www.cs.brandeis.edu/~dcc

PROGRAM
Data Compression Conference (DCC 2020)
Sponsored by U. Arizona, Brandeis U., Microsoft Research, IEEE Signal Processing Society
Proceedings published by IEEE Computer Society Conference Publishing Services (CPS)
Snowbird, Utah, March 24 - March 27, 2020

PROGRAM COMMITTEE
Michael W. Marcellin, University of Arizona (DCC Co-Chair)
James A. Storer, Brandeis University (DCC Co-Chair)
Ali Bilgin, University of Arizona (Committee Co-Chair)
Joan Serra-Sagrista, U. Autonoma de Barcelona (Committee Co-Chair)
Henrique Malvar, Microsoft Research (Publications Chair)
James E. Fowler, Mississippi State University (Publicity Chair)
Charles D. Creusere, New Mexico State U.
Travis Gagie, Dalhousie University
Simon Gog, EBay
Hamid Jafarkhani, U. California Irvine
Giovanni Motta, Google, Inc.
Gonzalo Navarro, University of Chile
Yakov Nekrich, Michigan Technological U.
Jan Østergaard, Aalborg University
Majid Rabbani, Rochester Institute of Tech.
Yuriy Reznik, Brightcove, Inc.
Thomas Richter, Fraunhofer IIS
Victor Sanchez, University of Warwick
Serap Savari, Texas A&M University
Khalid Sayood, University of Nebraska
Peter Schelkens, Vrije Universiteit Brussel
Rahul Shah, Louisiana State University
Dana Shapira, Ariel University
Ofer Shayevitz, Tel Aviv University
Gary J. Sullivan, Microsoft Corporation
Aaron B. Wagner, Cornell University
Jiangtao Wen, Tsinghua University
Jizheng Xu, Bytedance Inc.
En-Hui Yang, University of Waterloo
Yan Ye, Alibaba Group
Peng Yin, Dolby Laboratories, Inc.

SCHEDULE OVERVIEW:

Tuesday Evening, March 24:
Registration and Reception (7pm - 10pm)

Wednesday, March 25:
Morning: Technical Sessions 1,2 (9:00am - noon)
Mid-Day: Keynote Speaker (2:30pm - 3:30pm)
Afternoon: Technical Sessions 3,4 (4:00pm - 6:20pm)

Thursday, March 26:
Morning: Technical Sessions 5,6,7 (9:00am - noon)
Mid-Day: Technical Session 8 (2:30pm - 3:50pm)
Afternoon: Poster Session and Reception (4:00pm - 7:00pm)

Friday, March 27:
Morning: Technical Sessions 9,10 (9:00am - 11:40am)
Mid-Day: Technical Session 11 (noon - 1:00pm)
TUESDAY EVENING - Registration / Reception, 7:00-10:00pm (Golden Cliff Room)

WEDNESDAY MORNING

SESSION 1

9:00am: DRASIC: Distributed Recurrent Autoencoder for Scalable Image Compression

Enmao Diao¹, Jie Ding², and Vahid Tarokh¹
¹Duke University, ²University of Minnesota-Twin Cities

9:20am: Deep Learning-Based Image Compression with Trellis Coded Quantization

Binglin Li¹, Mohammad Akbari¹, Jie Liang¹, and Yang Wang²
¹Simon Fraser University, ²University of Manitoba

9:40am: The Sibling Neural Estimator: Improving Iterative Image Decoding with Gradient Communication

Ankur Mali¹, Alexander G. Ororbia², and C. Lee Giles¹
¹The Pennsylvania State University, ²Rochester Institute of Technology

10:00am: Noise-to-Compression Variational Autoencoder for Efficient End-to-End Optimized Image Coding

Jixiang Luo¹, Shaohui Li¹, Wenrui Dai¹,², Yuhui Xu¹, De Cheng², Gang Li², and Hongkai Xiong¹
¹Shanghai Jiao Tong University, ²Huawei Cloud

