IEEE Information Theory Society Newsletter

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President's Column

Aylin Yener

We are quickly approaching the end of summer and the reopening of campuses at least across the US. As I write this, I find myself looking at the same view as I was when writing the previous columns, with perhaps a slight change (for the better) in the temperature and a new end-of-the summer breeze that makes sitting in my balcony so much better. I feel lucky once again to have an outdoor space; one I came to treasure much more than I did in BC (Before COVID). I realize I have forgotten the view from the office I got to sit in no more than ten days before the closure in March and try to recall -to no avail- if any part of the city skyline was visible. I should have taken pictures I conclude. I have, over the years, taken tens of thousands of photographs wherever I traveled (including at all ISITs and ITWs), with vintage cameras, with small and bulky digital cameras, and with my phones. I must admit that an office or its view was not ones that I would imagine regretting not to have photographed. I decide to take one for a virtual zoom background, when I am able to go in, then immediately drop the idea.

Such is the new normal, as campuses are cautiously beginning to reopen, students are slowly moving-in, and everyone is holding their breath, it is clear that we will need to be cognizant of human density indoors (and outdoors), for the foreseeable future. The impact of the ongoing pandemic remains significant on being able to hold in-person or hybrid meetings and conferences, with international travel restrictions continuing, coupled with the fact that universities are not permitting business travel (including to conferences) for at least until the end of the year. Prior actions by our event organizers and the board of governors left all but one event as in-person that was postponed to the fall earlier, the European School of Information Theory, which is now going to transition to a virtual event. Another activity that we elected to pause early in the year was our Distinguished Lecturer program, which provides resources for the chapters of our society to invite the lecturers to their locality and provide an in-person lecture experience from these reputed information theorists. I am pleased to report that our Distinguished Lecturer program, is gearing up to be back on, but with virtual lectures. The Board of Governors has extended the terms of the current lecturers by a year so that when traveling resumes, the lecturers will have the opportunity to re-coupe the lost year in in-person chapter visits. For now, all chapters should consider inviting the lecturers for online lectures, which can be facilitated on zoom or webex. I hope that the chapters and our members will find this resource useful.

We are continuing to live our lives online (almost entirely). Yes, zoom fatigue has set in, but it is also undeniable that there is merit to not having to commute to meetings or even to class—for those teaching online. This new set up is already allowing for new avenues of information dissemination and collaboration. Instead of our traditional departmental or group seminar series, we are finding ourselves all over the world listening and interacting in outstanding talks with just one click. I know I am not the only one envisioning this year's impact to be long-term, in particular in multi-institution research collaborations, and perhaps even in collaborative education going forward.

In the information theory community, a paradigm shift that has slowly been happening for many decades, namely that of the expansion of the professional community from a few centers of gravity to all over the world, is continuing. A number of notable community building efforts, have contributed to this expansion. In mid-2000s, with the launch of the student committee, students' events started bringing junior members from everywhere together at conferences. Shortly thereafter, the society launched itsoc.org. Information Theory schools followed, commencing in North America in late 2000s. Outreach committee was founded and it instituted mentor-mentee programs for students and faculty

(continued on page 14)

From the Editor

Salim El Rouayheb

I hope you have had a safe summer. We start this fall issue as usual with the President's Column. We continue with the awards given to members of our society. Congratulations to all the award winners. We have an article on the activities of the IEEE Information Theory Society North Macedonia Chapter who won the 2020 Chapter of the Year award. We also have reports from the 2020 DLR-MIT-TUM Workshop on Coding and Random Access and the 2020 IEEE International Workshop on Privacy and Security for Information Systems (WPS 2020). As you probably know, ISIT was held online this year due to the pandemic. We have an article by the general chairs on their experience on moving ISIT online and their thoughts on it. With sadness, we conclude this issue with tributes to Katalin Marton and Jorma Rissanen who passed away this year.

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, 2020 for the issue of December 2020.

Jan 10, 2021 for the issue of March 2021.

April 10, 2021 for the issue of May 2021.

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

IEEE Information Theory Society Newsletter

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Awards

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

Anders Lindquist: 2020 IEEE Control Systems Award

The Control Systems Award recognizes outstanding contributions to control systems engineering, science, or technology.

Balaji Prabhakar: 2020 IEEE Koji Kobayashi Computers and Communications Award

The purpose of the IEEE Koji Kobayashi Computers and Communications Award is to recognize outstanding contributions to the integration of computers and communications.

Alfred O. Hero, III: 2020 IEEE Fourier Award for Signal Processing

The Fourier Award recognizes an outstanding contribution to the advancement of signal processing, other than in the areas of speech and audio processing.

Shu Lin: 2020 IEEE Leon K. Kirchmayer Graduate Teaching Award

The Leon K. Kirchmayer Graduate Teaching Award recognizes inspirational teaching of graduate students in the IEEE fields of interest.

Robert M. Gray: 2020 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.

2019 IEEE Communications Society & Information Theory Society Joint Paper Award

The purpose of the Communications Society & Information Theory Paper Award is to recognize the authors of outstanding papers appearing in any publication of the IEEE Communications Society or the IEEE Information Theory Society in the previous three calendar years.

The 2019 award winning publication is:

- Kangwook Lee, Maximilian Lam, Ramtin Pedarsani, Dimitris Papailiopoulos, and Kannan Ramchandran, "Speeding up Distributed Machine Learning Using Codes," IEEE Transactions on Information Theory, vol. 64, no. 3, pp. 1514–1529, March 2018

Yury Polyanskiy: 2020 James L. Massey Award

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

Pengkun Yang: 2020 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.

- Pengkun Yang, "Polynomial Methods in Statistical Inference: Theory and Practice." Ph.D. Thesis, University of Illinois at Urbana-Champaign, Dec. 2018

David Tse : 2020 Padovani Lecturer

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

Ayfer Özgür: 2020 Goldsmith Lecturer

The Goldsmith Lecture is delivered by an early-career woman researcher at one of the ITSoc's Schools of Information Theory, held for the benefit of students and postdoctoral researchers.

2020 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 2020 winner is the

- Republic of North Macedonia Chapter

The following awards were announced at the 2020 IEEE International Symposium on Information theory.

Alon Orlitsky: The 2021 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.

2020 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:

- Tomer Berg, Tel Aviv University, "Binary Hypothesis Testing with Deterministic Finite-Memory Decision Rules," co-authored with Or Ordentlich and Ofer Shayevitz.

- Payam Delgosha, University of California Berkeley, "A Universal Low Complexity Compression Algorithm for Sparse Marked Graphs," co-authored with Venkat Anantharam.

- Navneeth Ramakrishnan, Imperial College London; Raban Iten, ETH Zurich. "Quantum Blahut-Arimoto Algorithms," co-authored with Volkher Scholz and Mario Berta.

2020 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.

- Emmanuel Abbe, Afonso S. Bandeira, Georgina Hall, "Exact Recovery in the Stochastic Block Model," in *IEEE Transactions on Information Theory, vol. 62, no. 1, pp. 471–487, Jan. 2016.*

- Elchanan Mossel, Joe Neeman, and Allan Sly, "Consistency Thresholds for the Planted Bisection Model," *in Electronic Journal of Probability, no. 21, pp. 1–24, 2016.*

IEEE Information Theory Society North Macedonia Chapter

Venceslav Kafedziski, Aleksandar Risteski

The IEEE Information Theory Society North Macedonia Chapter received the 2020 Chapter of the Year Award at the ISIT 2020 Virtual Conference in Los Angeles "for educational programs, outreach activities and the promotion of information-theory research". The Chapter was founded in 2011 upon an initiative of Prof. Venceslav Kafedziski who was the Chapter Interim Chair and served three terms as the Chapter Chair. Some of the more significant events organized by the Chapter were the ESIT 2013 in Ohrid, the Shannon Centennial celebration in 2016, the Mini Workshop "The Applications of Machine Learning in Telecommunications" in 2019, and the visits by distinguished lecturers of IEEE IT Society in 2015 and 2019. Each year, numerous technical events are being organized, usually featuring guest speakers from abroad. These events attract attendees from academia, telecom industry, telecom authorities etc.

