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Chairs: Ioannis Krikidis (University of Cyprus, Cyprus), Constantinos Psomas (University of Cyprus, Cyprus), John Thompson (University of Edinburgh, United Kingdom (Great Britain))

Organizers: Constantinos Psomas (University of Cyprus), Ioannis Krikidis (University of Cyprus), John Thompson (The University of Edinburgh)

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Tuesday, November 1 20:00 - 21:00

Plenary Talk - Advances in Differential Privacy: Getting More for Less

Chair: Lara Dolecek (UCLA, USA)

Differential privacy is a definition of privacy tailored to the analysis of large datasets. The key to the success of differential privacy is the ability to quantify and reason about cumulative privacy loss over many differentially private interactions. When upper bounds on privacy loss are loose, the deployment of the algorithms is by definition conservative, "leaving something on the table." Under high levels of composition, much potential utility is lost. We survey two general approaches to getting more utility: privacy amplification techniques, which are algorithmic, and definitional changes, which lead to tighter analyses of existing algorithms.

Cynthia Dwork, Gordon McKay Professor of Computer Science at the Harvard Paulson School of Engineering, Radcliffe Alumnae Professor at the Radcliffe Institute for Advanced Study, and Affiliated Faculty at Harvard Law School and Department of Statistics, uses theoretical computer science to place societal problems on a firm mathematical foundation.

She was awarded the Edsger W. Dijkstra Prize in 2007 in recognition of some of her earliest work establishing the pillars on which every fault tolerant system has been built for a generation (Dwork, Lynch, and Stockmeyer, 1984).

Her contributions to cryptography include the launching of non-malleable cryptography, the subfield of modern cryptography that studies - and remedies - the failures of cryptographic protocols to compose securely (Dolev, Dwork, and Naor, 1991). She is a co-inventor of the first public-key cryptosystem based on lattices, the current best bet for cryptographic constructions that will remain secure even against quantum computers (Ajtai and Dwork, 1997). More recently, Dwork spearheaded a successful effort to place privacy-preserving analysis of data on a firm mathematical foundation. A cornerstone of this effort is the invention of Differential Privacy (Dwork, McSherry, Nissim, and Smith, 2006, Dwork 2006), now the subject of intense activity across many disciplines and recipient of the Theory of Cryptography Conference 2016 Test-of-Time award and the 2016 Gödel Prize. Now widely used in industry - for example by Google, MIcrosoft, Uber, and, most prominently, by Apple - differential privacy will also be the foundation of the Disclosure Avoidance System in the 2020 US Decennial Census.

Dwork was educated at Princeton and Cornell. She received her BSE (with honors) in electrical

engineering and computer science at Princeton University, where she also received the Charles Ira Young Award for Excellence in Independent Research, the first woman ever to do so. She received her M.Sc. and Ph.D. degrees in computer science at Cornell University.

Dwork is a member of the US National Academy of Sciences and the US National Academy of Engineering, and is a fellow of the ACM, the American Academy of Arts and Sciences, and the American Philosophical Society.

Tuesday, November 1 21:30 - 23:00

Themed Session: Machine Learning and Data Storage

Chairs: Netanel Raviv (Washington University in Saint Louis, USA), Paul H. Siegel (University of California, San Diego, USA)

Organizers: Paul H. Siegel (University of California, San Diego), Netanel Raviv, (Washington University, St. Louis), Anxiao (Andrew) Jiang (Texas A&M University)

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Organizers: Yu-Chih Huang (National Yang Ming Chiao Tung University, Taiwan), Shih-Chun Lin (National Taiwan University), Stefano Rini (National Yang Ming Chiao Tung University, Taiwan)

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Laboratoire Hubert Curien, France)

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Sunday, November 6 14:00 - 16:50

Tutorial: Bridging Information Theory and Machine Learning: A Loss Function Perspective

Chair: Vinod M Prabhakaran (Tata Institute of Fundamental Research, India)

Machine learning has dramatically enhanced the role of automated decision making across a variety of domains. There are three ingredients that are at the heart of designing of sound ML algorithms: data, learning architectures, and loss functions. In this tutorial, we focus on loss functions and the role of information theory in understanding the choice of loss functions in learning. To this end, we introduce alpha-loss as a parameterized class of loss functions that resulted from operationally motivating information-theoretic measures. Tuning the parameter alpha from 0 to infinity allows continuous interpolation between known and oft-used losses: log-loss (alpha=1), exponential loss (alpha=1/2), and 0-1 loss (alpha=infinity).

