEEE Young Professional Committee. The N&A Committee is recommending Yony Murin, who works at Apple, for this role. Yony completed his PhD at the Ben-Gurion University, Israel, and was a postdoc at Stanford University.

Motion: To confirm Yony Murin as ITSoc Young Professionals Representative. The motion carried.

The report concluded with a discussion of the ongoing reorganization of the Membership Committee. The Schools and Outreach committees are to be reorganized under the Membership Committee. While that reorganization has not yet been completed, the above confirmations match the future organizational structure of the Membership Committee. We are currently in a transition period.

5) **Treasurer's Report:** Outgoing Treasurer Daniela Tuninetti next presented her (final) Treasurer's report. Daniela reviewed the budget from 2017, the approved budget for 2018, and some upcoming initiatives and deadlines.

Daniela showed the 2017 results as per the FM13 (fiscal month 13) report. Revenue and expenses seem mostly to be as budgeted, with some normal variations, with the two following exceptions.

First, in 2017 $105k USD was budgeted for new initiatives under the "3% rule" for continuation of the Shannon Centennial Broad Outreach initiative. Of this, less $50k USD appears to have been spent as of FM13. It was, however, noted that a number of expenses for new initiatives, including $30k USD for videos, were filed only very late in the year and thus may not yet have appeared on the official IEEE ledger.

Second, in 2017 the IEEE budgeted ITSoc revenue from periodicals of $863k USD (from publications, digital library, and fees). However, FM13 reported income was only $706 USD. Alex Acero (Director of IEEE Area IX, who was in attendance) mentioned that overall IEEE revenue from publications is expected to be less than budgeted and that this will result in less revenue redistribution to societies and councils. ITSoc has seen a trend in declining publication revenue over a number of years, and this is expected to continue as a result of the decline in IEEE Xplore clicks for the Transactions and IEEE-level changes in revenue redistribution. It is expected that the overall revenue will be $109k USD less than budgeted.

Final numbers for 2017 will only be available from the IEEE in March.

Daniela then discussed the 2018 budget. The budget includes $68k USD under the "3% rule" for continuation of the Shannon Centennial Broad Outreach initiative, resources that will soon need to be assigned to ongoing projects. The 2018 budget for new initiatives under the "50% rule" will be available once the IEEE books close in March 2018. Daniela reminded the BoG that the goal of a zero operational net means that any variation can leave the Society in the negative.

Due to the large shortfall in 2017 revenue, in comparison to IEEE predictions, there was a discussion of how ITSoc gets it budgeting information from the IEEE. Generally the Treasurer and Officers felt that they could use help understanding the budgetary forecasting process at the IEEE level. Assistance was offered by Alex Acero.

Finally, a number of ideas were raised by Daniela and other BoG members regarding sources of increased revenue. First, in comparison to other societies, ITSoc revenue has traditionally come more from publications than from conference fees, but the gap between the two is decreasing as publication revenue decreases. Increasing conference fees would yield an immediate increase in income. Second, ITSoc has only one publication at the moment. Sibling societies have many more. The new initiatives of a special topics journal and a magazine could, in the long term, increase revenue. However, over the next few years, as these publications are getting established, they will contribute more to expenses than to revenue. Third was a change approved by the BoG at a previous meeting; the subsidy for printed subscription

to the Transaction is ending. This is expected to have a smallish net positive effect on overall Society income. Other possibilities raised by the BoG include enforcing page limits or extra page charges. Neither has ever been applied to the Transactions, though one or both will almost certainly be applied to any new publication.

6) **Conference Committee:** Conference Committee Chair Emanuele Viterbo updated the BoG on the membership of the Committee, which includes three new members to be voted upon for approval. He thanked outgoing members Rudi Urbanke and Ubli Mitra. The proposed three new members are Daniela Tuninetti, Li Chen, and Salman Avestimehr.

   Motion: To confirm Daniela Tuninetti, Li Chen, and Salman Avestimehr as members of the Conference Committee. The motion passed.

   Emanuele then reviews the IT Symposia. Barcelona'16 is closed with a surplus of 8.1%, the audit is concluded. Aachen'17 is almost closed, with a surplus of about 10%. There was nothing to report about Vail'18. Paris'19 is requesting BoG approval of its loan so that it can place a deposit on the venue. Los Angeles'20 needs BoG approval of its budget for IEEE to sign contracts. There was nothing to report about Melbourne'21.