The European School of Information Theory (ESIT) 2013, organized at the initiative of Prof. Petar Popovski from Aalborg University, took place between April 22nd and 26th 2013 in the ancient city of Ohrid,. Around 50 PhD and Master students from numerous countries attended the School. The list of lecturers included Prof. Suhas Diggavi ("An Approximation Approach to Network Information Theory"), Prof. Stark Draper ("Error exponents and non-asymptotics, feedback"), Prof. Bane Vasic ("Codes on Graphs and Iterative Decoding"), Prof. Angel Lozano ("Lost in Assumptions"), Prof. Gerhard Kramer ("Short Message Noisy Network Coding"), Prof. Osvaldo Simeone ("Source Coding With Side Information") and Prof. Christina Fragouli ("Network Coding Theory and Applications"). IT Society has supported the school with a grant of US$20,000. Our IT Chapter was one of the school co-organizers and was responsible for distributing the Scholarships that covered the participation fees to local students and to students from the Balkan countries through the corresponding IEEE sections/chapters.

In 2016 the Chapter was actively involved in the Claude Shannon centennial celebration. A stamp with the image of Claude Shannon was issued by the Macedonian Post Administration. On April 9th 2016 we organized a Shannon Centenary Day at the Faculty of Electrical Engineering and Information Technologies (FEEIT), University Ss Cyril and Methodius in Skopje. IEEE IT Society supported this event with a grant of US$500. The event coincided with the FEEIT open day intended to promote FEEIT to high school students and was attended by more than one hundred students. An exhibition of posters on the different subjects of the science of Information Theory accompanied the event. A film about Claude Shannon's life, his scientific achievements, hobbies and innovations, prepared by the IEEE IT Society, was continuously running during the event. Short presentations about the life and work of Claude Shannon were given by the FEEIT Telecommunications Department members to groups of attending students. The event fully achieved its goal in terms of raising the awareness about the importance of Claude Shannon as the father of the information age among the younger population.

As mentioned, we had two Distinguished Lecturers as guests of our Chapter. Prof. Giuseppe Caire from the Technical University in Berlin, a Distinguished Lecturer of the IEEE IT Society for the period 2014-2015 gave a Distinguished Lecture on June 8th 2015, entitled "Massive MIMO with structured channels". Prof. Amos Lapidoth from ETH Zurich, a Distinguished Lecturer of the IEEE IT Society for the period 2018-2019 gave a Distinguished Lecture on April 8th 2019, entitled "All data are equal, but some data are more equal than others". In both cases the local arrangements were financially supported by our Chapter.

Some of the technical events have been co-organized with the IEEE Computer Society North Macedonia Chapter and IEEE

ESIT 2013 participants.

Communications Society North Macedonia Chapter. There have been joint events co-organized with other chapters as well.

2019 Mini Workshop on Applications of Machine Learning in Telecommunications.

The IEEE IT Society North Macedonia Chapter organized a Mini Workshop on the subject of "The Applications of Machine Learning in Telecommunications", that took place on December 23rd 2019 at the Faculty of Electrical Engineering and Information Technologies, Ss Cyril and Methodius University in Skopje. The list of lecturers included Prof. Petar Popovski ("On the Use of Machine Learning Methods in Wireless IoT Connectivity"), Prof. Predrag Ivanis ("Towards Designing FTN Signaling Systems with Limited Computational Resources"), Prof. Dejan Vukobratovic ("Two Faces of Machine Learning: Model Based vs Data Based - An Intimate Story"), Prof. Gjorgji Madzarov ("Streaming Data: Big Data at High Velocity") and lecturers from the local industry. Introductory remarks were given by the Workshop organizer, Prof. Venceslav Kafedziski. The Workshop was financially supported by our IT Chapter.

Each year we provide the IEEE IT Society members and other IEEE members, as well as the wider audience, with numerous technical events, inspired by the exciting science of Information Theory. Despite the small size of the country of Republic of North Macedonia and the limited number of professionals working in this field, we are managing to attract interest from both the academia and the telecom industry by keeping high standards of the organized events. The Chapter of the Year Award is a valuable recognition of the efforts and activities of our IT Chapter and is a great inspiration to further promote Information Theory among the professionals and wider audience in North Macedonia.

Prof. Venceslav Kafedziski,
Former Chapter Chair/Current Chapter Vice-chair
(University Ss Cyril and Methodius in Skopje)

Prof. Aleksandar Risteski,
Current Chapter Chair
(University Ss Cyril and Methodius in Skopje)

Report on the 2020 DLR-MIT-TUM Workshop on Coding and Random Access

Organizers: Gerhard Kramer, Yury Polyanskiy, Gianluigi Liva

The first **DLR-MIT-TUM Workshop on Coding and Random Access** was held in Oberpfaffenhofen, Germany, on February 24-25, 2020. The event was organized by the Institute of Communications and Navigation of the German Aerospace Center (DLR), the Institute for Communications Engineering of the Technical University of Munich (TUM), and the Massachusetts Institute of Technology (MIT). The workshop had over 50 registered participants.

The technical program included 25 invited talks. On Monday, February 24, the speakers were A. Fengler, R. Müller, K. Andreev, A. Frolov, A. Guillén i Fàbregas, G. Kramer, A. Özgür, J.-F. Chamberland, S. Saeedi Bidokhti, M. Chiani, H. Pfister, L. Schmalen, M. Geiselhart, and A. Buchberger. On Tuesday, February 25, the speakers were A. Munari, R. Venkataramanan, D. Vukobratovic, P. Popovski, Y. Polyanskiy, A. Pradhan, E. Paolini, M. Frey, G. Durisi, G. Kabatiansky, E. Jorswieck, and G. Cocco.

The talks' topics included channel code design and decoding, machine learning applied to communications, coding for massive uncoordinated multiple access protocols, multi-user information theory, and finite-length information theory. From the insightful talks, and from the unmissable coffee break discussions, a clear direction emerged: iterative decoding algorithms, polar codes and tools from compressed sensing are likely to be the pillars of the next-generation MAC and massive random access designs for IoT systems.

