# 2020 54th Annual Conference on Information Sciences and Systems (CISS 2020)

Princeton, New Jersey, USA 18 – 20 March 2020



IEEE Catalog Number: CFP2060A-POD ISBN: 978-1-7281-8831-7

### Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP2060A-POD

 ISBN (Print-On-Demand):
 978-1-7281-8831-7

 ISBN (Online):
 978-1-7281-4085-8

#### **Additional Copies of This Publication Are Available From:**

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



## 2020 54th Annual Conference on Information Sciences and Systems (CISS)

### Statistical Inference I

	Sequential Hypothesis Testing Game
	Guanze Peng (New York University, USA), Quanyan Zhu (New York University, USA)
	Performance Analysis for Tensor-Train Decomposition to Deep Neural Network Based Vector-to-Vector Regression
	Jun Qi (Georgia İnstitute of Technology, USA), Xiaoli Ma (Georgia Institute of Technology, USA), Jun Du (University of Science and Technology of China, China), Sabato M Siniscalchi (Kore University of Enna, Italy), Chin-Hui Lee (Georgia Institute of Technology, USA)
	Improving Recommendation Performance with Clustering and Missing Value Prediction
	Chenrui Xiong (York University, Canada), Youwu Liu (York University, Canada), Zijiang Yang (York University, Canada), Eric Liu (Bayview Secondary School, Canada)
	Granger Causal Inference from Indirect Low-Dimensional Measurements with Application to MEG Functional Connectivity Analysis
	Behrad Soleimani (University of Maryland, USA), Proloy Das (University of Maryland, USA), Joshua Kulasingham (University of Maryland, USA), Jonathan Simon (University of Maryland, USA), Behtash Babadi (University of Maryland, USA)  19
	Deterministic Sampling of Multivariate Densities based on Projected Cumulative Distributions
	Uwe D. Hanebeck (Karlsruhe Institute of Technology & Karlsruhe Institute of Technology (KIT), Germany)24
	Reduced-rank Least Squares Parameter Estimation in the Presence of Byzantine Sensors
	Nagananda K (Lehigh University, USA), Rick Blum (Lehigh University, USA), Alec Koppel (Army Research Laboratory, USA)30
	Ahmet Demirkaya (Bilkent University, Turkey), Jiasi Chen (University of California, Riverside, USA), Samet Oymak (University of California, Riverside, USA)
Inforn	nation Theory and Coding Theory
	Converse for Multi-Server Single-Message PIR with Side Information  Su Li (EPFL, Switzerland), Michael Gastpar (EPFL, Switzerland)
Statis	tical Inference II
	MSE-Optimal Neural Network Initialization via Layer Fusion  Ramina Ghods (Carnegie Mellon University, USA), Andrew Lan (University of Massachusetts Amherst, USA), Tom  Goldstein (University of Maryland, USA), Christoph Studer (Cornell University and Cornell Tech, USA)

Information Theory and Coding Theory	
The Gaussian lossy Gray-Wyner network Erixhen Sula (École Polytechnique Fédérale de Lausanne, Switzerland), Michael Gastpar (EPFL, Switzerland)	69
Statistical Inference II	
Robust Inference of Neuronal Correlations from Blurred and Noisy Spiking Observations  Anuththara Rupasinghe (University of Maryland, USA), Behtash Babadi (University of Maryland, USA)  Fundamental Limitations in Sequential Prediction and Recursive Algorithms: \(\( (L_p \))\) Bounds via an Entropic Analysis  Song Fang (New York University, USA), Quanyan Zhu (New York University, USA)	
Information Theory and Coding Theory	
On the Universality of Low-Density Parity-Check Block Codes  Wei Liu (EPFL, Switzerland), Ruediger L Urbanke (EPFL, Switzerland)	86
Statistical Inference II	
Almost Uniform Sampling From Neural Networks  Changlong Wu (University of Hawaii at Manoa, USA), Narayana Prasad Santhanam (University of Hawaii at Manoa, USA)  USA)	92
Information Theory and Coding Theory	
Optimal Selective Encoding for Timely Updates  Melih Bastopcu (University of Maryland, USA), Baturalp Buyukates (University of Maryland, USA), Sennur Ulukus (University of Maryland, USA)  5G NR CA-Polar Maximum Likelihood Decoding by GRAND  Ken R. Duffy (Hamilton Institute, Maynooth University, Ireland), Amit Solomon (Massachusetts Institute of Technology, USA), Kishori Konwar (CSAIL, MIT, USA), Muriel Médard (MIT, USA)	98 104
Statistical Inference II	
Fitting Network Traffic to Phase-Type Bounds  Massieh Boroujeny (George Mason University, USA), Brian L Mark (George Mason University, USA), Yariv Ephraim (George Mason University, USA)	109
Information Theory and Coding Theory	
On the \(\epsilon\)-Capacity of Finite Compound Channels with Applications to the Strong Converse and Second Order Coding Rate  Holger Boche (Technical University Munich, Germany), Rafael F. Schaefer (Technische Universität Berlin, Germany), H. Vincent Poor (Princeton University, USA)	115
Bayesian Bounds for Stochastic Signal Recovery	
Bayesian Fisher Information and Detection of a Small Change in a Parameter	121