   There was a question about the relative costs of ISIT versus non-IEEE conferences, some of which are significantly less expensive, and what ITSoc might learn from those conferences. Ideas on how to reduce costs included not to have a full awards lunch or banquet or to make them an extra charge. Apparently, in the past ISIT followed such a model. The Symposium could be shortened, e.g., limiting it to four days instead of five. There was a discussion of how quickly such ideas could be implemented. It was asked whether symposia, the planning of which is already ongoing, could adopt some of these cut-reducing measures. Emanuele will relay these ideas to organizers to see what flexibility can be built into registration offerings and budget. The BoG vote to approve the budget of ISIT 2020, Los Angeles, was to be held online a few weeks following the BoG meeting. This was to provide the organizers an opportunity to consider alternative arrangements for the banquet to reduce cost and increase the surplus.

   A question was raised about industry sponsorship and whether the Society might help organizers get industry support, rather than leaving each organizing committee to start from scratch. The BoG also asked clarifying questions regarding the number of this year's ISIT submissions, and how that number has varied over time.

   Emanuele then reviewed IT workshops. Cambridge'16 is closed. Kaohsiung'17 has closed its budget with a surplus of 6.26%. Guangzhou'18 is on track. A proposal was made for holding an ITW in Visby, Sweden in late August 2019. A proposal will be made at the ISIT'18 BoG meeting to hold an ITW in Italy in 2020.

   Motion: To approve the proposal to hold ITW in Sweden in 2019. After discussion (see below) the motion was approved. The BoG raised a concern about timing, less than two months after ISIT'19 which will be held in Paris.

7) **Schools Subcommittee:** School Subcommittee Chair Aylin Yener reviewed the schools from 2017, and discussed the upcoming school for NASIT'18 to be held at Texas A&M. Krishnan Narayanan, chair of NASIT'19, reviewed preparations for the school. Aylin also reviewed the ESIT'18 school. Michelle Wigger presented a proposal to hold ESIT'19 in France at Eurocom with students to be housed in Antibes.

   Motion: To support the holding of ESIT 2019 in France and support ESIT'19 in the amount of $15,000 (USD). The motion carried.

   Aylin concluded her report by discussing the NASIT'18. There were 40 attendees at NASIT'18, whereas in the past attendance has been approximately 100. It is hoped that this year was an anomaly. There was an unfortunate overlap in dates with a major CS conference. BoG members also noted that it is very important to advertise the program of schools early and widely, before students firm up plans for summer travel or internships. The schedule, list of speakers, and speaker topics, should be made available as soon as possible. The Committee will monitor attendance.

8) **Publications:** EiC Prakash Narayan next discussed the state of the Transactions. Prakash will be stepping down as EiC on 30 June 2018. Sasha Barg will take over as EiC on 1 July 2018. And, as was approved earlier in the meeting, Igal Sason will start his term as EE on 1 July 2018. Prakash reviewed the number of papers published and the sub-to-pub time. The latter has dropped from 20.7 months in 2012 to 15.4 months in 2017. For the past few years the annual page count of the Transactions has been roughly 7500. In 2017, however, the page count was close to 8000. The page count in 2018 is expected again to be close to 8000 due to an extra (thirteenth) issue; the special issue in memory of Solomon W. Golomb. Prakash then reviewed some recent initiatives. The first is the invitation of cross-cutting articles that connect information theoretic ideas to developments in complementary fields. Currently two such articles are in review and two more are expected to be submitted the next few months. The second is the monthly email delivery to subscribers of the Transactions' table-of-contents. Prakash reviewed the editorial board and thanked retiring associate editors. He then made a motion.

   Motion: To approve two new associate editors to the editorial board: Bikash Kumar Dey and Maxim Raginsky. The motion was approved.

9) **Newsletter:** Outgoing Newsletter Editor Michael Langberg reviewed the parameters, logistics, and goals of the ITSoc Newletter. He discussed regular columns and ongoing projects which include developing content on open problems, columns on how to teach information theory, the provisioning of space in the Newsletter for funding agencies to advertise opportunities to the research community, and an upcoming series of columns on the history of information theory. Michael also discussed the upcoming turn-over of the editorial board and raised the question of whether the

four annual issues of the Newsletter are really required. Three issues may suffice, and would better correspond to the academic calendar and cycle of BoG meetings. Looking forward, a change to a three-yearly cycle may also ease the transition of Newsletter content into the proposed ITSoc Magazine.