The social program included lunches, refreshments, and a dinner. The organizers would like to thank Ms. Irmgard Völl-Elias for administrative support, and the DLR Satellite Networks Department for organizational support and funding. The program is available at the web address: http://smalldatanet.com

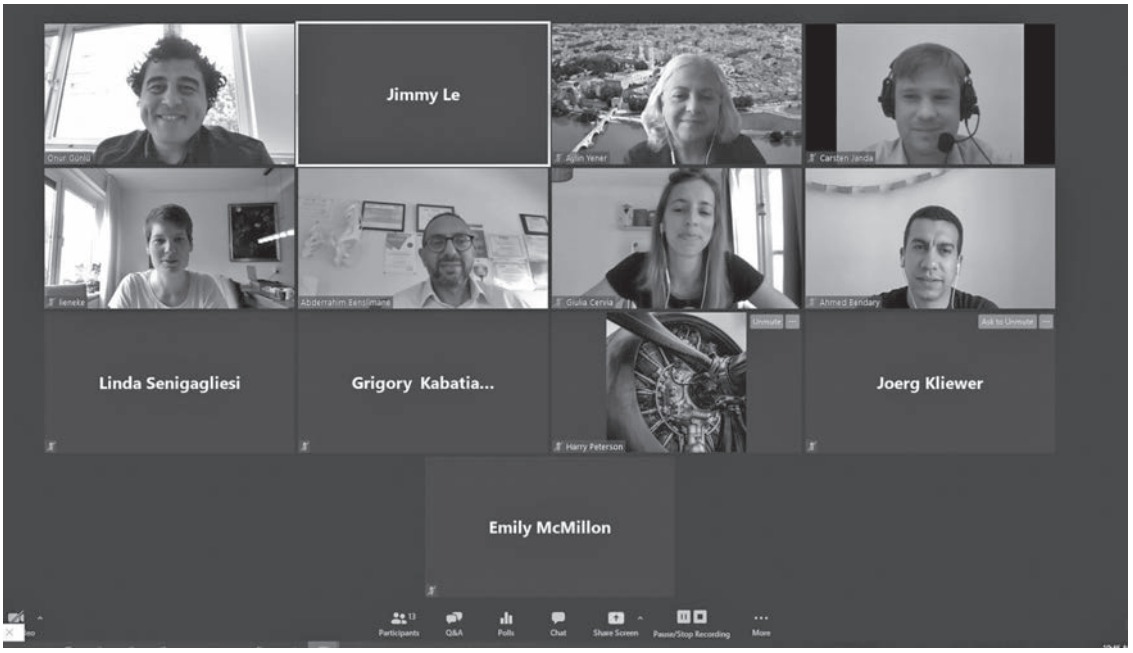
The audience following the talks attentively.

Henry Pfister illustrating his approach based on reinforcement learning to optimize belief propagation decoding.

Yury Polyanskiy and Gerhard Kramer discussing several open challenges in the area of uncoordinated multiple access.

Report on the 2020 IEEE International Workshop on Privacy and Security for Information Systems (WPS 2020)

Organizers: Onur Günlü
Rafael F. Schaefer
Matthieu Bloch
H. Vincent Poor



The 2020 IEEE International Workshop on Privacy and Security for Information Systems (WPS 2020) took place during the 2020 IEEE Conference on Communications and Network Security (CNS 2020) virtually on July 1, 2020. The main topics of the workshop were security and privacy for biometrics, 5G, IoT, and database search based on information- and coding-theoretic methods.

The technical program included talks given by researchers from the Rutgers University (USA), Cornell University (USA), Arizona State University (USA), Harvard University (USA), Massachusetts Institute of Technology (USA), Aalto University (Finland), Universidad de los Andes (Colombia), Ohio State University (USA), New Jersey Institute of Technology (USA), US Army Research Laboratory (USA), Technische Universitaet Braunschweig (Germany), Technical University of Munich (Germany), KTH Royal Institute of Technology (Sweden), University of Southern California (USA), Università Politecnica delle Marche (Italy), Skolkovo Institute of Science and Technology (Russia), and Eindhoven University of Technology (The Netherlands).

The workshop brought together researchers from the fields of information theory, coding theory, and machine learning to explore new privacy and security ideas. In total, 25 people from around the world attended the live events, some of them in the morning and others late at night. All attendees seemed to agree that the virtual workshop was a great success and that would still have been great to meet in Avignon, France (the originally planned location of the IEEE WPS 2020).

The technical program of the WPS 2020, which had an acceptance rate of 50%, was

- **ON/OFF Privacy**
  Salim El Rouayheb *(Keynote Talk I)*

- **Optimal Mechanisms Under Maximal Leakage**
  Benjamin H Wu, Aaron Wagner, and G. Edward Suh

- **Maximal alpha-Leakage and Its Properties**
  Jiachun Liao, Lalitha Sankar, Oliver Kosut, and Flavio P. Calmon

- **Notes on Communication and Computation in Secure Distributed Matrix Multiplication**
  Rafael D'Oliveira, Salim El Rouayheb, Daniel Heinlein, and David Karpuk

- **Security for and by Caching Networks**
  Aylin Yener *(Keynote Talk II)*

- **Authentication and Partial Message Correction over Adversarial Multiple-Access Channels**
  Allison Beemer, Eric Graves, Joerg Kliewer, Oliver Kosut, and Paul Yu

- **Arbitrarily Varying Wiretap Channels with and Without Non-Causal Side Information at the Jammer**
  Carsten Janda, Moritz Wiese, Eduard Jorswieck, and Holger Boche

- **Secure Strong Coordination**
  Giulia Cervia, Germán Bassi, and Mikael Skoglund

- **Turbo-Aggregate: Breaking the Quadratic Aggregation Barrier in Secure Federated Learning**
  Salman Avestimehr *(Keynote Talk III)*

- **Physical Layer Authentication Techniques Based on Machine Learning with Data Compression**
  Linda Senigagliesi, Marco Baldi, and Ennio Gambi

- **Adversarial Multiple Access Channels and a New Model of Multimedia Fingerprinting Coding**
  Grigory Kabatiansky and Elena Egorova

- **Modeling Temperature Behavior in the Helper Data for Secret-Key Binding with SRAM PUFs**
  Lieneke Kusters, Alexandros Rikos, and Frans MJ Willems

More information about the IEEE WPS 2020 is available at the web address https://www.user.tu-berlin.de/gunlu89/cns2020privacysecurityworkshop/index.html

How will the Future of Scientific Conferences be Shaped by COVID? A Perspective From ISIT 2020

Giuseppe Caire and Salman Avestimehr

I. How It Happened

Imagine to spend the past 3 years planning for IEEE Int. Symp. on Inform. Theory (ISIT) 2020 in Los Angeles. Imagine putting together a proposal to the ITsoc Board of Governors, winning the bid after multiple former ISIT-LA proposals have failed, trying to put LA in the nice light that it deserves, at the center of one of the most formidable hubs focused on communications technology, with Caltech, UCLA, USC, and JPL, and close neighbors as UCI, UCSD, and the Aerospace Industry that has shaped a significant part of the evolution of our field. Leveraging unique features such as the beaches, the hills, the attractions (e.g., Universal Studios), and the completely reborn LA downtown. Imagine negotiating with several hotels for the conference space, room availability, and catering, when hotels in LA are used to to much larger events such as the Oscars, or the LA Car show, whose rituals and requirements are completely different from those of ISIT.

Nevertheless, after many iterations with the ITsoc conference committee and endless budget simulations, in March 2020 we were "ready to go live". We found a really nice and iconic venue in LA downtown, we negotiated an excellent catering package which would have included the use of the conference center at no additional cost, and we managed to organize an exciting and unconventional social event for the classical "Wednesday afternoon of the ISIT week" at Universal Studios.

Then COVID happened. It started affecting personal life and professional activities in Europe with the outburst in Italy, the first European country to enter a systemic healthcare crisis. COVID hit so hard in the region around Milan, that all of a sudden what was thought as a theoretical and remote possibility became a hard reality in the space of days. Suddenly traveling even through the Schengen area became impossible, flights were canceled, and travel bans were instated. Suddenly it was clear that keeping ISIT 2020 on course would have been a very big risk, both for the financial implications and for the objective danger incurred by people traveling across the world and attending a large live event.