In the first third of the tutorial, we will discuss fundamental properties of alpha-loss: its information-theoretic interpretations, consistency and generalization guarantees, and the behavior of its optimization landscape in the logistic model as viewed through the lens of Strict-Local-Quasi-

Convexity.

In the second part of the tutorial, we will highlight the robustness of this loss family to a variety of data corruptions (referred to as "twists") including benign and adversarial feature and/or label noise. We do so using a new robustness framework called Twist-Properness. We will prove that the alpha-loss is more robust to symmetric label noise with a fixed hyperparameter than the oft-used log-loss. In addition, we also present an algorithmic contribution: a new robust boost algorithm to "properly" boost the alpha-loss called PILBoost (Pseudo-Inverse Link Boost). Indeed, for several datasets and twists, we show that PILBoost is more robust than XGBoost, which is a state-of-the-art boosting algorithm.

Finally, we will conclude by highlighting how the core information-theoretic properties of this loss function class allow it to unify a range of generative adversarial network (GAN) models. Here, we will show that a large class of GANs from the original (oft-called vanilla GAN) GAN to f-GANs to Wasserstein and other IPM GANs are captured by using alpha-loss to write the value function of GANs, and thus, present a mechanism to enable meaningful comparisons of GANs. Throughout the tutorial, the technical results will be accompanied by results on publicly available large datasets and deep learning models.

Lalitha Sankar is an Associate Professor in the School of Electrical, Computer, and Energy Engineering at Arizona State University. She received her doctorate from Rutgers University, her master's from the University of Maryland, and her bachelor's degree from the Indian Institute of Technology, Bombay. Her research at present is at the intersection of information science and learning theory including their applications to the electric grid. She received the NSF CAREER award in 2014. She currently leads both an NSF HDR institute on data analytics for the electric grid and an NSF-and Google-funded effort on predicting infectious disease exposure risk in a secure and privacy-preserving manner.

Sunday, November 6 18:30 - 21:15

Tutorial: Quantum Information Processing: An Essential Primer (virtual)

Chair: Sidharth Jaggi (University of Bristol, United Kingdom (Great Britain))

Quantum information science is an exciting, broad, rapidly progressing,cross-disciplinary field, which makes it both attractive and hard to enter. This tutorial will first answer the three essential questions that any newcomer needs to know: How is quantum information represented? How is quantum information processed? How is classical information extracted from quantum states? We will then introduce the fundamental quantum algorithms and protocols that illustrate quantum computing advantages. We will examine how basic information and coding theoretic notions generalize to quantum. The tutorial will conclude with examples that demonstrate the power of quantum correlations. No prior knowledge of quantum mechanics is assumed.

Emina Soljanin is a professor of Electrical and Computer Engineering at Rutgers. Before moving to

Rutgers in January 2016, she was a (Distinguished) Member of Technical Staff for 21 years in various incarnations of the Mathematical Sciences Research Center of Bell Labs. Her broad interests and expertise include distributed computing and quantum information science. She is an IEEE Fellow, an outstanding alumnus of the Texas A&M School of Engineering, the 2011 Padovani Lecturer, a 2016/17 Distinguished Lecturer, and the 2019 IEEE Information Theory Society President.

Monday, November 7 9:00 - 10:00

Plenary Talk: A (Con)Sequential View of Information for Statistical Learning and Optimization

Chair: Navin Kashyap (Indian Institute of Science, India)

In most communication systems, adapting transmission strategies to the (unpredictable) realization of channel output at the receiver requires an unrealistic assumption about the availability of a reliable "feedback" channel. This unfortunate fact, combined by the historical linkage between teaching information theory and digital communication curriculum has kept "feedback information theory" less taught, discussed, appreciated and understood compared to other topics in our field.