10) **Online Committee:** Online Editor and Online Committee Chair Anand Sarwate update the BoG on his committee's work. Ali Tajer has been appointed to the committee. His initial focus will be on collecting and organizing information on past Shannon lecturers. Anand discussed maintenance issues and statistics of the monthly email distribution of the Transactions' table-of-contents: 30-40% of subscribers open the message and 10% click through to view articles. Anand next discussed the ITSoc YouTube video content. In the four weeks preceding the BoG meeting (mid-Jan to mid-Feb 2018) there were 1724 views with 11,348 minutes of viewing time. The direct link to the ITSoc YouTube channel is https://www.youtube.com/channel/UCNCCcJS339B8H2PVtq68YQg.

    Anand is concluding his term and shared some thoughts on how the role of the Online Committee and its chair should evolve. Anand first suggested creating a shift-register model for the Online Editor, paralleling that recently put in place for the Transactions. Under this model the role of the Online Editor could become more about soliciting and curating content rather than generating content. He suggested that the website could profitably evolve into a landing space for the general public to lean about information theory. He suggested that the development of outreach to industry could be an added aspect of the website and suggested that material should be reorganized by subject rather than by event (as it is currently). To support these ideas, as well as to provide needed maintenance and upgrades, additional funding will be required.

11) **IEEE Division IX, Director:** IEEE Division IX Director Alex Acero attended the meeting the better to connect to ITSoc, which is one society within Division IX. Alex works at Apple and has been an IEEE volunteer for 25 years, closely affiliated with the Signal Processing Society. His hope in attending the BoG meeting was to learn from ITSoc so that he can use what he learned both to help the IEEE and to help ITSoc within the IEEE. As Alex has served on many committees within the IEEE he offered that his experience, e.g., on serving on financial committees, might help ITSoc better navigate some of the financial challenges (mentioned above) that it is currently facing. Alex overview the organization structure of the IEEE including the IEEE Board of Directors, the Technical Activities Board (the "TAB" of which ITSoc is a part, the role of which is to represent the interests of the technical societies), Member and Geographic Activities (MGA), Educational Activities, IEEE Standards, Publication and Service Products, IEEE USA. Alex is the director of Division IX for 2018–19. Division IX consists of seven societies. The grouping of societies into divisions is by size, not by topic. There are ten divisions in all. In contrast, MGA divides up members by geographic regions, of which there are also ten. Currently 43% of overall IEEE membership (which is roughly 417,000) is in the US. Six of the MGA regions are in the US. This is an historic artifact of the fact that the IEEE was founded in the US. While IEEE membership in the US has decreased by 14% in the past 10 years (it currently stands at 181,000), it has increased by 123% in India (currently 52,000) and 286% in China (currently 19,000). Most membership in India and China is at the student member level. The greatest drop in membership has been among industrial members. E.g., in 2000 60% of (non-student) members were in industry while only 14% were in academia. In contrast those numbers respectively stand at 47% and 29% today. It appears that a significant contributing factor to the drop in industrial membership is the emergence of the ArXiv. Due to the ArXiv, (former) industrial members no longer need to be able to log in to IEEEXplore to access state-of-the-art research results. Alex discussed challenges that face societies across the IEEE, in particular that growth has slowed across the board. There was a discussion of how large and small societies fit within the IEEE, how IEEE overhead impacts societies, and the formula for distributing resources to societies. Alex discussed some of the dynamics within IEEE, how the committees work, and the objectives of the IEEE Board of Directors.

12) **Shannon Centennial Committee:** Dawn Faelnar, a designer who has been working with Anna Scaglione and Christina Fragoulli on the children's book, next made a presentation. She discussed possible distribution channels, mainly via Amazon. Amazon can both produce and ship the book. (ITSoc simply provides the PDF.) Amazon has options regarding the amount of royalties that would be accrued per book, from negligible to larger. Anna next discussed final revisions, the possibility of producing translations, and outstanding questions of copyright and royalties that involve discussions with the IEEE. Anna discussed how to connect to target audiences, discussing the appropriate age range, groups such as "Girls who code", and developing educational experience that could be provided to schools in conjunction with the book. The BoG raised the question of whether IEEE Education could support the final revisions and provide a direct distribution channel. However, meeting attendees that have interacted with IEEE Education voiced the opinion that the younger age bracket that the book is written for is not a target audience of IEEE Education, it is too young. In closing Anna presented a request for a final round of funding to complete the project. The BoG decided to defer that discussion pending greater clarification of the 2018 budget.

