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PROGRAM

Data Compression Conference (DCC 2022)

Sponsored by U. Arizona, Brandeis U., Microsoft Research, IEEE Signal Processing Society
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Snowbird, Utah, March 22 - March 25, 2022

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Jiangtao Wen, *Tsinghua University*
Jizheng Xu, *Bytedance Inc.*
Yan Ye, *Alibaba Group*
Peng Yin, *Dolby Laboratories, Inc.*

SCHEDULE OVERVIEW (*all times U.S. Mountain Daylight Time*):

Tuesday Evening, March 22: Registration and Reception (7pm - 9pm)

Wednesday, March 23:

Morning:	Technical Sessions 1,2,3	(8:00am - 12:20pm)
Mid-Day:	Keynote Speaker	(2:30pm - 3:30pm)
Afternoon:	Technical Sessions 4,5	(4:00pm - 6:40pm)

Thursday, March 24:

Morning:	Technical Sessions 6,7,8	(8:00am - 12:20pm)
Mid-Day:	Keynote Speaker	(2:30pm - 3:30pm)
Afternoon:	Poster Session and Reception	(4:00pm - 6:00pm)

Friday, March 25:

Morning:	Technical Sessions 9,10	(8:00am - 11:00am)
Mid-Day:	Technical Sessions 11,12	(11:20am - 2:00pm)

TUESDAY EVENING - Registration / Reception, 7-9pm (Golden Cliff Room)

WEDNESDAY MORNING

SESSION 1 ***Advances in Video Coding Technologies and Applications, Part 1***

Break: 9:40am - 10:00am

SESSION 2 ***Computation Over Compressed Data, Part 1***

Break: 11:00am - 11:20am

SESSION 3 ***Computation Over Compressed Data, Part 2***

Wednesday Lunch Break: 12:20pm - 2:30pm

WEDNESDAY MID-DAY

Keynote Speaker

2:30pm - 3:30pm

Generative Face Video Compression: Promises and Challenges

Dr. Yan Ye
Alibaba Group

Rapid advancement in artificial intelligence technology has allowed people to manipulate images and videos using deep generative models. Among these, a particular area of interest to the data compression community is the application of deep generative models towards compressing talking-face video at ultra-low bit rates. By focusing on talking faces, generative face video compression is able to effectively learn the inherent structure and prior knowledge about human faces (such as their shape, composition of different parts, and movement) and deliver promising compression results. At ultra-low bit rates, when conventional video compression standards such as H.264/AVC, H.265/HEVC and even the latest H.266/VVC standard are apt to suffer from significant blocking artifacts and blurriness beyond the point of recognition, generative face compression can maintain clearer images of the face and its expression. Further, generative face compression techniques can be applied toward rotation and/or animation of the reconstructed face and promise to deliver a more interactive and immersive experience in the nascent metaverse. In this talk, we present an overview of generative face video compression schemes, and compare their compression efficiency and visual quality with that of the state-of-the-art VVC standard. At the same time of showing great potential, generative face video compression also faces a multitude of challenges, including delivering stable performance (e.g. minimizing visually unpleasant distortions), operating beyond ultra-low bit rate ranges, and efficiently compressing content with larger range of motion such as those found in head-and-shoulder videos. The second part of this talk will be devoted to discussing some of our recent attempts to overcome these challenges.

Yan Ye is the head of Video Standards and Implementations at Alibaba Cloud Intelligence, Alibaba Group, Sunnyvale, CA, USA, where she oversees multimedia standards development, hardware and software video codec implementations, as well as AI-based video technology development. She is also the chair of INCITS L3.1 MPEG development activity, and an associate rapporteur of ITU-T SG16 Q6 video coding experts group (VCEG). She has been involved in the development of various video coding and streaming standards, including H.266/VVC, H.265/HEVC, scalable extension of H.264/MPEG-4 AVC, MPEG DASH, and MPEG OMAF. She is an editor of the VVC Test Model and the 360Lib algorithm description, and was previously an editor of the scalable extension and the screen content coding extension of the HEVC standard. She received the B.S. and M.S. degrees in electrical engineering from the University of Science and Technology of China, and the Ph.D. degree in electrical engineering from the University of California, San Diego. She has published more than 50 articles in peer-reviewed journals and conferences. Her research interests include advanced video coding, processing and streaming algorithms, real-time and immersive video communications, AR/VR, and deep learning-based video coding, processing, and quality assessment.