This talk, in contrast, highlights important and challenging problems in machine learning, optimization, statistics, and control theory, where the problem of acquiring information in an adaptive manner arises very naturally. Thus, I will argue that an increased emphasis on (teaching) feedback information theory can provide vast and exciting research opportunities at the intersection of information theory and these fields. In particular, I will revisit simple-to-teach results in feedback information theory including sequential hypothesis testing, arithmetic coding, successive refinement, noisy binary search, and posterior matching. I will also highlight the successful application of these sequential techniques in a variety of problem instances such as black-box optimization, distribution estimation, and active machine learning with imperfect labels.

Tara Javidi received her BS in electrical engineering at Sharif University of Technology, Tehran, Iran. She received her MS degrees in electrical engineering (systems) and in applied mathematics (stochastic analysis) from the University of Michigan, Ann Arbor as well as her Ph.D. in electrical engineering and computer science in 2002. From 2002 to 2004, Tara Javidi was an assistant professor at the Electrical Engineering Department, University of Washington, Seattle. In 2005, she joined the University of California, San Diego, where she is currently a professor of electrical and computer engineering and a founding co-director of the Center for Machine-Intelligence, Computing and Security.

Tara Javidi's research interests are in theory of active learning, information acquisition and statistical inference, information theory with feedback, stochastic control theory, and wireless communications and communication networks. Tara served as a Distinguished Lecturer of the IEEE Information Theory Society (2017/18) as well as Communications Society (2019/20). She is also a member of the Board of

Governors of the IEEE Information Theory Society (2017/18/19-2020/21/22).

Tara Javidi is a Fellow of IEEE. She and her Phd students are recipients of the 2021 IEEE Communications Society & Information Theory Society Joint Paper Award. She also received the 2018 and 2019 Qualcomm Faculty Award for her contributions to wireless technology. Tara Javidi was a recipient of the National Science Foundation early career award (CAREER) in 2004, Barbour Graduate Scholarship, University of Michigan, in 1999, and the Presidential and Ministerial Recognitions for Excellence in the National Entrance Exam, Iran, in 1992. At UCSD, she has also received awards for her exceptional University service/leadership and contributions to diversity.

Monday, November 7 10:30 - 11:50

Topics in Coding I

Chair: Rawad Bitar (Technical University of Munich, Germany)

10:30 ***A subclass of LRC codes with intersecting recovering sets...512***
Charul Rajput (Indian Institute of Science, India); Maheshanand Bhaintwal (Indian Institute of Technology Roorkee, India)

10:50 ***Irregular Generalized LDPC codes in practical communication scenarios...517***
Sander Mikelsaar, Irina Bocharova and Boris D. Kudryashov (University of Tartu, Estonia)

11:10 ***On the Classification of \(\mathbb{Z}_p\mathbb{Z}_{p^2}\)-Linear Generalized Hadamard Codes...523***
Dipak Kumar Bhunia, Cristina Fernández-Córdoba and Mercè Villanueva (Universitat Autònoma de Barcelona, Spain)

11:30 ***Tamo-Barg Codes with Efficient Local Repair...529***
U. s. s. Sasanka and V. Lalitha (IIIT Hyderabad, India)

Shannon Theory

Chair: Vincent Y. F. Tan (National University of Singapore, Singapore)

10:30 ***Strong Converses using Change of Measure and Asymptotic Markov Chains...535***
Mustapha Hamad (Télécom Paris, France); Michele A Wigger (Telecom Paris, France); Mireille Sarkiss (Telecom SudParis, France)

10:50 ***A Quasi-Uniform Approach to Characterizing the Boundary of the Almost Entropic Region...541***

Satyajit Thakor and Dauood Saleem (Indian Institute of Technology Mandi, India)

11:10 ***On Information Bottleneck for Gaussian Processes...546***

Michael Dikshtein (Technion - Israel Institute of Technology, Israel); Nir Weinberger (Technion, Israel); Shlomo (Shitz) Shamai (The Technion, Israel)

11:30 ***The Classical Capacity of Quantum Jackson Networks with Waiting Time-Dependent Erasures...552***

Jaswanthi Mandalapu (Indian Institute of Technology, Madras, India); Krishna P Jagannathan (Indian Institute of Technology Madras, India)