    Motion: Conditioned on approval from IEEE regarding copyright issues, the Committee can make the book available for distribution. The motion was seconded. The vote carried.

13) **Video Project:** Suhas Diggavi presented an update on the YouTube videos that are being created by Matthieu Bloch, Michelle Effros, Christina Fragouli and him. The first two videos, on network coding and space-time codes, are now both available online:

    Network coding: https://www.youtube.com/watch?v=B0ZcAWEvjCA

    Space-time codes: https://www.youtube.com/watch?v=cbD4NsZQKYw

Two additional video efforts are in the works. The first will be on the Lempel Ziv algorithm and the second on low-density parity-check codes. Looking forward, Suhas conveyed the following message from the entire team involved with this project. They would really like input from the BoG (and the broader ITSoc membership) to identify topics for videos that would cater to interests both inside and outside of ITSoc. He commented that a more systematic approach is required to broaden the set of people involved, a broadening necessary to sustain the effort.

14) **JSTIT Proposal:** Jeff Andrews discussed the proposed IEEE Journal of Special Topics in Information Theory (JSTIT). A letter of intent (LoI) was submitted to the IEEE in August 2017, following a BoG vote at the July 2017 BoG meeting. The LoI was approved and IEEE provided some feedback. The next steps were the formation of a steering committee and the submission of a "Phase I" proposal to the TAB. Jeff reviewed the membership of the steering committee (see the President's Report, above) and its key responsibilities. The latter include directing the journal to technical and financial success, selecting the EiC, selecting the initial senior editors, seeding early special issues, and drafting the bylaws that will govern the JSTIT. Jeff reviewed the process of the Phase I proposal and (assuming success) the follow-on Phase II proposal. He also reviewed the rational for the journal: technical/scholarly, logistical, and financial.

There was a discussion of the finances of the new journal, whether it could be funded from Society reserves as a new initiative or would need to be supported as part of the annual budge, and how ITSoc's annual budget would be impacted. Jeff reviewed income numbers for the IEEE Journal of Special Topics in Signal Processing (JSTSP) which was founded in 2007. (The Journal of Special Areas in Communications, JSAC, is much more established, so less fitting as a point for comparison.) JSTSP spent about five years loosing money but for the last five years, and at present, is about $100k USD in the positive each year. This revenue is income for the Signal Processing Society. Jeff was asked about the break down of that $100k USD in income; roughly two-thirds comes from IEEEXplore and one-third from over length page charges. A small amount comes from open-access fees.

A question was raised whether the existence of JSTSP could reduce submissions to (and therefore income from) the Transactions. A meeting attendee that serves on the JSTSP editorial board stated that such is not the case for JSTSP. In other words, the existence of the JSTSP appears to have had no impact on submission to the Transactions on Signal Processing. Jeff committed to provide data to the BoG on this or the next meeting.

In conclusion, Jeff reviewed the timeline. The Phase I proposal is to be submitted to the TAB in March. The recruiting of senior editors is to occur in mid-2018. The editorial board will then start to line up the first special issues in the second half of 2018. The JSTIT will hopefully launch in mid-2019. A final comment was made regarding the timing of the proposals of the special topics journal and the magazine. It was felt that gaining approval of the TAB for a special topics journal is less automatic than getting approval for a magazine. For example, the relationship of the proposed special topics journal to existing publications must be mapped out. In contrast, all societies are approved to have a magazine. This is one reason why first efforts will be dedicated towards getting the special topics journal approved, with work on the magazine to follow.

Motion: To submit a Phase I Proposal for the Journal of Special Topics in Information Theory in March 2018. The motion carried.