When we realized that nothing was going to be as planned, the first question was whether ISIT was going to take place at all, and in what form. Fortunately, other well-known IEEE conferences from sister societies (namely, ICASSP and ICC) were planned before ISIT and had to take drastic re-organization steps in an even much shorter time. While we, the ISIT 2020 organizing committee, were discussing what to do and what to propose to the BoG as alternatives, we contacted the general co-chairs of ICASSP, which was going to be held in Barcelona at the beginning of May 2020. ICASSP used the same company (CMS) as ISIT for papers and website handling. Also, they identified Conference Catalyst (CC) to provide a platform for online virtual conferences. Given the short time at our disposal, following ICASSP example was the most logical and less risky strategy, also because we could test how such a virtual conference would look like, by participating as "authors" to ICASSP.

We took immediate action to cancel all contracts with the hotel in LA and Universal Studios. Fortunately, this incurred no penalty due to the clause of "force majeure". Shortly after notifying the ITsoc President, Aylin Yener, to proceed with an on-line conference, we were informed that the BoG passed a motion approving the virtual ISIT, with the recommendation of "preserving as much as possible a live experience". On the positive side, we managed to keep all our sponsors. As a matter of fact, the opportunity to have a sponsor on-line page with personalized and dedicated material on the CC platform and therefore the possibility of reaching a broader audience than with a live event was a winning argument. At the same time, we had to rework completely the budget and we realized that the costs of a virtual conference are about one order of magnitude less than the costs of a live one. This allowed to experiment a completely different "billing scheme" for registration: as a matter of fact, the cost of a virtual conference is essentially a "per paper" cost, which is generally much less than a registration (even a standard student registration). Since the number of accepted papers is fixed and known in advance, this eliminates the uncertainty due to the composition of full and reduced (student) registrations, which is one of the hardest problem in defining the budget of standard live conferences. In addition, since the budget is essentially determined by the registered papers, this gives the opportunity of offering access to the online conference platform (almost) for free to a large audience of virtual non-author attendees. Hence, this format has significant potential to reach out beyond the boundaries of the typical ISIT audience.

Perhaps the main problem that we had to address after the decision of going virtual and the choice of the conference platform were: 1) how to coordinate logistically the functions provided by CMS with those provided by CC, with the additional complication that the only solution for handling registrations was through EDAS. In this respect, we had to coordinate three different companies with different backhand systems and data infrastructure. This was possible not without some pain and a significant number of email exchanges, thanks to the wonderful cooperation and availability of CMS and CC, and the invaluable help of our finance chair, who managed the EDAS registration interface; 2) how to shape up the program, seeking a satisfactory tradeoff between non-real time and live events and, above all, taking into account implementation simplicity and reliability. In this respect, it became apparent that organizing pre-recorded paper presentations in sessions, allocated to time slots over the ISIT week, was completely meaningless. On one hand, most attendees would be on very different time zones, such that the number of people able to be online at given times would have been small, and therefore frustrating for the papers' authors. On the other hand, it makes no sense to "play synchronously" pre-recorded video presentations at the same time. In a live event, parallel sessions and papers presented at the same time is a necessity (after all, a day has only 24 hours). But for pre-recorded presentations, asynchronous on-demand access is much more efficient and much more meaningful. In addition, we are all already biased to consume multimedia material in this way, by platforms such as YouTube, Netflix, Hulu and so on. While for technical papers asynchronous on-demand access is best, for events such as plenary talks, tutorials, panels, and ITsoc events (awards and the Shannon Award announcement), a live webinar format was chosen. We decided to have a single live track per day, with events concatenated in sequence. This avoided timing problems, and significantly simplified the practical technical aspects, by allowing a single active Zoom webinar in each day.

As a final icing on the cake, just one week before ISIT we received an email from Alon Orlitsky and Christina Fragouli, proposing an open screening of "The Bit Player" on the last conference day (Friday) followed by a panel discussion as a conclusive event. This even turned out to be quite successful, despite some technical problems related to the live streaming of the long video via the Zoom Webinar platform. Overall, this was a really nice conclusion for an exciting week.

Although the virtual ISIT 2020 was far from perfect, and several aspects could have been improved with more time and planning at our disposal, the conference was quite successful and represents an interesting pilot project with several potential implications on how to run conferences in the future. Some interesting quantitative data and further considerations on what worked and what could be improved, are given in the next section.

II. How It Went

We finally organized the first virtual ISIT in the week of June 21–26, 2020, with a total of 1695 registered participants. The virtual event[1] essentially consisted of the following components:

- Asynchronous Technical Sessions: This is the technical program of the conference, which included all 523 accepted papers along with their video presentations that are available on demand.

- Synchronous Plenary talks and the Shannon Lecture: All four plenary talks and the Shannon lecture were delivered live on Zoom. Participants could post questions during the talk, and there was a live Q&A at the end, where the session chair relayed the questions from the audience to the speaker.

- Synchronous Tutorials/Panels: We also had three tutorials/panels on emerging topics that were organized live on Zoom. The audience could participate in the discussion by forwarding their comments/questions to the panelists during the panel, and a part of each panel was devoted to discuss the questions from the audience.

- Asynchronous Page of the Sponsors and Publishers: We had 5 generous sponsors and publishers that supported ISIT 2020. Each were provided a "virtual booth" that they could design to provide their desired contents. In particular, we had an industry session of recorded talks that were delivered by researchers from Intel, Qualcomm, and Samsung. Now Publishers also provided free access to several of the recent Foundations and Trends monographs to participants for the duration of the conference.

- Synchronous Ceremonies: The opening, closing, and award ceremonies were all organized live on Zoom. Each of these events included a host of live presenters, including Toshio Fukuda (the President of IEEE) who joined live to present the 2020 Kirchmayer award, Charles Bennett who received the 2020 Claude Shannon Award, and Alon Orlitsky who was announced as the recipient of 2021 Claude Shannon Award.

- Societal Activities: There were several events organized by the information theory society alongside of ISIT, in particular Student Video Exposition, Meet the Shannon Lecturer, and Perspective of Online Teaching. The virtual platform dedicated a page to each of these events to make their video content available to ISIT participants.

- Live Screening of "The Bit Player" movie along with a Panel Discussion: Finally, ISIT 2020 concluded with a live public screening of The Bit Player, which attracted 1524 viewers. The movie screening was also followed by a live panel with the film director/writer/producer Mark Levinson.

As mentioned earlier, we had a total of 1695 registered users who attended the virtual ISIT 2020. This is by far the largest number of attendees that ISIT has seen in its history, which demonstrates the appeal and ease of attending a virtual conference. Figure 1 further shows the number of sessions (i.e., virtual talks) and the number of page views by these registered participants during the course of the conference (June 21–June 26). This accounts for a total of 10,431 sessions and 79,309 page views during the one week period of the conference. The list of top 5 technical sessions/presentations that were viewed asynchronously (i.e, on demand) is also shown in Figure 2.

[1]https://2020.ieee-isit-virtual.org

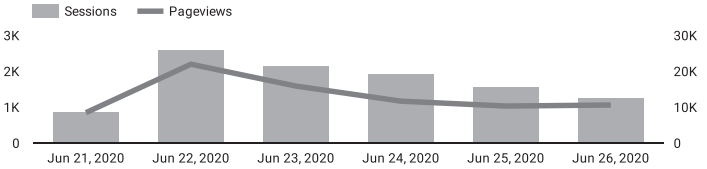


Fig 1: Sessions and pave views of the virtual ISIT platform.