Break: 10:20am - 10:40am

SESSION 2

10:40am: EPIC: Context Adaptive Lossless Light Field Compression using Epipolar Plane Images

Muhammad Umair Mukati and Søren Forchhammer
DTU Fotonik, Technical University of Denmark

11:00am: Super-Resolution in Compressive Coded Imaging Systems via $l_2 - l_1 - l_2$ Minimization Under a Deep Learning Approach

Hans Garcia, Miguel Marquez, and Henry Arguello
Universidad Industrial de Santander

11:20am: Gaussian Guided Inter Prediction for Focal Stack Images Compression

Kejun Wu¹,², Qiong Liu¹,², Yaguang Yin³, and You Yang¹,²
¹Huazhong University of Science and Technology, ²Wuhan National Laboratory for Optoelectronics, ³Academy of Broadcasting Science, China

11:40am: Implicit Geometry Partition for Point Cloud Compression

Xiang Zhang, Wen Gao, and Shan Liu
Tencent
Quality is in the Eye of the Beholder

Alan C. Bovik, Director
Laboratory for Image and Video Engineering (LIVE)
The University of Texas at Austin

In this talk I will discuss recent experiments targeting a deeper understanding of the relationships between global and local visual perception of picture quality and compression. Specifically, I will discuss novel deep network architectures for picture quality analysis and novel loss functions for picture compression, leading to interesting potential advances in practice.

Al Bovik is the Cockrell Family Regents Endowed Chair Professor at The University of Texas at Austin. He has received many major international awards, including the 2019 Progress Medal of the Royal Photographic Society, the 2019 IEEE Fourier Award, the 2017 Edwin H. Land Medal from the Optical Society of America, the 2015 Primetime Emmy Award for Outstanding Achievement in Engineering Development from the Academy of Television Arts and Sciences, and the Norbert Wiener and ‘Sustained Impact’ Awards of the IEEE Signal Processing Society. His is a Fellow of the IEEE, the Optical Society of America, and SPIE. His books include The Handbook of Image and Video Processing, Modern Image Quality Assessment, and The Essential Guides to Image and Video Processing. Al co-founded and was the longest-serving Editor-in-Chief of the IEEE Transactions on Image Processing and created the IEEE International Conference on Image Processing in Austin, Texas, in November, 1994.
WEDNESDAY AFTERNOON

SESSION 3, Latest Advances in Video Coding

4:00pm: Residual Coding for Transform Skip Mode in Versatile Video Coding ..................83
   Tung Nguyen, Benjamin Bross, Heiko Schwarz, Detlev Marpe, and Thomas Wiegand
   Fraunhofer HHI

4:20pm: Advanced Geometric-Based Inter Prediction for Versatile Video Coding ..........93
   Han Gao¹, Ru-Ling Liao², Kevin Reuze³, Semih Esenlik¹, Elena Alshina¹, Yan Ye², Jie Chen², Jiancong Luo², Chun-Chi Chen³, Han Huang³, Wei-Jung Chien³, Vadim Seregin³, and Marta Karczewicz³
   ¹Huawei Technologies, ²Alibaba Group, ³Qualcomm Inc

4:40pm: Gradient-Based Early Termination of CU Partition in VVC Intra Coding ..........103
   Jing Cui¹, Tao Zhang², Chenchen Gu², Xinfeng Zhang³, and Siwei Ma¹
   ¹Peking University, ²Tencent, ³UCAS

Break: 5:00pm - 5:20pm

SESSION 4, Computation over Compressed Data

5:20pm: Semantrix: A Compressed Semantic Matrix ..........................................................113
   Nieves R. Brisaboa¹, Antonio Fariña¹, Gonzalo Navarro², and Tirso Varela Rodeiro¹
   ¹Universidade da Coruña, ²University of Chile