15) **Discussion on Statement to Reaffirm IEEE Code of Conduct, IEEE Code of Ethics, and IEEE Non-discrimination Policy:** Elza Erkip next discussed the increasing recognition, and broad societal conversations regarding, harassment, bullying and discrimination. IEEE has several existing relevant policies: the IEEE Code of Conduct, the IEEE Code of Ethics, the IEEE Policy on Nondiscrimination. Through joining the IEEE all IEEE members have agreed to uphold the values in these codes and policies. That said, because of recent high-profile cases, the IEEE has been in process of formulating a statement, led by the IEEE TAB Committee on Diversity and Inclusion, for societies to adopt, at their own discretion. The following statement, vetted by IEEE lawyers, is being presented to societies for their discussion/approval /adoption/posting on their website and materials, etc. The IEEE is also voting on adopting this statement.

Motion: To approve the dissemination of the following statement: "IEEE members are committed to the highest standards of integrity, responsible behavior, and ethical and professional conduct. The IEEE Information Theory Society reaffirms its commitment to an environment free of discrimination and harassment as stated in the IEEE Code of Conduct, IEEE Code of Ethics, and IEEE Nondiscrimination Policy. In particular, as stated in the IEEE Code of Ethics and Code of Conduct, members of the Society will not engage in harassment of any kind, including sexual harassment, or bullying behavior, nor discriminate against any person because of characteristics protected by law. In addition, Society members will not retaliate against any IEEE member, employee or other person who reports an act of misconduct, or who reports any violation of the IEEE Code of Ethics or Code of Conduct." Follow a discussion (see below) the motion passed.

In the discussion that followed a question was raised regarding which "law" the statement applied to. As the IEEE is a US-based organization it was thought to refer to US law.

16) **Information Theory Society Conference Statement and Ad-Hoc Committee on Diversity and Inclusion:** Following the discussion of the IEEE Code of Ethics and Non-discrimination Policy, Stark Draper described an independent grass-roots effort, from within ITSoc, to develop an ITSoc Conference Statement in response to recent reports of gender harassment. Stark described two motions that a group of BoG members formulated. The group included

Elza Erkip, Tara Javidi, Tsachy Weissman and Stark. The group was motivated by the current and broad societal conversation on harassment (#MeToo, #WomensMarch, #GBV) events at related technical conferences (NIPS'17), in Hollywood, and in politics (U.S., Canada, and elsewhere). The group felt that it is important for ITSoc to take an explicit stance to spell out that the BoG is committed to encouraging a safe, welcoming, and equitable environment for all. The group felt that the BoG being prompt and visible in its actions would help people of all groups (including women, and those of all ethnicities, religions, gender identities, and sexual orientations) to decide to join and to stay in our community and to help ensure the relevance and vibrancy of our discipline. The group felt also that this objective falls squarely in line with strategic discussions the BoG has been having over the past year. These have focused on how to ensure the relevance and impact of ITSoc and information theoretic perspectives on a broad range of scientific disciplines. Not only do we need to develop connections — e.g., evidenced by the launching of the special topics journal and the magazine — but we need the best and brightest to choose information theory as their discipline of choice, and to stick with ITSoc. Stark described two proposals. The first is a statement that is proposed to be included in all ITSoc conference and workshops. The second is a proposal to form an ITSoc ad-hoc committee on diversity and inclusion. Both motions are described below and the ensuing BoG discussion is detailed thereafter.

Motion: The IT Society BoG is committed to creating and ensuring an inclusive, welcoming, and safe environment for everyone in the field of information theory at all of our events and experiences. In particular, we require ITSoc sponsored conference/workshop organizers to commit to uphold this standard at ALL events held at or in conjunction with their main conference/workshop, even and particularly at those events broadly defined as conference social events and non-technical activities. We require that the following note be displayed prominently in the conference programs/hand-outs/websites:

> "Social outings, events, and activities are integral components of many academic workshops, and conferences. Despite the inherent hierarchical nature of academia in terms of seniority, advancement, contributions, and recognitions, academics often strive to build communities of collaborators, and friends across seniorities, generations, and institutions. Various conference-related social events with their less formal environments provide a great resource to the attendees to network, advance their careers, learn about others' works, make friends and meet potential mentors. On the other hand, exactly because of their less formal settings, these events can fall short of providing an inclusive, welcoming, and safe environment for all.
>
> In this context, we respect and encourage those who have chosen to speak out, in effect demanding that the academic and professional communities pay more attention, take notes, and continued actions. We would also like to take their lead and remind each and every attendee to take it upon her/himself to ensure that these social events do not become fertile grounds for abuse of power, sexual harassment, and/or bullying. Furthermore, we recommend our attendees to use common sense, support each other, and create a safe space by speaking up against any form of harassment or bullying.
>
> We will also like to remind our attendees to review the IEEE's code of conduct and follow the suggestions and best practices for how to make the IT Society conferences and venues safe and inclusive. Please consult the IEEE website and online sources for resources on how to report and combat all forms of harassment."