Finally, let us look at the statistics for live events of virtual ISIT (i.e., Shannon lecture, plenary talks, tutorials/panels, and award ceremonies), which is shown in Figure 3.

III. What We Learned

Looking back at our experience, some considerations are in order.

- Virtual conferences have the potential of reaching out a significantly larger audience, they are still attractive to sponsors, and provide automatically archival material (e.g., paper video presentartions, and videotapes of live events) that can remain available for a long time on stable and professionally managed platforms.

- Virtual conferences cost a fraction of standard live conferences. In uncertain times due to pandemic, with political and environmental crises looming in the hori- zon, developing a consistent strategy for online virtual conferences is almost a mandatory long-term strategy.

Event	Page Views
/presentation/shannonLecture	144
/tutorials/fundamentals-blockchain-systems	131
/tutorials/coded-computing	124
/tutorials/machine-learning-based-approaches-coding	123
/track/statistics-and-learning-theory	106

Fig 2: The list of top 5 technical sessions/presentations that were viewed asynchronously (i.e, on demand) during June 21-June 26.

Event	Number of Unique Viewers
Opening and IT Society Address	318
Plenary talk 1 and Tutorial/Panel 1	456
Plenary talk 2	355
Award Ceremony	201
Shannon Lecture and Tutorial/Panel 2	453
Plenary talk 3	257
Shannon Award Announcement	204
Plenary talk 4, Tutorial/Panel 3, and "The Bit Player" movie screening	1524

Fig 3: Number of unique visitors for different live events of the virtual ISIT.

- Despite the above advantages, the obvious drawback of virtual conferences is the lack of personal human-to-human interaction, which develops the sense of community also through convivial opportunities, dinner discussions, coffee break interactions. It remains as an OPEN PROBLEM (aren't we good in addressing open problems?) to find formats that preserve such live interactions while keeping the advantages of the online access. As a working hypothesis, the BoG may consider to have one very large virtual conference (e.g., ISIT) in order to maximize the reach and keep costs affordable to a large world-wide audience, and have much smaller single-track dedicated workshops (e.g., ITWs) where the human-to-human interaction in focus. The traditional format of ISIT has grown to such a point, that it might no longer be sustainable in the long-term, with 9 parallel sessions, and people hopping from session to session and not having any time to sit, chat, and develop real ideas and contacts. In addition, such large conferences have become really expensive, with registration fees often above the 800$ mark, in addition to (long distance) flights, and accommodation. Perhaps this shock is an occasion to rethink the whole conference business in our field and make it more adapted to the current times and needs.

- From an organization viewpoint, having to coordinate three different companies for paper handling and website (CMS), online platform (CC), and registrations (EDAS) is to be avoided at all costs. This makes the back-end mechanisms and data handling very cumbersome and prone to errors. Unfortunately, given the time constraint and the lack of last-minute flexibility of the different software platforms this was unavoidable in our case.

- From a technical viewpoint, we believe that one feature that could and should be improved in the online platform is the Q/A mechanism for paper video presentations. As in YouTube or Facebook, we are all used to post comments on videos. It would be nice that when a comment is posted, the authors and the session chairs are automatically notified by email (as done with YouTube, for example) so that they can post a reply, and when the reply is posted, the author of the comment gets notified. Involving the session chairs into the discussion is useful for moderation and to avoid trolling. This also gives a role to the session chairs (which become discussion forum moderators). In addition, such discussion forum should be public, such that anybody watching the video presentation can see also the follow-up Q/As, exactly as it happens for YouTube videos. We are all very used to such mechanisms which are common to social media, and these should be also leveraged to stimulate interactive scientific discussions in our conferences.

- Perhaps as a final remark, one aspect of the live component of the virtual conference that was thoroughly discussed before ISIT 2020 was to ensure that precautions were in place to prevent disruptions that could arise. We hope to find a solution that allows for active participation but protects the security of the event.

In Memoriam: Katalin Marton 1941–2019

Imre Csiszár and János Körner

Katalin Marton, mathematician, passed away on December 13, 2019, after a long fight with cancer. She was a leading expert of Information Theory (IT), the first and so far only female recipient of the Shannon Award. She is survived by son Péter Frenkel, a successful mathematician.

Katalin Marton (for colleagues Kati) was born in Budapest on December 9, 1941. She studied mathematics at the Loránd Eötvös University, Budapest, where she graduated in 1965. From 1965 to 1973 she worked at the Computer Science Department of the Central Institute of Physics, Budapest. Her first publications addressed combinatorial problems, but a seminar of Alfréd Rényi aroused her interest in IT.

At Rényi's advice, she spent a year in the Institute of Information Transmission Problems in Moscow, learning IT from Roland Dobrushin. This lead to her first results in this field. An outstanding one [M1] was a full characterization of achievable error exponents for (discrete memoryless) sources with a given distortion. The elegant combinatorial approach used in [M1] was later developed to the powerful general method of types. Kati had a substantial role in that development, too. She was coauthor of the contribution [CKM] that first demonstrated the power of the method for channels, strengthening the classical results of Shannon, Gallager and Berlekamp on channel error exponents.

In 1973, Kati joined the IT Group of the Mathematical Institute of the Hungarian Academy of Sciences, now Rényi Institute. She continued working there throughout her career, in later years as Scientific Advisor, then Research Professor, after retirement as Emerita.

In the early nineteen-seventies, multiuser IT was born, and immediately occupied center stage. Kati contributed to its development very substantially. She and János Körner [IS] developed an approach based on the concept of image size. The ε-image size of a set $A \subset \mathcal{X}^n$ over a (discrete memoryless) channel $W : \mathcal{X} \to \mathcal{Y}$ is the minimum cardinality of sets $B \subset \mathcal{Y}^n$ such that $W^n(B|\mathbf{x}) \geq 1-\varepsilon$ for all $\mathbf{x} \in A$. Via this approach, they determined the capacity resp. achievable rate regions of several small networks of channels resp. sources. In particular, the capacity region of Cover's two-receiver broadcast channel was determined [B] in the case when private messages were sent only to receiver 1, dispensing with the assumption that receiver 2 had a worse channel than receiver 1. Let us add that Kati and János in their very first joint paper [KK] introduced two new (non-equivalent) notions of channel comparison that later turned out relevant especially for communication with secrecy.

Kati's most cited result is her achievable rate region for two-receiver broadcast channels in the general (discrete memoryless) case [BB]. After more than 40 years, this "Marton inner bound" to the capacity region in still unbeaten, and it is open whether it is tight.

Kati had strongly contributed to our book [CK] as coauthor not only of papers but also of results not published elsewhere, in particular of the most general result about the aforementioned image sizes.

Kati and János were close friends and this influenced the topics of their joint work. After the completion of the monograph [CK], János returned to his old concept of graph entropy, discovering its potential in combinatorics and computer science. He proposed Kati collaboration in this direction, resulting in numerous joint papers. This shows how open and successful Kati was to work on problems posed by a friend. The graph entropy research culminated in a five-author paper [C5] giving an information-theoretic characterization of perfect graphs.