Monday, November 7 14:00 - 15:20

Constrained Coding I

Chair: Ankur A. Kulkarni (Indian Institute of Technology Bombay, India)

14:00 ***Codes for the Asymmetric Damerau--Levenshtein Distance...558***

Shuche Wang, Van Khu Vu and Vincent Y. F. Tan (National University of Singapore, Singapore)

14:20 ***The Input and Output Entropies of the k-Deletion/Insertion Channel with Small Radii...564***

Shubhransh Singhvi (International Institute of Information Technology, Hyderabad, India); Omer Sabary, Daniella Bar-Lev and Eitan Yaakobi (Technion, Israel)

14:40 ***Efficient Systematic Deletions/Insertions of 0's Error Control Codes...570***

Luca G. Tallini (Università di Teramo, Italy); Nawaf A Alqwaifly (2274 NW Hummingbird Drive & Oregon State University, USA); Bella Bose (Oregon State University, USA)

15:00 ***Achievable Rates and Algorithms for Group Testing with Runlength Constraints...576***

Stefano Della Fiore and Marco Dalai (University of Brescia, Italy); Ugo Vaccaro (University of Salerno, USA)

Neural Networks and Learning

Chair: Lalitha Sankar (Arizona State University, USA)

14:00 ***Do Neural Networks Compress Manifolds Optimally?...582***

Sourbh Nitin Bhadane and Aaron Wagner (Cornell University, USA); Johannes Ballé (Google, USA)

14:20 ***Sharp asymptotics on the compression of two-layer neural networks...588***

Mohammad Hossein Amani (EPFL, Switzerland); Simone Bombari (ISTA, Austria); Marco Mondelli (IST Austria, Austria); Rattana Pukdee (Carnegie Mellon University, USA); Stefano Rini (National Yangming Jiaotong University, Taiwan)

14:40 ***Active-LATHE: An Active Learning Algorithm for Boosting the Error Exponent for Learning Homogeneous Ising Trees...594***

Fengzhuo Zhang, Anshoo Tandon and Vincent Y. F. Tan (National University of Singapore, Singapore)

15:00 ***A learning-based approach to approximate coded computation...600***

Navneet Agrawal (Technische Universität Berlin, Germany); Yuqin Qiu (University of Melbourne, Australia); Matthias Frey (Technische Universität Berlin, Germany); Igor Bjelakovic (Fraunhofer Heinrich Hertz Institute, Germany); Setareh Maghsudi (University of Tübingen, Germany); Slawomir Stanczak (Technische Universität Berlin & Fraunhofer Heinrich Hertz Institute, Germany); Jingge Zhu (University of Melbourne, Australia)

Monday, November 7 15:50 - 16:50

Topics in Coding II

Chair: Joerg Kliewer (New Jersey Institute of Technology, USA)

15:50 ***Linear Computation Coding Inspired by the Lempel-Ziv Algorithm...606***

Ralf R. Müller (Friedrich-Alexander Universität Erlangen-Nürnberg, Germany)

16:10 ***Rate-Optimal Streaming Codes with Smaller Field Size Under Less-Stringent Decoding-Delay Requirements...612***

Shobhit Bhatnagar and Vinayak Ramkumar (Indian Institute of Science, India); P Vijay Kumar (Indian Institute of Science & University of Southern California, India)

16:30 ***Coded Data Rebalancing for Distributed Data Storage Systems with Cyclic Storage...618***

Athreya Chandramouli (International Institute of Information Technology, Hyderabad, India); Abhinav Vaishya and Prasad Krishnan (IIIT Hyderabad, India)

Monday, November 7 17:00 - 18:30

Themed Session: Information Theory for Modern Statistics and Machine Learning

Chair: Cynthia Rush (Columbia University, USA)

Organizers: Martina Cardone (University of Minnesota), Alex Dytso (New Jersey Institute of Technology), Cynthia Rush (Columbia University)

17:00 ***Short overview of the theme of the session...N/A***
Cynthia Rush (Columbia University, USA)

17:03 ***Message Passing Algorithms for Rotationally Invariant Generalized Linear Models...N/A***
Ramji Venkataramanan (University of Cambridge, United Kingdom (Great Britain))