Motion: Form an Ad-Hoc Committee on Diversity and Inclusion.

After reading the first motion on the conference statement, Stark described potential activities of the ad-hoc committee. It could, for example, write an article in the Newsletter to reach out to and involve community members. It could develop a set of metrics on diversity and inclusion to track. It could partner with the new IEEE-level TAB Committee on Diversity and Inclusion.

A number of points were raised in the BoG discussion. First, Stark was asked to clarify who drafted these motions. It was the group of BoG members mentioned above— Draper, Erkip, Javidi, Weissman. A question was asked whether the statement would need to be displayed by conferences that are co-sponsored, and a second questions was asked about meetings that are held in international locations since it seems quite possible that in certain jurisdictions such a statement would not "fly". While the answer to the former would need to be considered, regarding the latter it appears that a similar concern applies to umbrella IEEE policies on non-discrimination. Questions were raised on whether such a statement was necessary, whether it simply falls under the existing code-of-conduct. Members voiced opinions that the proposed statement is a nuanced version for conference and makes it clear that the above expectations hold also for social events associated with conferences (This point was confirmed already to be the case by those in the room with experience at the IEEE level). Some members also thought that, even if the some of the ideas fall broadly under IEEE statements, it is good to be explicit. Some IEEE statements are vague and a statement such as this one—coming up from the society level—could serve as a template for other societies to build off. Questions were raised about, once we have a statement, what is the procedure if something does occur. It was affirmed that there is already an IEEE process, one that can lead to loss of membership and loss of the ability to publish in IEEE publications. A worry was raised that conference organizers cannot really control all the things that occur at conference, so perhaps we should limit the statement to what the organizers can control. Others felt that the purpose of the statement is for the organizers to remind the attendees about these matters.

At this point Stark made the first motion on the conference statement. The motion was seconded by Suhas Diggavi, Daniela Tuninetti, and Wei Yu.

A number of points were then raised about the design of the statement, its length, certain phrasings, and whether it could be made more positive. One BoG member quickly formulated a shortened version as an example of the possibilities. A question was asked on how time-sensitive this is, and whether the task of revising the motion could be given to the ad-hoc committee (yet to be approved) as its first task.

At this point Elza moved to postpone the vote on the conference statement to take up the second motion on the ad-hoc committee. Alon seconded. The vote to postpone the vote on the First statement passed unanimously.

Elza then spent some time clarifying the purpose of the ad-hoc committee. Elza had already reached out to Emanuele (as Chair of the Conference Committee) and Stark (as, now confirmed, Chair of the Schools Committee) to formulate statements, best practices, and metrics on data on diversity and inclusion in the activities those committees oversee. This aligns with the proposed conference statement (i.e., the postponed motion) so a committee charged with these tasks would be a good to have within the ITSoc. The idea is that such a committee would work closely with the IEEE-wide committee.

Stark then made the motion to form an ad-hoc committee. Elza seconded. The motion passed unanimously.

The BoG then returned to the motion on the conference statement. After a recap of discussion, and Robert's Rules-of-order, it was noted that the mover can modify the moved motion. Suhas proposed the following revised motion (to which Stark agreed):

> **Motion:** The BoG accepts the intent of the submitted (original) statement as an initial draft and charges the ad hoc committee to prepare a final version of the statement for a future vote by the BoG prior to publication. The motion was seconded by Jeff Andrews. The motion passed with three abstentions.

17) **Update on Shannon Documentary:** Elza updated the BoG on the movie and asked the BoG to look at the slides that provide an update of the Shannon Documentary.

> **Motion:** A group consisting of the President and his or her appointees are empowered to negotiate the crediting given to different people in the Shannon movie with the IEEE, the director, funders, and other involved parties, on behalf of the BoG. The vote passed with 10 voting in favor and 5 abstentions.

18) **Adjournment:** The meeting adjourned at 7:20pm local time.