The collaboration of Kati and János was part of hourlong conversations on music, literature and the problems of daily life. When life was tough, mathematics was the ultimate consolation. There never was a shadow of rivalry, just the sheer pleasure of giving and getting ideas in a perfect harmony. Kati was the one who dug deeper. In [KMbi] Kati and János determined a particular point in the rate region for separate coding of two correlated binary sources allowing the almost error-free reconstruction of their mod 2 sum. The result seemed too special to be important, but the code construction had a rigid algebraic structure that appeared unique, with no other, more standard way to obtain. Years later Kati came up with a highly interesting and now much cited conjecture in additive combinatorics. It is called the polynomial Freiman- Ruzsa conjecture, see [FR]. It was Imre Ruzsa who first published, with reference to Kati, a precise reformulation of the informal conjecture that the mentioned code construction in [KMbi] was unique.

Kati was interested in applying IT ideas also in other fields of mathematics than combinatorics. Skipping her contributions to statistics and ergodic theory, we briefly discuss those to measure concentration, her main field of research in the past 25 years.

An early instance of the phenomenon now called measure concentration was the blowing-up lemma of Margulis [Mg]. Its improvement [AGK] was crucial for the image size approach in IT, making sure that ε-image sizes did not depend on the choice of $\varepsilon \in (0,1)$, in exponential sense as $n \to \infty$. Kati discovered that also the other way round, IT ideas could be efficiently used to prove measure concentration. She gave a purely information theoretic proof of the blowing-up lemma [bl] that, in addition, was much simpler than the original proof. Extending this result, in [d] she showed that for any metric space (in particular Euclidean space), measure concentration could be derived from distance-divergence inequalities, i.e., bounds to Wasserstein distance in terms of information divergence. She derived such inequalities via coupling techniques, her approach is now regarded a key instance of the so-called mass transportation method. She was first to prove measure concentration for Markov

chains [Mc], and later she proved similar results for more general processes. She was deservedly regarded a leading expert of measure concentration, as well as of IT. The Raginsky-Sason monograph [RS] discusses her results at length in two chapters. An excellent overview of her key contributions to this field was her Shannon lecture, see [Sh].

Kati's most prestigious award was the 2012 Shannon Award, and her Shannon lecture at ISIT 2013, see [Sh], was a great success. In October 2019 she was nominated for the Noether Lecture Award of AWM-AMS. Alas, she was already terminally ill at that time. Her other awards include:

- Eötvös Wreath of the Hungarian Academy of Sciences, 2013, for outstanding academic contributions in a lifetime
- Alfréd Rényi Prize of the Rényi Institute of Mathematics, 1996, for fellows of the Institute, to recognize outstanding research performance in the previous five year period
- Géza Gru¨nwald Memorial Medal of the J. Bolyai Mathematical Society, 1972, for successful young researchers in mathematics

Kati's research work, unlike that of many leading scientists, had not been coupled with teaching or engineering applications. Neither did she hold positions in professional (let alone political) organizations. Still, as fundamental results of researchers of her caliber always enrich the field in an essential and lasting manner, so did hers. She will always be remembered by the IT community, and her colleagues at the Rényi Institute will miss her very much.

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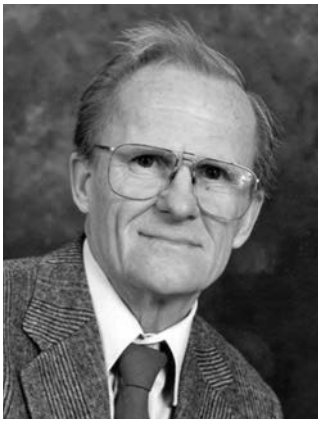
In Memoriam: Jorma J. Rissanen, 1932–2020

Peter Grünwald, Petry Myllymäki, Teemu Roos, and Ioan Tabus

Jorma Johannes Rissanen, giant of information theory, control theory and statistics, passed away at age 87 after a long illness in Los Gatos, California, on 9 May 2020. Jorma Rissanen was perhaps best known for making arithmetic coding practical and for inventing the Minimum Description Length (MDL) principle. The importance of both contributions can hardly be overstated. Arithmetic coding is a central part of information theory; the MDL Principle has also had a profound influence on the data sciences: statistics, machine learning and data mining. It has played a central role in making information-theoretic approaches mainstream to those fields.



Born October 20, 1932, Rissanen grew up in Kemi, a small town near the Swedish border in the north-west of Finland. He moved on to study in Helsinki and obtained his Master's degree in electrical engineering in 1956, his Licentiate and Doctor of Technology degrees in control theory and mathematics in 1960 and 1965, respectively, all from the Helsinki University of Technology. Most of the doctorate work was done at a distance, while Rissanen worked for the IBM Nordic Laboratory in Stockholm, Sweden, which he joined in 1960. Eventually this led him to move to IBM's San Jose Research Laboratory in California in 1966. He stayed there until his retirement in 2002, except for the academic year 1973-1974 when he held the chair of control theory in Linköping University, Sweden. Until quite recently, Rissanen remained active in research as a professor emeritus of Tampere University of Technology, where he became part-time professor after receiving an Honory Doctorate degree in 1992.

While Rissanen's early work was mostly in control theory, he was given free hands at IBM to study and work on whatever he found interesting. Continuously expanding his research interests, he thus became, in his own words, a "lifelong professional student", passionate about learning and discovery. This freedom, in combination with Rissanen's highly original thinking and a serendipitous touch of luck connected to his stay in Sweden, led to an Annus Mirabilis: around 1975, Rissanen invented both practical arithmetic coding (first publication 1976) and the MDL Principle (first publication 1978) – in his mind, both concepts were in fact very closely connected. Ironically, though Rissanen did not enjoy his time in Sweden in 1973–74, it played a fundamental role in these discoveries. In his own words:

"[going to Sweden]…was a disastrous move. I found that I don't like the field of control, I don't like to be a professor, and I don't like the climate nor the at that time very socialist Sweden. However, something happened, which maybe could not have happened otherwise: I was exposed to the exciting ideas of Chaitin, Kolmogorov and Martin-Löf [on Kolmogorov complexity and algorithmic randomness], which set my mind in fire….I found that this is what interests me…We returned to IBM San Jose after just one year."

While Rissanen had already made fundamental contributions to control theory, system theory, database theory and numerical analysis, the focus now shifted and productivity accelerated: the years after 1975 saw a steady stream of groundbreaking articles and patents on data compression and modeling, containing one fundamental contribution after the other. What were these contributions about? The main idea of the MDL Principle is that all learning from data can be fruitfully cast in terms of data compression. This goes hand in hand with the philosophy that probability models in statistics should be viewed as *codes*, i.e. languages for describing patterns in the data, and one should never think of them as 'true' or 'generating the data' – as traditional, frequentist, statisticians do. Whereas researchers often do pay lip service to such statements, they then usually go on to design estimators that minimize expected losses, where expectations are taken under some distribution. Even though they interpret such procedures differently, such a path is also routinely followed by Bayesian statisticians – and Rissanen rejected the standard Bayesian approach just as much as the frequentist one. Instead, he derived and insisted on methods that have a clear interpretation *in terms of data only* – a prime example is Shtarkov's normalized maximum likelihood code, achieving an objective required to hold for all possible data sequences at the same time. As he wrote in the monograph *Stochastic Complexity and Statistical Inquiry* (1989),

"We never want to make the false assumption that the observed data actually were generated by a distribution of some kind, say Gaussian, and then go on to analyze the consequences and make further deductions. Our deductions may be entertaining, but quite irrelevant to the task at hand, namely, to learn useful properties from the data."