17:21 ***Towards theoretically-founded structure learning...N/A***
Shirin Jalali (Rutgers University, USA)

17:39 ***Misspecified Regret Rates of Convergence for Unknown Feature Density...N/A***
Nir Weinberger (Technion, Israel)

17:57 ***Being Properly Improper: The Role of Loss Functions in Robust Machine Learning...N/A***
Lalitha Sankar (Arizona State University, USA)

18:15 ***Panel Discussion***

Tuesday, November 8 9:00 - 10:00

Plenary Talk: Listen to the Noise

Chair: Andrew Thangaraj (IIT Madras, India)

Careful joint constructions of codes and decoders generally presuppose, often implicitly, isotropic IID models of noise, sublimated into algebraic notions, such as minimum distance. The difficulty of the design of codes and decoders is such that it has to a large extent dominated the construction of the communications architecture stack, from modulation to detection. In this talk, we envisage a different philosophy. We consider taking as a starting point that the core parameter in operating communications system is the effect of the channel characteristics, such as the noise, which are beyond the engineer's control and often highly time-varying, and which should be considered in terms of their realizations, not their average behavior. The construction of the code can be in effect relegated merely to that of a good hash for verification of the validity of a codeword. In that case, the

decoder goes from being code-centric to noise centric. We provide some examples of that philosophy, from guessing random additive noise decoding (GRAND) to noise recycling, that use the real-time realizations of the noise and any statistical knowledge of it, in a code-agnostic way. We argue that the stack can become simplified, more modular and far more efficient. All work is joint with Ken Duffy.

Muriel Médard is the Cecil H. and Ida Green Professor in the Electrical Engineering and Computer Science (EECS) Department at MIT, where she leads the Network Coding and Reliable Communications Group in the Research Laboratory for Electronics at MIT. She obtained three Bachelors degrees (EECS 1989, Mathematics 1989 and Humanities 1991), as well as her M.S. (1991) and Sc.D (1995), all from MIT. She is a Member of the US National Academy of Engineering (elected 2020), a Fellow of the US National Academy of Inventors (elected 2018), American Academy of Arts and Sciences (elected 2021), and a Fellow of the Institute of Electrical and Electronics Engineers (elected 2008). She holds Honorary Doctorates from the Technical University of Munich (2020) and from The University of Aalborg (2022).

She was co-winner of the MIT 2004 Harold E. Egerton Faculty Achievement Award and was named a Gilbreth Lecturer by the US National Academy of Engineering in 2007. She received the 2017 IEEE Communications Society Edwin Howard Armstrong Achievement Award and the 2016 IEEE Vehicular Technology James Evans Avant Garde Award. She received the 2019 Best Paper award for IEEE Transactions on Network Science and Engineering, the 2018 ACM SIGCOMM Test of Time Paper Award, the 2009 IEEE Communication Society and Information Theory Society Joint Paper Award, the 2009 William R. Bennett Prize in the Field of Communications Networking, the 2002 IEEE Leon K. Kirchmayer Prize Paper Award, as well as eight conference paper awards. Most of her prize papers are co-authored with students from her group.

She has served as technical program committee co-chair of ISIT (twice), CoNext, WiOpt, WCNC and of many workshops. She has chaired the IEEE Medals committee, and served as member and chair of many committees, including as inaugural chair of the Millie Dresselhaus Medal. She was Editor in Chief of the IEEE Journal on Selected Areas in Communications and has served as editor or guest editor of many IEEE publications, including the IEEE Transactions on Information Theory, the IEEE Journal of Lightwave Technology, and the IEEE Transactions on Information Forensics and Security. She was a member of the inaugural steering committees for the IEEE Transactions on Network Science and for the IEEE Journal on Selected Areas in Information Theory.She currently serves as the Editor-in-Chief of the IEEE Transactions on Information Theory. Muriel was elected president of the IEEE Information Theory Society in 2012, and serves on its board of governors, having previously served for eleven years.