Statement on Sexual Harassment

The Board of Governors condemns sexual harassment in the strongest terms and affirms that the Information Theory Society will be guided by best practices as outlined in the National Academies 2018 report suggesting "that the most potent predictor of sexual harassment is organizational climate" and that research communities "can take concrete steps to reduce sexual harassment by demonstrating how seriously" they "listen to those who courageously speak up to report their sexual harassment experiences."

We therefore reaffirm that the guiding principle for ITSoc volunteers and members is to act ethically and respectfully towards other members, not to denigrate victims or reporters of sexual harassment, nor discourage other members from reporting sexual harassment. Volunteers and members are not to engage in any form of retaliation, bullying or cyber-bullying around sexual harassment cases. Volunteers and members are reminded that the IEEE has policies and procedures in place to handle reported violations.

Recent Publications

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Foundations and Trends in Signal Processing

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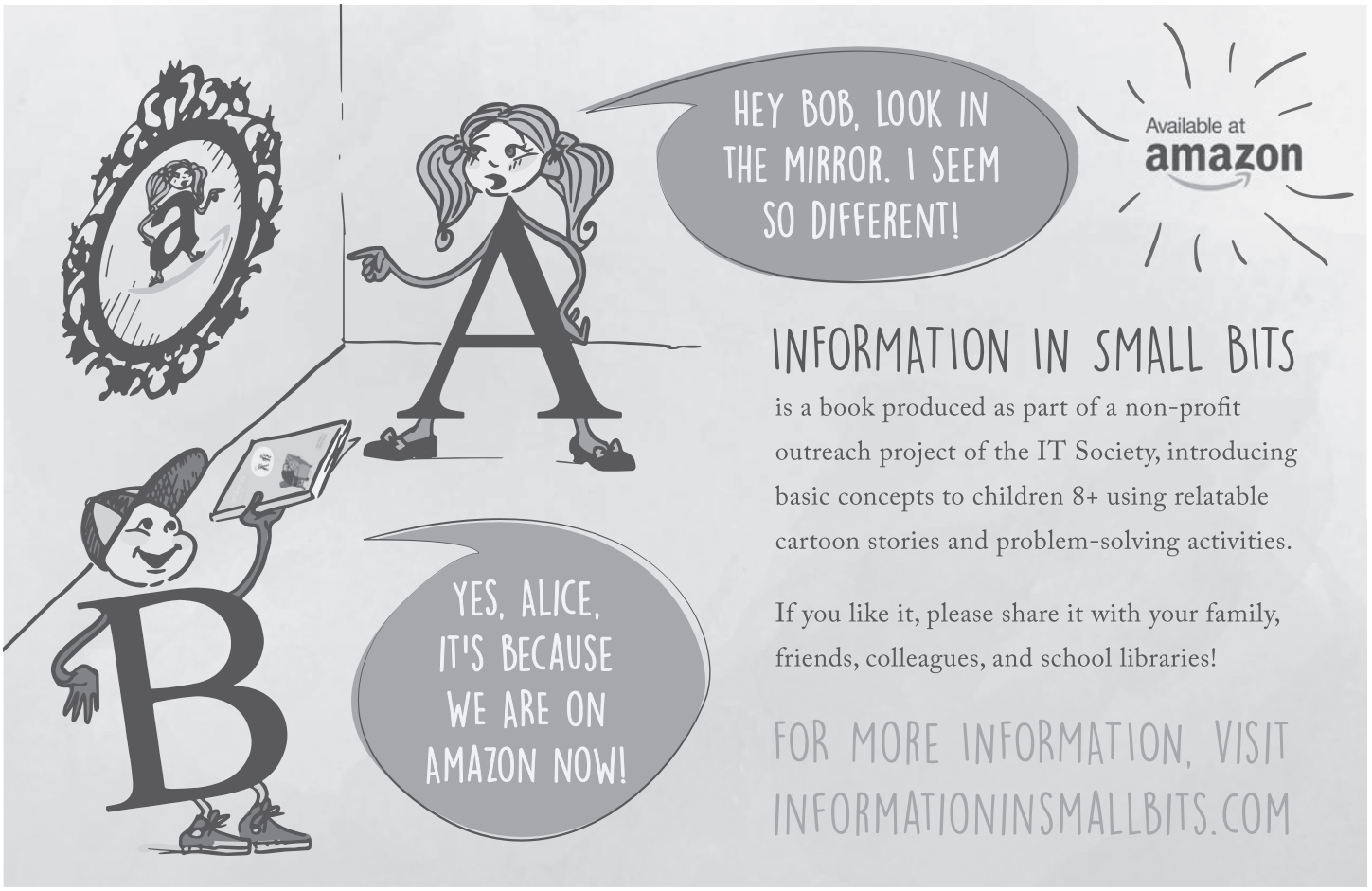

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is a book produced as part of a non-profit outreach project of the IT Society, introducing basic concepts to children 8+ using relatable cartoon stories and problem-solving activities.