5:40pm: Revisiting Compact RDF Stores Based on k2-Trees ........................................123
   Nieves R. Brisaboa, Ana Cerdeira-Pena, Guillermo De Bernardo, and Antonio Fariña
   Universidade da Coruña

6:00pm: Bitvectors with Runs and the Successor/Predecessor Problem ..............................133
   Adrián Gómez-Brandón
   Universidade da Coruña
THURSDAY MORNING

SESSION 5, Computation over Compressed Data

9:00am: Decompressing Lempel-Ziv Compressed Text ......................................................... 143

Philip Bille¹, Mikko Berggren Ettienne¹, Travis Gagie², Inge Li Gørtz¹, and Nicola Prezza³

¹Technical University of Denmark, ²Dalhousie University, ³LUISs University of Rome

9:20am: Approximating Optimal Bidirectional Macro Schemes ............................................. 153

Luís M. S. Russo¹, Ana Sofia D. Correia¹, Gonzalo Navarro², and Alexandre P. Francisco¹

¹Instituto Superior Técnico Universidade de Lisboa, ²University of Chile

Break: 9:40am - 10:00am

SESSION 6

10:00am: State-Based Multi-parameter Probability Estimation for Context-Based
Adaptive Binary Arithmetic Coding......................................................................................... 163

Paul Haase, Stefan Matlage, Heiner Kirchhoff, Christian Bartnik,
Heiko Schwarz, Detlev Marpe, and Thomas Wiegand

Fraunhofer Heinrich-Hertz-Institute (HHI)

10:20am: Reverse Multi-Delimiter Compression Codes ......................................................... 173

Igor Zavadskyi and Anatoly V. Anisimov

Taras Shevchenko National University of Kyiv

Break: 10:40am - 11:00am

SESSION 7, Latest Advances in Video Coding

11:00am: Convolutional Neural Network-Based Coefficients Prediction for HEVC
Intra-Predicted Residues ........................................................................................................ 183

Changyue Ma¹, Dong Liu¹, Li Li², Yao Wang³, and Feng Wu¹

¹University of Science and Technology of China, ²University of Missouri-Kansas City,
³New York University

11:20am: Luma Mapping with Chroma Scaling in Versatile Video Coding ...................... 193

Taoran Lu¹, Fangjun Pu¹, Peng Yin¹, Sean McCarthy¹, Walt Husak¹, Tao Chen¹,
Edouard Francois², Christophe Chevancé², Franck Hiron², Jie Chen³, Ru-Ling Liao³,
Yan Ye³, and Jiancong Luo³

¹Dolby Laboratories Inc., ²InterDigital, ³Alibaba Group

11:40am: Sub-Sampled Cross-Component Prediction for Chroma Component Coding...... 203

Junru Li¹, Meng Wang², Li Zhang², Kai Zhang³, Shiqi Wang², Shanshe Wang¹,
Siwei Ma¹, and Wen Gao¹

¹Peking University, ²City University of Hong Kong, ³Bytedance Inc.
Thursday Lunch Break: noon - 2:30pm

THURSDAY MID-DAY

SESSION 8, Computation over Compressed Data

2:30pm: On Dynamic Succinct Graph Representations.......................................................213
  Miguel E. Coimbra¹, Alexandre P. Francisco¹, Luís M. S. Russo¹, Guillermo De
  Bernardo²³, Susana Ladra³, and Gonzalo Navarro⁴
  ¹Universidade de Lisboa, ²Universidade da Coruña, ³Enxenio SL, ⁴University of Chile

2:50pm: Edge Minimization in de Bruijn Graphs...........................................................223
  Uwe Baier, Thomas Büchler, Enno Ohlebusch, and Pascal Weber
  University of Ulm

3:10pm: Compact Representation of Graphs with Small Bandwidth and Treedepth ....233
  Shahin Kamali
  University of Manitoba