Muriel received the inaugural 2013 MIT EECS Graduate Student Association Mentor Award, voted by the students. She set up the Women in the Information Theory Society (WithITS) and Information Theory Society Mentoring Program, for which she was recognized with the 2017 Aaron Wyner

Distinguished Service Award. She served as undergraduate Faculty in Residence for seven years in two MIT dormitories (2002-2007). She was elected by the faculty and served as member and later chair of the MIT Faculty Committee on Student Life and as inaugural chair of the MIT Faculty Committee on Campus Planning. She was chair of the Institute Committee on Student Life. She was recognized as a Siemens Outstanding Mentor (2004) for her work with High School students. She serves on the Board of Trustees since 2015 of the International School of Boston, for which she is treasurer.

She has over sixty US and international patents awarded, the vast majority of which have been licensed or acquired. For technology transfer, she has co-founded CodeOn, for which she consults, and Steinwurf, for which she is Chief Scientist.

Muriel has supervised over 40 master students, over 20 doctoral students and over 25 postdoctoral fellows.

Tuesday, November 8 10:30 - 12:00

Themed Session: Fundamental Information Limits of Networks of Noisy Quantum Components

Chairs: Avhishek Chatterjee (Indian Institute of Technology Madras, India), Prabha Mandayam (Indian Institute of Technology Madras, India)

Organizers: Avhishek Chatterjee (IIT Madras), Krishna Jagannathan (IIT Madras), Prabha Mandayam (IIT Madras), Lav Varshney (University of Illinois, Urbana Champaign)

10:30 ***Introduction and context...N/A***
Prabha Mandayam (Indian Institute of Technology Madras, India)

10:40 ***Conquering noise in quantum communications...N/A***
Saikat Guha (University of Arizona, USA)

11:10

11:15 ***Quantum computing in the presence of resource constraints: Limitations and optimizations...N/A***
Hui Khoon Ng (National University of Singapore, Singapore)

11:45 ***Concluding remarks***
Avhishek Chatterjee (Indian Institute of Technology Madras, India)

Tuesday, November 8 14:00 - 15:00

Constrained Coding II

Chair: Adrish Banerjee (Indian Institute of Technology, Kanpur, India)

14:00 ***Linear Runlength-Limited Subcodes of Reed-Muller Codes and Coding Schemes for Input-Constrained BMS Channels...624***

V. Arvind Rameshwar (Indian Institute of Science, Bengaluru, India); Navin Kashyap (Indian Institute of Science, India)

14:20 ***Sequential Decoding of Convolutional Codes for Synchronization Errors...630***

Anisha Banerjee (Technical University of Munich, Germany); Andreas Lenz (Technische Universität München, Germany); Antonia Wachter-Zeh (Technical University of Munich (TUM), Germany)

14:40 ***Optimal Error-Detecting Codes for General Asymmetric Channels via Sperner Theory...636***

Mladen Kovačević and Dejan Vukobratović (University of Novi Sad, Serbia)

Information Theory and Statistics

Chair: Rajesh Sundaresan (Indian Institute of Science, India)

14:00 ***On Universal Sequential Classification from Sequentially Observed Empirical Statistics...642***

Chia-Yu Hsu (Realtek Semiconductor Corp., Taiwan); Ching-Fang Li and I-Hsiang Wang (National Taiwan University, Taiwan)

14:20 ***Best Restless Markov Arm Identification...648***

Karthik Periyapattana Narayana Prasad, Srinivas Reddy Kota and Vincent Y. F. Tan (National University of Singapore, Singapore)

14:40 ***Second-Order Asymptotics of Hoeffding-Like Hypothesis Tests...654***

Harsha K v (India); Jithin Ravi (Indian Institute of Technology Kharagpur, India); Tobias Koch (Universidad Carlos III de Madrid & Gregorio Marañón Health Research Institute, Spain)

Tuesday, November 8 15:05 - 16:05

Topics in Coding III

Chair: Marco Dalai (University of Brescia, Italy)

15:05 ***On DNA Codes Over the Non-Chain Ring \(\mathbb{Z}_4+u\ mathbb{Z}_4+u^2\mathbb{Z}_4\) with \(u^3=1\)...660***

Shibsankar Das and Krishna Gopal Benerjee (Indian Institute of Technology Kanpur, India); Adrish Banerjee (Indian Institute of Technology, Kanpur, India)

15:25 ***On the Relationship Between the Minimum of the Bethe Free Energy Function of a Factor Graph and Sum-Product Algorithm Fixed Points...666***