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IEEE

The fifth London Symposium on Information Theory (LSIT) will be held on 30th and 31st of May 2019 at King's College London. The symposium continues the tradition of the historical first four editions of LSIT, which were held in London in 1950, 1952, 1955, and 1960, and were attended by the likes of Claude Shannon and Alan Turing.

This will be a two-day event, with the first day devoted to exploring the intersection of machine learning and information theory and the second day dedicated to novel applications of information theory. We will have two keynote presentations per day, as well as invited talks, and poster sessions. The registration will be free for all the attendees.

We welcome submissions for poster presentations on any topic related to information theory and its applications. Please check the following event website for submission and registration information and other updates:

https://bit.ly/2Jv2tNG

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Welcome to ITW 2018 in Guangzhou! ITW 2018 solicits and welcomes original contributions on the frontiers of information theory, coding theory and their applications, as well as the frontiers with other fields such as data science, biology and signal processing. The conference structure consists of a daily plenary seminar followed by two parallel sessions throughout the day. Guangzhou is the third largest city in mainland China with a history of over 2,000 years. The conference will take place at the **Sun Yat-sen Kaifeng Hotel**, located within the university campus where the attendees can explore many historic architectures and artifacts, including the famous Swacey Hall, Xing Pavilion, Scholar Archway and many others. The conference also provides ample social events for better interactions among the participants. With appreciation and anticipation, we look forward to welcoming you in Guangzhou.

Scope of Submission

Original papers on **Information and Coding Theory** are encouraged for submission. The scope of submissions includes, but is not limited to

- Information Theory and its Applications
- Frontiers of Coding Theory and Practice
- Boundaries between Information Theory and Data Science, Biology and Signal Processing
- Network Information Theory
- Network Coding and Distributed Storage
- Information Theoretic Security

Important Dates

Paper submission : **May 18, 2018**
Acceptance notification : **August 13, 2018**
Final paper submission : **September 13, 2018**
Tutorial proposal submission: **March 1, 2018**
Tutorial acceptance notification: **March 15, 2018**

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Call For Papers

Conference Calendar

DATE	CONFERENCE	LOCATION	WEB PAGE	DUE DATE
October 01–06, 2018	**Conference on Sequences and Their Applications (SETA)**	Hong Kong, China	http://seta2018.ust.hk/	Passed
October 2–5, 2018	**56th Annual Allerton Conference on Communication, Control, and Computing**	Allerton, University of Illinois at Urbana-Champaign, USA	http://allerton.csl.illinois.edu/	Passed
October 28–31, 2018	**International Symposium on Information Theory and Its Applications (ISITA)**	Singapore	http://www.isita.ieice.org/2018/home.html	Passed
October 28–31, 2018	**The International Symposium on Information Theory and Its Applications (ISITA) 2018**	Singapore	http://www.isita2018.org/	Passed
November 25–29, 2018	**Information Theory Workshop**	Guangzhou, China	http://www.itw2018.org/	Passed
November 26–28, 2018	**Global Conference on Signal and Information Processing (GlobalSIP)**	Anaheim, California	https://2018.ieeeglobalsip.org/	September 7
December 09–13, 2018	**Global Communications (GLOBECOM)**	Abu Dhabi, UAE	http://globecom2018.ieee-globecom.org/	Passed
February 10–15, 2019	**The Information Theory and Its Applications Workshop (ITA)**	San Diego, Califronia	http://ita.ucsd.edu/workshop/19	…
March 20–22, 2019	**Conference on Information Sciences and Systems (CISS)**	Johns Hopkins University, USA	https://ciss.jhu.edu/	December 10, 2018

Major COMSOC conferences: http://www.comsoc.org/confs/index.html