3:30pm: c-Trie++: A Dynamic Trie Tailored for Fast Prefix Searches.........................243
  Kazuya Tsuruta¹, Dominik Köppl¹², Shunsuke Kanda³, Yuto Nakashima¹,
  Shunsuke Inenaga¹, Hideo Bannai¹, and Masayuki Takeda¹
  ¹Kyushu University, ²Japan Society for Promotion of Science, ³RIKEN, Japan

POSTER SESSION AND RECEPTION

  4:00pm - 7:00pm
  In the Golden Cliff Room

A full listing of participants is at the end this program.
FRIDAY MORNING

SESSION 9, Latest Advances in Video Coding
9:00am: Spectral Video Compression Using Convolutional Sparse Coding........................................253
   Crisostomo Alberto Barajas-Solano¹, Juan-Marcos Ramirez², and Henry Arguello¹
   ¹Universidad Industrial de Santander, ²Universidad Rey Juan Carlos
9:20am: Online Probability Model Estimation for Video Compression...............................................263
   Yue Sun¹, ², Jingning Han¹, and Yaowu Xu²
   ¹University of Washington, ²Google Inc
9:40am: Revisiting Local Texture Correlation for Rate-Distortion Optimized Intra Coding .....................273
   Meng Wang¹, Junru Li², Li Zhang², Hongbin Liu³, Jizheng Xu³, and Shiqi Wang¹
   ¹City University of Hong Kong, ²Peking University, ³Bytedance Inc., USA, ⁴Bytedance (HK) Limited, Hong Kong

Break: 10:00am - 10:20am

SESSION 10
10:20am: Tensor Dictionary Learning with Representation Quantization for Remote Sensing Observation Compression ........................................................................................................283
   Anastasia Aidini¹, ², Grigoris Tsagkatakis², and Panagiotis Tsakalides¹, ²
   ¹University of Crete, ²Institute of Computer Science, FORTH
10:40am: A Stochastic Model of Block Segmentation Based on the Quadtree and the Bayes Code for It ......................................................................................................................293
   Yuta Nakahara and Toshiyasu Matsushima
   Waseda University
11:00am: Denoising Deep Boltzmann Machines: Compression for Deep Learning ..............................303
   Qing Li¹ and Yang Chen²
   ¹Western Digital, ²University of Michigan
11:20am: Encryption Before Compression Coding Scheme for JPEG Image Compression Standard ...........313
   Dariusz Puchala, Kamil Stokfiszewski, and Mykhaylo Yatsymirskyy
   Lodz University of Technology

Break: 11:40am - noon

FRIDAY MID-DAY

SESSION 11
noon: The Exponential Distribution in Rate Distortion Theory:
The Case of Compression with Independent Encodings ........................................................................323
   Uri Erez¹, Jan Østergaard², and Ram Zamir¹
   ¹Tel Aviv University, ²Aalborg University
12:20pm: Functional Epsilon Entropy ........................................................................................................332
   Soumya Basu, Daewon Seo, and Lav R. Varshney
   University of Illinois at Urbana-Champaign
12:40pm: LFZip: Lossy Compression of Multivariate Floating-Point Time Series Data via Improved Prediction ..................................................................................................................342
   Shubham Chandaki¹, Kedar Tatwawadi¹, Chengtao Wen², Lingyun Wang², Juan Aparicio², and Tsachy Weissman¹
   Stanford University, ²Siemens Corporation
Lossless Multi-component Image Compression Based on Integer Wavelet Coefficient Prediction using Convolutional Neural Networks..........................................................355
Eze Ahanonu, Michael Marcellin, and Ali Bilgin
University of Arizona

Binary Representation and High Efficient Compression of 3D CNN Features for Action Recognition..........................................................................................................................356
Peiyin Xing¹, Peixi Peng¹, Yongsheng Liang², Tiejun Huang¹,
and Yonghong Tian¹,³
¹Peking University, ²Harbin Institute of Technology, ³Pengcheng Laboratory