Yuwen Huang and Pascal Vontobel (The Chinese University of Hong Kong, Hong Kong)

15:45 ***Double-Cover-Based Analysis of the Bethe Permanent of Non-negative Matrices...672***

Kit Shing Ng and Pascal Vontobel (The Chinese University of Hong Kong, Hong Kong)

Caching

Chair: V. Lalitha (IIIT Hyderabad, India)

15:05 ***Shared Cache Coded Caching Schemes with known User-to-Cache Association Profile using Placement Delivery Arrays...678***

Elizabath Peter, K. K. Krishnan Namboodiri and B. Sundar Rajan (Indian Institute of Science, India)

15:25 ***Universal Caching...684***

Ativ Joshi and Abhishek Sinha (Tata Institute of Fundamental Research, India)

15:45 ***Security and Privacy in Cache-Aided Linear Function Retrieval for Multi-Access Coded Caching...690***

Mallikharjuna Chinnapadamala and B. Sundar Rajan (Indian Institute of Science, India)

Tuesday, November 8 16:30 - 18:00

Themed Session: Information-Theoretic Methods for Black-Box Optimization

Chairs: Aditya Gopalan (Indian Institute of Science, India), Tara Javidi (UCSD, USA)

Organizers: Aditya Gopalan (Indian Institute of Science), Tara Javidi (University of California, San Diego), Jonathan Scarlett (National University of Singapore)

16:30 ***A Brief Introduction to Black-Box Optimization...N/A***

Aditya Gopalan (Indian Institute of Science, India); Tara Javidi (UCSD, USA); Jonathan Scarlett (National University of Singapore, Singapore)

17:00 ***Almost Optimal Variance-Constrained Best Arm Identification...N/A***

Yunlong Hou, Zixin Zhong and Vincent Y. F. Tan (National University of Singapore, Singapore)

17:20 ***Time Uniform Concentration Bounds for Black Box Optimization...N/A***

Sayak Ray Chowdhury (Microsoft Research, India)

17:40 ***Demonstration of Website and Video***

Wednesday, November 9 8:30 - 9:50

Coding and Computing I

Chair: Nikhil Karamchandani (Indian Institute of Technology Bombay, India)

8:30 ***Bounding the Optimal Length of Pliable Index Coding via a Hypergraph-based Approach...696***

Tulasi Sowjanya Barika (IIITH, India); Visvesh S Subramanian (International Institute of Information Technology Hyderabad, India); Prasad Krishnan (IIIT Hyderabad, India)

8:50 ***Minrank of Embedded Index Coding Problems and its Relation to Connectedness of a Bipartite Graph...702***

Anjana Ambika Mahesh (Indian Institute of Science, Bangalore, India); B. Sundar Rajan (Indian Institute of Science, India)

9:10 ***Straggler-Resilient Differentially-Private Decentralized Learning...708***

Yauhen Yakimenka (Simula UiB, Norway); ChungWei Weng (Simula UiB AS, Norway); Hsuan-Yin Lin and Eirik Rosnes (Simula UiB, Norway); Joerg Kliewer (New Jersey Institute of Technology, USA)

9:30 ***Multi-Message Pliable Private Information Retrieval...714***

Sarah A. Obead (Simula UiB, Norway); Joerg Kliewer (New Jersey Institute of Technology, USA)

Security

Chair: Christian Deppe (Technical University of Munich, Germany)

8:30 ***Semantic Security with Infinite Dimensional Quantum Eavesdropping Channel...720***

Matthias Frey (Technische Universität Berlin, Germany); Igor Bjelakovic (Fraunhofer Heinrich Hertz Institute, Germany); Janis Nötzel (Technische Universität München, Germany); Slawomir Stanczak (Technische Universität Berlin & Fraunhofer Heinrich Hertz Institute, Germany)

8:50 ***Positivity of Secret Key Capacity for Hypergraphical Sources with a Linear Wiretapper...726***

Praneeth Kumar Vippathalla (Indian Institute of Science, India); Chung Chan (City University of Hong Kong, Hong Kong); Navin Kashyap (Indian Institute of Science, India); Qiaoqiao Zhou (National University of Singapore, Singapore)