### Distributed Inference and Learning Distributed Joint Detection and Estimation: A Sequential Approach Dominik Reinhard (Technische Universität Darmstadt, Germany), Michael Fauß (Princeton University, USA), Abdelhak M Zoubir (Darmstadt University of Technology, Germany) . ..... 126 Foundations and Applications of Data Science Escaping Saddle Points for Zeroth-order Non-convex Optimization using Estimated Gradient Descent Qinbo Bai (Purdue University, USA), Mridul Agarwal (Purdue University, USA), Vaneet Aggarwal (Purdue University, ..... 132 Distributed Inference and Learning Cybersecurity of Inference in Vehicular Ad-hoc Networks Zisheng Wang (Lehigh University, USA), Rick Blum (Lehigh University, USA) Foundations and Applications of Data Science Overcoming Challenges for Estimating Virus Spread Dynamics from Data Damir Vrabac (KTH Royal Institute of Technology, Sweden), Philip E Paré (KTH Royal Institute of Technology, Sweden), Henrik Sandberg (KTH Royal Institute of Technology, Sweden), Karl H. Johansson (KTH, Sweden) \_\_\_\_\_\_144 Bayesian Bounds for Stochastic Signal Recovery Generalized Bayesian Cramér-Rao Inequality via Information Geometry of Relative $\alpha$ -Entropy Kumar Vijay Mishra (United States Army Research Laboratory, USA), Ashok Kumar M. (Indian Institute of Technology Palakkad, India) ... A Bayesian lower bound for parameters with bounded support priors Raksha Ramakrishna (Arizona State University, USA), Anna Scaglione (Arizona State University, USA) Distributed Inference and Learning Deterministic Multiple Change-Point Detection with Limited Communication Eyal Nitzan (Aalto University, Finland), Topi Halme (Aalto University, Finland), H. Vincent Poor (Princeton University, USA), Visa Koivunen (Aalto University, Finland) .... 162 Foundations and Applications of Data Science An Adaptive Content Skipping Methodology based on User Behavioral Modeling Yuwei Tu (Zoomi Inc., USA), Elizabeth Tenorio (Zoomi Inc., USA), Christopher G. Brinton (Purdue University & Zoomi Inc., USA) .... ... 168 Distributed Optimization, Networks, and Scheduling

An Optimal Stopping Approach for Iterative Training in Federated Learning

Redundancy-based mitigation of jamming attacks

Pengfei Jiang (Arizona State University, USA), Lei Ying (University of Michigan, USA) ......

Satyaki Nan (Tennessee State University, USA), Swastik Brahma (Tennessee State University, USA) ......