Higher-Order Count Sketch: Dimensionality Reduction that Retains Efficient Tensor Operations..........................................................357
Yang Shi¹ and Animashree Anandkumar²
¹Rakuten Institute of Technology, ²California Institute of Technology

Scalable Trellis Quantization for JPEG XS........................................................................358
Thomas Richter
Fraunhofer IIS

Light Field Image Compression Using Multi-branch Spatial Transformer Networks Based View Synthesis..........................................................................................................................359
Jin Wang¹, Qianwen Wang¹, Ruiqin Xiong², Qing Zhu¹, and Baocai Yin³
¹Beijing University of Technology, ²Peking University,
³Dalian University of Technology

Practical Repetition-Aware Grammar Compression................................................................360
Isamu Furuya
Hokkaido University

Video Denoising for the Hierarchical Coding Structure in Video Coding..................361
Cheng Chen, Jingning Han, and Yaowu Xu
Google Inc.

Fast CU Size Decision Using Machine Learning for Depth Map Coding in 3D-HEVC....362
Ruyi Zhang, Kebin Jia, and Pengyu Liu
Beijing University of Technology

Deep Clustering of Compressed Variational Embeddings................................................363
Suya Wu¹, Enmao Diao¹, Jie Ding², and Vahid Tarokh¹
¹Duke University, ²University of Minnesota Twin Cities

Temporal Redundancy Reduction in Compressive Video Sensing by using Moving Detection and Inter-Coding .................................................................364
Jirayu Peetakul and Jinjia Zhou
Hosei University of Science and Technology
Video-Based Compression for Plenoptic Point Clouds

**Li Li**, **Zhu Li**, **Shan Liu**, and **Houqiang Li**

1University of Missouri-Kansas City, 2Tencent America, 3University of Science
and Technology of China

Pattern Search in Grammar-Compressed Graphs

**Stefan Böttcher**, **Rita Hartel**, and **Sven Peeters**
Paderborn University

A Rate Control Scheme for HEVC Intra Coding Using Convolution
Neural Network (CNN)

**Xin Lu**, **Bixing Zhou**, **Xuesong Jin**, and **Graham Martin**

1Harbin Institute of Technology, 2Harbin University of Commerce,
3University of Warwick

Concise Fuzzy Representation of Big Graphs: A Dimensionality
Reduction Approach

**Faisal Abu Khzam**, **Amer Haj Ahmad**, and **Rana Mouawi**
Lebanese American University

Statistical Modeling Based Fast Rate Distortion Estimation Algorithm for HEVC

**Xiang Meng**, **Xiaofeng Huang**, **Haibin Yin**, **Shengsheng Zheng**, and **Shiqi Wang**

1Harbin Dianzi University, 2City University of Hong Kong

A High Efficient Cascade Coder with Predictor Blending Method for Lossless
Audio Compression

**Grzegorz Ulacha and Cezary Wernik**
West Pomeranian University of Technology in Szczecin

Weighted Adaptive Huffman Coding

**Aharon Fruchtman**, **Yoav Gross**, **Shmuel T. Klein**, and **Dana Shapira**

1Ariel University, 2Bar Ilan University

Non-Binary Robust Universal Variable Length Codes

**Shmuel T. Klein**, **Tamar C. Serebro**, and **Dana Shapira**

1Bar Ilan University, 2Ariel University

SQUAREMIX: A Faster Pseudorandom Number Generator
for Dynamic-Multithreading Platforms

**Robert Ritchie and Khodakhast Bibak**
Miami University

Fixed-Length Coding for Escape Samples in Palette Mode

**Weijia Zhu**, **Jizheng Xu**, **Li Zhang**, and **Yue Wang**

1Bytedance Inc., 2Beijing Bytedance Network Technology

Improved Hard-Decision Quantization with Decision Tree for HEVC
Video Compression

**Motong Xu and Byeungwoo Jeon**
Sungkyunkwan University
Flow-Guided Temporal-Spatial Network for HEVC Compressed Video Quality Enhancement..................................................................................................................376