Once the principle – learning as compression – and the accompanying philosophy – probability models as languages - were in place, Rissanen continued to refine it and to apply it to a variety of problems in statistics, and the results started flowing. We stress that, while Rissanen's radical philosophy served as a continuous source of inspiration, the resulting learning algorithms were often shown to be optimal also in more traditional analyses – to use and enjoy them, one does not have to subscribe to the philosophy.

The first MDL paper (*Modeling by the Shortest Data Description*, 1978, Best Paper Award IFAC 1981) introduced the two-part code and its application to model selection, which remains the most important application area for MDL methods till this day. It included the celebrated $(k/2)\ \log n$ formula – formally equivalent to the BIC, formulated in the same year with a very different, Bayesian motivation by Schwartz. The two-part code turned out be a special case of an (individual sequence) *universal code*, and Rissanen soon found that other, more sophisticated universal codes can be used as well: in 1984 he introduced the predictive plug-in code, also known as the 'prequential plug-in code' given its relation to A.P. Dawid's ideas on 'prequential' statistics. In the same year, he established the general link between sequential prediction and universal coding and formulated one of his most important results, a lower bound on prediction error and codelength which he referred to as a `Grand Cramèr-Rao Bound' (*Universal Coding, Information, Prediction and Estimation*, 1984, IEEE IT Soc. Best Paper Award 1986). The

Bayesian mixture universal code was introduced in 1986, jointly with the fundamental concept of *stochastic complexity* as a measure of the inherent complexity of a statistical model. By now, a whole new theory had emerged, which was eloquently described in the 1989 monograph from which we cited above. The crowning achievement came in 1996 with the paper *Fisher information and stochastic complexity* in which Shtarkov's normalized maximum likelihood code was identified as the ideal universal code to use, and its properties were analyzed. In the mean time, the work on arithmetic coding and data compression was also expanded, resulting in, for example, the data compression algorithm *Context* (1983) that introduced what has later been called variable-length Markov chains.

This remarkable sequence of articles was soon to be followed by an equally remarkable sequence of honors, including aforementioned best paper awards, the IEEE 1993 Richard W. Hamming medal, an IEEE Information Society Golden Jubilee Award for Technical Innovation for the invention of arithmetic coding in 1998, and, in 2009, the most important award in information theory, the IEEE Claude E. Shannon Award. Numerous further honors include two honorary doctorates, several IBM awards and foreign membership of the Finnish Academy of Science and Letters.

As regards his personal life, Rissanen was married for 64 years to Riitta Rissanen (née Aberg), and in his free time he was a passionate fan of football (soccer). In the 1950s, he seriously contemplated a professional football career. He kept playing several times a week during noon breaks at IBM San José from 1966 all the way up until his retirement in 2002 – indeed, as a tribute to Jorma, plans are under way to organize a Jorma Rissanen Soccer Cup at the next ITA conference. Jorma, atypically for the modern scientist, had no patience at all for small talk, networking and the typical conference breaks or receptions with hundreds of people present – still he was very sociable and tremendously enjoyed time in restaurants and bars with much smaller groups of close academic friends. He was a most loyal and inspiring mentor for many younger researchers (including some of the undersigned), providing essential support in building their careers. Jorma Rissanen impressed all those who had the privilege of knowing him with his commitment to stay true to his values and pursue truth through science. He is indeed famous for numerous memorable anecdotes that reflect his intransigent attitude towards science. Some of the stories have been saved for future generations in the Festschrift collection that was compiled in 2008 to honor his 75th birthday. The quotation above on his time in Sweden, taken from an interview in the Festschrift is Vintage Jorma. We strongly encourage everybody who wants to see more of his highly refreshing directness and honesty to take a look at the interview and the entertaining quotes and recollections in the Festschrift. He will be missed.

The first quotation is from the interview *A Conversation with Jorma Rissanen by P. Huuhtanen, E. Liski and S. Puntanen, published in the Festschrift in Honor of Jorma Rissanen (P. Grünwald, P. Myllymäki, I. Tabus, M. Weinberger and B. Yu, eds.), Tampere 2008*.

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

alike within the society. These continuing efforts supported by the society are a reason why we are here today, with our events and publication outlets reflecting contributions from all over the world. Notably, our society is continuing to expand in IEEE regions outside of US and Canada, and we can catalyze this trend in the virtual world we live in.

In addition to society-supported activities, our community members have had excellent grassroots efforts in community-building and information exchange. Since long before it became a necessity to deliver talks online, our own newsletter editor Prof. Salim El Rouayheb has been running "The Shannon Channel" on YouTube which features talks on topics related to information theory and relevant areas including wireless networks, privacy, machine learning and optimization. Launched in 2015 (five years ago!), with typically a new talk every month, it already has about fifty archived talks with over 12000 total views. Video content is not only a preferred information source for the younger side of the community, but is a venue even those of us who still prefer a paper to an iPad screen, can appreciate as a most useful way to disseminate knowledge.

As I hope I have been able to convey, our members have always been innovative and at the forefront of community building and information dissemination. The virtual world we are currently conducting all of our operations in provides us with an excellent opportunity to unify all our efforts, update them, and develop new ones, under our society's umbrella and with its support. Our vision, which we are affectionately calling FITS (Future of Information Theory Society), is a unified digital presence, and targets improving the value of the society membership. This is a multi-year effort that has many components including a unified digital portal, providing and storing multimedia content, being able to run our societies' meetings (of various scales), imagining new ways of interactions for our members, maintaining a more substantial social media presence (for example for technical content), providing avenues for discussions for our members, for research, for opportunities within and external to our society, and so on. Naturally, taking this on requires a lot of volunteer effort, and we are starting small this year with a few planned experiments. Among these experiments is an effort to professionally edit lectures, for archival value. Specifically, the society volunteers are working with professional editors and a few distinguished lecturers to enrich the content of the online lectures, in selected technical areas, with the goal of creating information resources for current and future members. Another experiment is the upcoming (virtual) European School of Information Theory where the society volunteers are working with the organizers to organize a virtual school that emulates some of the traits of an in-person school.

As for the upcoming ISIT and ITWs (now both in 2021), we are still in a holding pattern. But, no matter what happens in the next few months, two things are certain: the virtual components of conferences are unlikely to go away even after COVID is eradicated, and that one day, it will indeed be eradicated and we will return to normalcy again. For now, we will continue to operate virtually.

Stay well and healthy.

Recent Publications

IEEE Transactions on Information Theory

Table of content for volumes 66(6), 66(7), 66(8)

Vol. 66(6): June 2020.

Vol. 66(7): July 2020.

Vol. 66(8): Aug. 2020.

Call for Papers

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Fair dinkum, ISIT returns to Australia. In 2021, the IEEE International Symposium on Information Theory (ISIT) will be held 11–16 July at the Melbourne Convention & Exhibition Center in Melbourne, Victoria, Australia. ISIT was last held in Australia in 2005, in Adelaide.

Interested authors are encouraged to submit previously unpublished contributions from a broad range of topics related to information theory, including but not limited to the following areas:

- Communication and Storage Coding
- Coding Theory
- Coded and Distributed Computing
- Combinatorics and Information Theory
- Communication Theory
- Compressed Sensing and Sparsity
- Cryptography and Security
- Detection and Estimation
- Deep Learning for Networks
- Distributed Storage
- Emerging Applications of IT
- Information Theory and Statistics
- Information Theory in Biology
- Information Theory in CS
- Information Theory in Data Science
- Learning Theory
- Network Coding and Applications
- Network Data Analysis
- Network Information Theory
- Pattern Recognition and ML
- Privacy in Information Processing
- Quantum Information Theory
- Shannon Theory
- Signal Processing
- Source Coding and Data Compression
- Wireless Communication

Submitted and published manuscripts should not exceed 5 pages in length plus an optional extra page containing references only. Submitted manuscripts should be of sufficient detail to be evaluated by expert reviewers in the field. Full information about paper submission will be posted on the conference web site.

http://isit2021.org/

Paper submission deadline: **January 10, 2021**

Notification of acceptance: March 26, 2021

Accepted papers must be presented by an author in person. International attendees wishing to attend ISIT 2021 must be aware of Australian visa requirements. Attendees requiring a visa are advised to begin the visa application process immediately after acceptance notification.