9:10 ***Commitment over Unreliable Noisy Channels: When Awareness Meets Control...732***

Amitalok J. Budkuley (Indian Institute of Technology Kharagpur, India); Pranav Joshi (Independent Researcher, India); Manideep Mamindlapally (Indian Institute of Technology Kharagpur, India); Anuj Kumar Yadav (Indian Institute of Technology Patna)

Wednesday, November 9 10:20 - 11:20

Coding and Computing II

Chair: Ralf R. Müller (Friedrich-Alexander Universität Erlangen-Nürnberg, Germany)

10:20 ***All-to-All Encode in Synchronous Systems...738***

Canran Wang (Washington University in St. Louis, USA); Netanel Raviv (Washington University in Saint Louis, USA)

10:40 ***Breaking Blockchain's Communication Barrier with Coded Computation...744***

Canran Wang (Washington University in St. Louis, USA); Netanel Raviv (Washington University in Saint Louis, USA)

11:00 ***Fractional Graph Coloring for Functional Compression with Side Information...750***

Derya Malak (EURECOM, France)

Techniques in Information Theory and Coding

Chair: Bikash K Dey (Indian Institute of Technology Bombay, India)

10:20 ***A Bivariate Invariance Principle...756***

Alexander Mariona and Homa Esfahanizadeh (Massachusetts Institute of

Technology, USA); Rafael D'Oliveira (Clemson University, USA); Muriel Médard (MIT, USA)

10:40 ***A General Formula for Uniform Common Randomness Capacity...762***
Rami Ezzine, Moritz Wiese and Christian Deppe (Technical University of Munich, Germany); Holger Boche (Technical University Munich, Germany)

11:00 ***Safety in Numbers: Asymptotic Analysis of a Monitoring Problem...768***
Reka Inovan and Emre Telatar (EPFL, Switzerland)

Wednesday, November 9 11:30 - 12:30

Plenary Talk: Coded Caching: Research Trends and Challenges

Chair: Srikrishna Bhashyam (Indian Institute of Technology Madras, India)

Coded caching deals with reducing the peak hour load in a wireless network by proper choice of placement of data a priori in the caches accessible to the users and reducing the delivery load by coding when the demands of the users are made known to the server later. Starting from the seminal work by Maddah-Ali and Niesen, results have been reported with several variations like, centralized and decentralized placement, multi-antenna server, coded vs uncoded placement, shared link and D2D network, unequal cache size, data and demand privacy, etc. In this talk, after a quick survey of key results, recent research trends will be highlighted along with the challenges encountered.

Balaji Sundar Rajan received his B.Sc. degree in mathematics from Madras University, B.Tech. degree in electronics from Madras Institute of Technology, India, and M.Tech. and Ph.D. degrees in electrical engineering from Indian Institute of Technology, Kanpur, India. He was a faculty member at the Department of Electrical Engineering, Indian Institute of Technology, Delhi, from 1990 to 1997. He has been a Professor with the Department of Electrical Communication Engineering at Indian Institute of Science, Bangalore, since 1998.

Sundar Rajan was an Associate Editor of IEEE Transactions On Information Theory (2008-2011 and 2013-2015), an Editor of IEEE Transactions on Wireless Communications (2007-2011) and an Editor of IEEE Wireless Communications Letters (2012-2015). He served as a Technical Program Co-Chair of the IEEE Information Theory Workshop (ITW'02), held in Bangalore, in 2002 and was a member of Fellow Evaluation Standing Committee of IEEE Communications Society (2019-2021). He is a fellow of IEEE, the Indian National Academy of Engineering, the Indian National Science Academy, the Indian Academy of Sciences, and the National Academy of Sciences, India. He is a recipient of Prof. Rustum Choksi Award by Indian Institute of Science for Excellence in Research in Engineering for the year 2009, the IETE Pune Center's S.V.C Aiya Award for Telecom Education in 2004, and Best Academic Paper Award at the IEEE WCNC 2011.

Sundar Rajan's current research interests include Coded Caching, Private Information Retrieval (PIR),

Private Information Delivery, Network Coding and Coding for MIMO and multi-user communication.