Xiandong Meng¹, Xuan Deng², Shuyuan Zhu², Shuaicheng Liu², and Bing Zeng²

¹The Hong Kong University of Science and Technology, ²University of Electronic Science and Technology of China

DZip: Improved General-Purpose Lossless Compression Based on Novel Neural Network Modeling..................................................................................................................377

Mohit Goyal¹, Kedar Tatwawadi², Shubham Chandak², and Idoia Ochoa¹

¹University of Illinois at Urbana Champaign, ²Stanford University

Spatial-Temporal Fusion Convolutional Neural Network for Compressed Video Enhancement in HEVC........................................................................................................378

Xiaoyu Xu, Jian Qian, Li Yu, Hongkui Wang, Hao Tao, and Shengju Yu

Huazhong University of Science and Technology

Fast Depth Intra Coding Based on Layer-Classification and CNN for 3D-HEVC ..........379

Chang Liu¹, Kebin Jia¹,², Pengyu Liu¹,², and Zhonghua Sun¹,²

¹Beijing University of Technology, ²Beijing Key Laboratory of Computational Intelligence and Intelligent System

Secondary Intra Prediction Scheme for HEVC ...............................................................380

Junhui Liang, Yamei Chen, Hongkui Wang, Hailang Yang, and Li Yu

Huazhong University of Science and Technology

Adaptive Stream-Based Entropy Coding........................................................................381

Shinichi Yamagiwa, Eisaku Hayakawa, and Koichi Marumo

University of Tsukuba

Training Machine Learning on JPEG Compressed Images ........................................382

Maxime Pistono¹,², Gouenou Coatrieux¹, Jean-Claude Nunes², and Michel Cozic³

¹IMT Atlantique, ²Universite de Rennes 1, ³MEDECOM

An Adaptive Quantization Based PVC Scheme for HEVC ........................................383

Hailang Yang, Hongkui Wang, Li Yu, Junhui Liang, and Tiansong Li

Huazhong University of Science and Technology

Towards Better Compressed Representations ...............................................................384

Michał Gańczorz

University of Wroclaw

A QD&JND Compensation Based PVC Scheme for HEVC ........................................385

Hongkui Wang¹, Li Yu¹, Xiatao Tang², Haibing Yin³, and Junhui Liang¹

¹Huazhong University of Science and Technology, ²Zhejiang Special Equipment Research Institute, ³Hangzhou Dianzi University

Wide and Deep Learning for Video Summarization via Attention Mechanism and Independently Recurrent Neural Network ......................................................... 386

Juanping Zhou and Lu Lu

South China University of Technology

Convolutional Neural Network Based Fast Intra Mode Prediction for H.266/FVC Video Coding............................................................................................................................... 387

Ting-Lan Lin¹, Kai-Wen Liang², Jing-Ya Huang², Yu-Liang Tu², and Pao-Chi Chang²

¹National Taipei University of Technology, ²National Central University, Taiwan
Densely Connected Unit Based Loop Filter for Short Video Coding

Shengwei Wang, Peidi Yi, Hongkui Wang, and Li Yu
Huazhong University of Science and Technology

Decode-Efficient Prefix Codes for Hierarchical Memory Models

Shashwat Banchhor1, Rishikesh R. Gajjala1, Yogish Sabharwal2, and Sandeep Sen1,3

1Indian Institute of Technology, 2IBM Research, Delhi, 3Shiv Nadar University, India

Depth-First Decoding of Distributed Arithmetic Codes for Uniform Binary Sources

Bowei Shan1, Yong Fang1, Vladimir Stankovic2, Samuel Cheng3, and En-hui Yang4

1Chang’an University, China, 2University of Strathclyde, 3University of Oklahoma, 4University of Waterloo

Machine-Learning-Based Method for Finding Optimal Video-Codec Configurations Using Physical Input-Video Features