Clock Synchronization with Exponential Smoothing for Dynamic Networks Sirajo Abdullahi Bakura (Universite Paris-Sud, France), Thomas Nowak (Université Paris-Sud, France), Alain Lambert (University of Paris Sud, France)	186
Machine Learning and Its Applications	
Text-based Malicious Domain Names Detection Based on Variational Autoencoder And Supervised Learning Yuwei Sun (The University of Tokyo, Japan), Ng Chong (United Nations University, Japan), Hideya Ochiai (The University of Tokyo, Japan)	192
Signal Processing for Communications	
Sparse Recovery of Intermittent Frequency Hopping Signals aided by DOA  Annan Dong (New Jersey Institute of Technology, USA), Anushreya Ghosh (New Jersey Institute of Technology, USA), Alexander Haimovich (NJIT, USA), Jason Dabin (Naval Information Warfare Center Pacific, USA)	197
Machine Learning and Its Applications	
A New Method for Hierarchical Image Segmentation from Visual Designs Pavel Myznikov (Novosibirsk State University, Russia), Yan Huang (University of North Texas, USA)	203
Signal Processing for Communications	
Performance of Two-Sensors Tandem Network for Detecting Deterministic Signals in Correlated Gaussian Noise Shailee Yaqnik (University of Mississippi, USA), Ramanarayanan Viswanathan (University of Mississippi, USA), Lei Cao (The University of Mississippi, USA)	209
Machine Learning and Its Applications	
Convolutional Neural Network Based Radio Tomographic Imaging  Hongzhuang Wu (China University of Mining and Technology, China & Georgia Institute of Technology, USA, China), Xiaoli Ma (Georgia Institute of Technology, USA), Chao-Han Huck Yang (Georgia Institute of Technology, USA), Songyong Liu (China University of Mining and Technology, China)	215
Signal Processing for Communications	
Efficient Estimation of a Sparse Delay-Doppler Channel Alisha Zachariah (University of Wisconsin Madison, USA)	221
Machine Learning and Its Applications	
Aesthetic-Aware Text to Image Synthesis Samah Saeed Baraheem (University of Dayton & Umm Al-Qura University, USA), Tam V Nguyen (University of Dayton, USA)	227
Signal Processing for Communications	
Spectrum Sensing in Interference and Noise Using Deep Learning  Daniel Chew (Johns Hopkins University, USA), Brinton Cooper III (The Johns Hopkins University, ? )	233

Nonlinear Equalization for TDMR Channels Using Neural Networks  Jinlu Shen (Washington State University, USA), Nitin Nangare (Marvell Semiconductor, USA)	239
Machine Learning and Its Applications	
Decentralized Federated Learning for Electronic Health Records  Songtao Lu (IBM Research, USA), Yawen Zhang (Hong Kong University of Science and Technology, China), Yunlong Wang (IQVIA, USA)	245
Machine Learning and Statistical inference II	
Support Stability of Spike Deconvolution via Total Variation Minimization  Maxime Ferreira Da Costa (Carnegie Mellon University, USA), Yuejie Chi (Carnegie Mellon University, USA)	250
Age of Information: Recent Advances	
Age of Information with Gilbert-Elliot Servers and Samplers  Baturalp Buyukates (University of Maryland, USA), Sennur Ulukus (University of Maryland, USA)	256
Recent Advances in Sequential Analysis-I	
On Mismatched Detection and Safe, Trustworthy Machine Learning  Kush Varshney (IBM Thomas J. Watson Research Center, USA)	262
Age of Information: Recent Advances	
Timely Updates By Multiple Sources: The M/M/1 Queue Revisited  Sanjit K Kaul (IIIT Delhi, India), Roy Yates (Rutgers University, USA)  Average Aol of Cached Status Updates for a Process Monitored by an Energy Harvesting Sensor	266
Nikolaos Pappas (Linköping University, Sweden), Zheng Chen (Linköping University, Sweden), Mohammad Hatami (University of Oulu, Finland)	272
Songtao Feng (The Pennsylvania State University, USA), Jing Yang (The Pennsylvania State University, USA)	277
Security & Privacy	
A Statistical Decision-Theoretic Approach for Measuring Privacy risk and Utility in Databases Alisa Miyashita (Waseda University, Japan), Akira Kamatsuka (Waseda University, Japan), Takahiro Yoshida (Nihon University, Japan), Toshiyasu Matsushima (Waseda University, Japan)	283
Vulnerable Web Server Protection by Hash Based URL Transformation  Ryuya Uda (Tokyo University of Technology, Japan)	289
The Minimum Cost of Information Erasure for Stationary Memoryless Sources under Restriction on the Output Distribution  Naruaki Amada (University of Electro-Communications, Japan), Hideki Yagi (University of Electro-Communications,	
Japan)	301