We look forward to welcoming you to ISIT 2021 in Melbourne.

2020 Riva del Garda

IEEE Information Theory Workshop

Call For Papers

Apr 11–15, 2021
Riva del Garda (TN) - Italy
www.itw2020.it

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Riva del Garda is situated on the northern shore of Lake Garda. The mild climate favcrs a Mediterranean vegetation with laurels, lemon, olive and palm trees that frame the great lake and the beauty of the mountains in the backdrop: a true Mediterranean island at the foot of the Dolomites. Boasting a number of lovely bays and ports, Riva del Garda is a popular venue for windsurfers and sailors.

The center of Riva del Garda will fascinate you with its art and architecture, witnessing to ancient history and clutural diversity. The Congress Centre, located in the heart of the town, surrounded by ancient parkland, combines the most extraordinary lake-side setting with a strategic position, making it easily reachable on foot from the hotels.

Topics

Interested authors are encouraged to submit previously unpublished contributions in all areas of coding and information theory. The program will include both invited and contributed sessions, with a particular emphasis on the interface between information theory and other topics including, but not limited to:

- Statistics, Learning, and Deep Neural Networks
- Quantum Computing and Coding
- Coding for Computation and Learning
- Queuing Theory
- Blockchains and Cryptocurrencies
- Computational and Synthetic Biology

Tutorials

The workshop will feature tutorials on interdisciplinary topics of emerging interest. Tutorials will be held on Sunday, April 11

Papers

Papers for the contributed sessions must be submitted according to the guidelines appearing on the workshop website: http://www.itw2020.it

Dates

Paper submission deadline: September 30, 2020
Acceptance notification: November 30, 2020
Final manuscript and author registration: TBD

Hosted by the
Department of Electrical and Computer Engineering, Johns Hopkins University
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IEEE Information Theory Society

https://ciss.jhu.edu

Due to the COVID-19 global pandemic, CISS 2021 will be conducted virtually, featuring live talks, prerecorded sessions with live discussions, and other enhancements. Details will be provided when finalized. Procedures and deadlines for submission and review of contributions will not change. Thank you for your understanding, and we look forward to seeing you at CISS 2021!

Authors are invited to submit previously unpublished papers describing theoretical advances, applications, and ideas in the fields of Information Sciences and Systems including:

- Information Theory
- Communications
- Energy Systems
- Signal Processing
- Image Processing
- Coding
- Systems and Control
- Optimization
- Quantum Systems
- Machine Learning
- Security and Privacy
- Statistical Inference
- Biological Systems
- Neuroscience

Papers will require approximately 18 minutes for presentation and will be reproduced in full (up to six pages) in the conference proceedings.

Submissions of sufficient detail and length to permit careful reviewing must be submitted online, at **https://ciss.jhu.edu** only, by **December 7, 2020**. Authors will be notified of acceptance no later than **January 18, 2021**. Final manuscripts of accepted papers are to be submitted in PDF format no later than Febr**uary 1, 2021**. **These are firm deadlines that are necessary to ensure the timely availability of the conference program.** IEEE reserves the right to exclude a paper from distribution after the conference, including removal from IEEE Xplore®, if the paper is not presented by an author at the conference.

Conference Coordinator	Program Directors	Important Dates
Colleen Amaral 410-516-7031 Department of Electrical and Computer Engineering Johns Hopkins University Baltimore, MD 21218 **https://ciss@jhu.edu**	Prof. Archana Venkatarman Prof. A. Brinton Cooper Department of Electrical and Computer Engineering Johns Hopkins University Baltimore, MD 21218	**Submission deadline:** December 7, 2020 **Notification of acceptance:** January 18, 2021 **Final manuscript due:** February 1, 2021

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Special Issue on

Sequential, active, and reinforcement learning

There has been a long history of the interplay between information theory and sequential data analysis in the context of sequential estimation, hypothesis testing, and change-point detection. Recently, sequential methods have become hugely popular in domains such as reinforcement learning, multi-armed bandits, online convex optimization, and active learning. These methods have assumed tremendous importance due to the wide availability of large amounts of data, including data acquired in real time by advanced sensing technologies, and audio-visual content available on social media platforms. Although many practical algorithms have been developed for making accurate decisions on-the-fly, there is also a strong need for understanding the fundamental performance limits of these algorithms designed for the sequential learning tasks. Herein lies an excellent opportunity for information theory to employ the vast array of techniques in its arsenal to answer these fundamental questions. Simultaneously, sequential learning has already started to motivate new problems and insights in information theory and has led to new perspectives. This special issue seeks to fertilize new topics at the intersection of information theory and sequential, active, and reinforcement learning, and to promote synergies across these areas of research.

Topics

Prospective authors are invited to submit original manuscripts on topics including, but not limited to:

(a) Multi-armed bandits;
(b) Reinforcement learning;
(c) Bayesian optimization;
(d) Change-point detection, anomaly detection;
(e) Stochastic optimization methods;
(f) Active learning;
(g) Sequential estimation, hypothesis testing, and tracking;
(h) Sequential experimental design.

Important Dates

Manuscript Due: October 1, 2020
Acceptance Notification: March 15, 2021
Final to Publisher: April 10, 2021
Expected Publication: April/May 2021

Senior Editors

Robert Nowak (University of Wisconsin Madison)
David Tse (Stanford University)

Guest Editors

(a) Yao Xie (Georgia Tech, Lead)
(b) Vincent Tan (National University of Singapore, Lead)
(c) Mengdi Wang (Princeton University)
(d) Venugopal Veeravalli (UIUC)
(e) George Moustakides (University of Patras)
(f) Csaba Szepesvari (University of Alberta)
(g) Zheng Wen (DeepMind)

Conference Calendar

DATE	CONFERENCE	LOCATION	WEB PAGE	DUE DATE
October 24–27, 2020	International Symposium on Information Theory and its Applications (ISITA)	Kapolei, Hawaii, USA	http://www.isita.ieice.org/2020/home.html	Passed
November 16–19, 2020	60st Annual IEEE Symposium on Foundations of Computer Science (FOCS)	Durham, North Carolina, USA	https://focs2020.cs.duke.edu/index.php/cfp/	Passed
December 7–11, 2020	IEEE Global Communications Conference (GLOBECOM)	Taipei, Taiwan	https://globecom2020.ieee-globecom.org	Passed
March 22–24, 2021	54th Annual Conference on Information Sciences and Systems (CISS)	Virtual	https://ciss.jhu.edu	December 7, 2020
April 11–15, 2021	2020 IEEE Information Theory Workshop (ITW)	Riva del Garda, Italy	http://itw2020.it/welcome.html	September 30, 2020
July 11–16, 2021	2020 IEEE International Symposium on Information Theory (ISIT)	Melbourne, Victoria, Australia	https://2021.ieee-isit.org	January 10, 2021

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