Roman Kazantsev, Sergey Zvezdakov, and Dmitriy Vatolin
Lomonosov Moscow State University

Fast Multi-rate Encoding for Adaptive HTTP Streaming

Hadi Amirpour1, Ekrem Çetinkaya1, Christian Timmerer1,2, and Mohammad Ghanbari3,4

1Alpen-Adria-Universität Klagenfurt, Austria, 2Bitmovin, Austria, 3University of Tehran, 4University of Essex

Model-Independent Rate Control for Intra-Coding Based on Piecewise Linear Approximations

Victor Sanchez
University of Warwick

Linear Model Based Geometry Coding for Lidar Acquired Point Clouds

Xiang Zhang, Wen Gao, and Shan Liu
Tencent America

Segmentation of Text-Lines and Words from JPEG Compressed Printed Text Documents Using DCT Coefficients

Bulla Rajesh1, Mohammed Javed1, P. Nagabhushan1, and Watanabe Osamu2

1Indian Institute of Information Technology Allahabad, 2Takushoku University

Compressive Classification via Deep Learning using Single-Pixel Measurements

Jorge Bacca, Nelson Diaz, and Henry Arguello
Universidad Industrial de Santander

Efficient Storage of Images onto DNA using Vector Quantization

Melpomeni Dimopoulou and Marc Antonini
Université Côte d’Azur, I3S, CNRS

On the Robustness of Causal Discovery with Additive Noise Models on Discrete Data

Kang Du, Austin Goddard, and Yu Xiang
University of Utah
Perceptual Video Coding using Deep Neural Network Based JND Model ................................399

Jongho Kim1, Dae Yeol Lee1,2, Seyoon Jeong1, and Seunghyun Cho1
1Electronics and Telecommunications Research Institute, 2University of Texas at Austin

Low Rate Compression of Video with Dynamic Backgrounds ...........................................400

Solomon Garber1, Ryan Marcus2, Antonella DiLillo1, and James Storer1
1Brandeis University, 2MIT CSAIL

Image Compression Based on Neuroscience Models: Rate-Distortion Performance of the Neural Code .................................................................401

Effrosyni Doutsi1 and Panagiotis Tsakalides2
1Foundation for Research and Technology - Hellas, 2University of Crete

Compressed Quadratization of Higher Order Binary Optimization Problems ................402

Avradip Mandal, Arnab Roy, Sarvagya Upadhyay, and Hayato Ushijima-Mwesigwa
Fujitsu Laboratories of America

Intra Prediction in the Emerging VVC Video Coding Standard ....................................403

Alexey Filippov1, Vasily Rufitskiy1, Jianle Chen2, and Elena Alshina3
1Huawei Technologies Co., Ltd., 2Futurewei Technologies, 3Huawei Technologies, Düsseldorf GmbH

Re-Pair in Small Space ........................................................................................................404

Dominik Köppl1, Tomohiro I1, Isamu Furuya2, Yoshimasa Takabatake2, Kensuke Sakai2, and Keisuke Goto4
1Kyushu University/JSPS, 2Kyushu Institute of Technology, 3Hokkaido University, 4Fujitsu Laboratories Ltd.

Grammar Compression with Probabilistic Context-Free Grammar ...............................405

Hiroaki Naganuma1, Diptarama Hendrian1, Ryo Yoshinaka1, Ayumi Shinohara1, and Naoki Kobayashi2
1Tohoku University, 2The University of Tokyo

Compressing and Randomly Accessing Sequences (note) ............................................406

Laith Ali Abdusahib1, Diego Arroyuelo2, and Rajeev Raman1
1University of Leicester, 2IMFD and Technical University of Federico Santa Maria

Artificial Intelligence Based Region of Interest Enhanced Video Compression ...............407

Palanivel Guruvareddiar and Praveen Prasad
Intel Corporation

Entropy Coders Based on the Splitting of Lexicographic Intervals ................................408

Danny Dubé
Université Laval