Wireless Communication and Networks I	
Learning Parallel Markov Chains over Unreliable Wireless Channels  Weichang Wang (Arizona State University, USA), Lei Ying (University of Michigan, USA)	307
Security and Adversarial Machine Learning	
Data User-Based Attribute Based Encryption  Ehsan Meamari (University of Delaware, USA), Hao Guo (University of Delaware, USA), Chien-Chung Shen (University of Delaware, USA), Rui Zhang (University of Delaware, USA)	313
Wireless Communication and Networks I	
Belief Propagation Pattern-Coupled Sparse Bayesian Learning for Non-Stationary Uplink Channel Estimation Over Massive-MIMO Based 5G Mobile Wireless Networks Jianqiao Chen (Texas A&M University, USA), Xi Zhang (Texas A&M University, USA)	318
Security and Adversarial Machine Learning	
Model Evasion Attack on Intrusion Detection Systems using Adversarial Machine Learning  Md. Ahsan Ayub (Tennessee Technological University, USA), William A. Johnson (Tennessee Technological University, USA), Douglas A. Talbert (Tn Tech, USA), Ambareen Siraj (Tennessee Technological University, USA)	324
Wireless Communication and Networks I	
Over-the-Air Adversarial Attacks on Deep Learning Based Modulation Classifier over Wireless Channels  Brian Kim (University of Maryland, USA), Yalin E Saqduyu (Intelliqent Automation, Inc., USA), Kemal Davaslioqlu (Intelligent Automation, Inc, USA), Tugba Erpek (Virginia Tech, USA), Sennur Ulukus (University of Maryland, USA)	330
Security and Adversarial Machine Learning	
Defense Strategies Against Adversarial Jamming Attacks via Deep Reinforcement Learning Feng Wang (Syracuse University, USA), Chen Zhong (Syracuse University, USA), M. Cenk Gursoy (Syracuse University, USA), Senem Velipasalar (Syracuse University, USA)	336
Wireless Communication and Networks I	
Statistical Delay/Error-Rate Bounded QoS Provisioning Across Clustered MmWave-Channels Over Cell-Free Massive MIMO Based 5G Mobile Wireless Networks in the Finite Blocklength Regime  Xi Zhanq (Texas A&M University, USA), Jingqing Wang (Texas A&M University, USA), H. Vincent Poor (Princeton University, USA)	342
Coding for Optimization	
Stochastic Gradient Descent Methods for Corrupted Systems of Linear Equations  Jamie Haddock (UCLA, USA), Deanna Needell (University of California, Los Angeles, USA), Elizaveta Rebrova (UCLA, USA), William Swartworth (UCLA, USA)	2/18

### Wireless Communication and Networks II

Spherical Color-Shift Keying for Visible Light Communication Systems	
Wenjun Chen (Sun Yat-sen University, China), Bo Chen (Sun Yat-sen University, China), Ming Jiang (Sun Yat-sen University, China)	354
Deep Learning based Affective Sensing with Remote Photoplethysmography	
Timur Luquev (Fraunhofer Institute for Integrated Circuits IIS, Germany), Dominik Seuß (Fraunhofer Institute for Integrated Circuits IIS, Germany), Jens-Uwe Garbas (Fraunhofer Institute for Integrated Circuits IIS, Germany)  Bilateral Contract Based Incentive Matching for Device-to-Device Content Sharing	360
Mingzhi Xu (Sun Yat-sen University, China), Fengxia She (Sun Yat-sen University, China), Kuan Wu (Sun Yat-sen University, China), Ming Jiang (Sun Yat-sen University, China)	364
Towards a Robust WiFi-based Fall Detection with Adversarial Data Augmentation	
Tuan-Duy H. Nguyen (VNUHCM - University of Science, Vietnam), Huu-Nghia H. Nguyen (VNUHCM - University of Science, Vietnam)	370
Transfer Learning for Wildfire Identification in UAV Imagery	
Haiyu Wu (Northern Arizona University, USA), H. Li (Northern Arizona University, USA), Alireza Shamsoshoara (Northern Arizona University, USA), Abolfazl Razi (Northern Arizona University, USA), Fatemeh Afghah (Northern Arizona University, USA)	376
Age of Information Minimization in Wireless Powered Stochastic Energy Harvesting Networks	
Omar M. Sleem (Pennsylvania State University, USA), Shiyang Leng (The Pennsylvania State University, USA), Aylin Yener (Pennsylvania State University, USA)	382