WEDNESDAY AFTERNOON

SESSION 4

Break: 5:00pm - 5:20pm

SESSION 5

THURSDAY MORNING

SESSION 6 *Machine Learning in Compression, Part 1*

Break: 9:40am – 10:00am

SESSION 7 *Computation Over Compressed Data, Part 3*

Break: 11:00am - 11:20am

SESSION 8 *Computation Over Compressed Data, Part 4*

Thursday Lunch Break: 12:20pm - 2:30pm

THURSDAY MID-DAY

Keynote Speaker

2:30pm - 3:30pm

On the Compressibility of Highly Repetitive Sequences

Prof. Gonzalo Navarro
University of Chile

While statistical entropy captures well the limit of compressibility in many scenarios, the case of highly repetitive sequence collections is out of its reach. This case is important because it arises in many of the fastest-growing sequence collections, like genomic collections or versioned document and software collections. Focusing on the compressibility of individual strings, various ad-hoc measures have been used in the past, like the size of the Ziv-Lempel parse, of the smallest bidirectional macro scheme, or of the smallest context-free grammar generating the sequence. Related to the basic compressibility question ("is there a representation of this size?"), these measures pose farther-reaching ones, like "can one efficiently access a substring without decompressing the whole string?" and in general "can one manipulate the string in compressed form?"; such questions separate, for example, Lempel-Ziv from grammar compression. In this talk I will cover those measures, but I will then focus on more recent and principled measures, like gamma (based on string attractors) and delta (based on substring complexity), and describe what is known about their relations. I will argue that delta is a good candidate for describing the compressibility of repetitive sequences, but I will also show some recent intriguing results that challenge delta by exploiting other characteristics that are arguably present in repetitive sequences.

Gonzalo Navarro completed his PhD in Computer Science in 1998 at the University of Chile, where he is currently full professor. His areas of interest include algorithms and data structures, compression, and text searching. He has directed the Millennium Nucleus Center for Web Research and projects funded by Yahoo! Research and Google. He currently participates in the Center for Biotecnology and Bioengineering (CeBiB) and the Millennium Institute for Foundational Research on Data (IMFD). He has chaired 12 international conferences and has been Steering Committee member of SPIRE, LATIN, SISAP (which he created), and ESA. He is the Editor in Chief of the ACM Journal of Experimental Algorithmics and a member of the Editorial Board of Information Systems. He has been guest editor of special issues in ACM SIGSPATIAL, Journal of Discrete Algorithmics, Information Systems, and Algorithmica. He has given 12 plenary talks and 5 tutorials in international conferences. He is an ACM Distinguished Member. He has published two books, "Flexible Pattern Matching in Strings" (2001) and "Compact Data Structures" (2016), about 25 book chapters, more than 180 papers in international journals, and over 260 in international conferences. He is one of the most prolific and highly cited authors in Latin America.

THURSDAY AFTERNOON

POSTER SESSION AND RECEPTION

4:00pm – 6:00pm

In the Golden Cliff Room

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

FRIDAY MORNING

SESSION 9 ***Machine Learning in Compression, Part 2***

8:00am: High-Fidelity 3D Model Compression Based on Key Spheres 292

Yuanzhan Li, Yuqi Liu, Yujie Lu, Siyu Zhang, Shen Cai, and Yanting Zhang

Donghua University, China

8:20am: Attribute-Decomposable Motion Compression Network for 3D MoCap Data 302

Zengming Chen[2], Junxuan Bai[1,2], and Ju Dai[1]

[1]Peng Cheng Laboratory, China, [2]Beihang University, China

8:40am: A Physics-Informed Vector Quantized Autoencoder for Data Compression of Turbulent Flow 312

Mohammadreza Momenifar, Enmao Diao, Vahid Tarokh, and Andrew Bragg

Duke University, USA

9:00am: Compressing Multisets with Large Alphabets 322

Daniel Severo[1], James Townsend[2], Ashish Khisti[3], Alireza Makhzani[4], and Karen Ullrich[1]

[1]Meta AI, USA, [2]University College London, United Kingdom, [3]University of Toronto, Canada, [4]Vector Institute for AI, Canada

9:20am: Learning Tucker Compression for Deep CNN 332

Pengyi Hao, Xiaojuan Li, and Fuli Wu

Zhejiang University of Technology, China

Break: 9:40am - 10:00am

SESSION 10 ***Advances in Video Coding Technologies and Applications, Part 2***

10:00am: Adaptive Bilateral Matching for Decoder-Side Motion Vector Refinement in Video Coding 342

Han Huang, Zhi Zhang, Vadim Seregin, Wei-Jung Chien, Chun-Chi Chen, and Marta Karczewicz

Qualcomm Inc.

10:20am: High-Order Intra Prediction for Future Video Coding.....349

Kai Lin[1], Jiaqi Zhang[2], Junru Li[1], Chuanmin Jia[1], and Wen Gao[1]

[1]Peking University, China, [2]University of Chinese Academy of Sciences, China

10:40am: Cross-Component Sample Adaptive Offset 359

Che-Wei Kuo, Xiaoyu Xiu, Yi-Wen Chen, Hong-Jheng Jhu, Wei Chen, Ning Yan, and Xianglin Wang

Kwai Inc., USA

FRIDAY MID-DAY

Break: 11:00am - 11:20am

SESSION 11

Break: 12:20am - 12:40pm

SESSION 12

Poster Session

(listed alphabetically by first author)