

Proceedings

DCC 2007

2007 DATA COMPRESSION CONFERENCE

March 27-29, 2007

Snowbird, Utah

Sponsored by

Brandeis University



Los Alamitos, California
Washington • Tokyo



Contents

Technical Sessions

Session 1

A Stochastic Model for Video and Its Information Rates	3
<i>Arthur L. da Cunha, Minh Do, and Martin Vetterli[†]</i>	
University of Illinois Urbana-Champaign, [†] LCAV-EPF Lausanne	
Half-Pel Accurate Motion-Compensated Orthogonal Video Transforms	13
<i>Markus Flierl and Bernd Girod</i>	
Stanford University	
Spatial Sparsity Induced Temporal Prediction for Hybrid Video Compression	23
<i>Gang Hua and Onur G. Guleryuz[†]</i>	
Rice University, [†] DoCoMo USA Laboratories, Inc.	

Session 2

Normalized Maximum Likelihood Model of Order-1 for the Compression of DNA Sequences	33
<i>Gergely Korodi and Ioan Tabus</i>	
Tampere University of Technology	
A Simple Statistical Algorithm for Biological Sequence Compression.....	43
<i>Minh Duc Cao, Trevor I. Dix, Lloyd Allison, and Chris Mears</i>	
Monash University	
Structure Induction by Lossless Graph Compression	53
<i>Leonid Peshkin</i>	
Harvard University	

Session 3

Multiple-Description Coding by Dithered Delta-Sigma Quantization	63
<i>Jan Østergaard and Ram Zamir[†]</i>	
Delft University of Technology, [†] Tel Aviv University	
Multiple Description Coding for Stationary and Ergodic Sources.....	73
<i>Jun Chen, Chao Tian[†], and Suhas Diggavi[†]</i>	
IBM T. J. Watson Research Center, [†] Swiss Federal Institute of Technology	
Lossless Transmission of Correlated Sources over a Multiple Access Channel with Side Information	83
<i>Deniz Gündüz and Elza Erkip</i>	
Polytechnic University, Brooklyn, NY	

Distributed Functional Compression through Graph Coloring	93
<i>Vishal Doshi, Devavrat Shah, Muriel Médard, and Sidharth Jaggi</i>	
Massachusetts Institute of Technology	

Session 4

Differential Compression of Executable Code	103
<i>Giovanni Motta, James Gustafson, and Samson Chen</i>	
Bitfone Corporation	
Compressed Delta Encoding for LZSS Encoded Files	113
<i>Shmuel T. Klein and Dana Shapira[†]</i>	
Bar Ilan University, [†] Ashkelon Academic College	
Simple Linear-Time Off-Line Text Compression by Longest-First	
Substitution	123
<i>Ryosuke Nakamura, Hideo Bannai, Shunsuke Inenaga,</i>	
<i>and Masayuki Takeda</i>	
Kyushu University	
Bounds on Redundancy in Constrained Delay Arithmetic Coding.....	133
<i>Ofer Shayevitz, Eado Meron, Meir Feder, and Ram Zamir</i>	
Tel Aviv University	

Session 5

Distributed Grayscale Stereo Image Coding with Unsupervised	
Learning of Disparity	143
<i>David Varodayan, Aditya Mavlankar, Markus Flierl, and Bernd Girod</i>	
Stanford University	
Edge-Based Prediction for Lossless Compression of Hyperspectral Images.....	153
<i>Sushil K. Jain and Donald A. Adjeroh</i>	
West Virginia University	
Spectral Predictors	163
<i>Lorenzo Ibarria, Peter Lindstrom[†], and Jarek Rossignac</i>	
Georgia Institute of Technology, [†] Lawrence Livermore National Laboratory	
On Compression of Encrypted Video.....	173
<i>Daniel Schonberg, Chuohao Yeo, Stark C. Draper[†], and Kannan Ramchandran</i>	
University of California, Berkeley, [†] Mitsubishi Electric Research Laboratories	
A Parallel Decoder for Lossless Image Compression by Block Matching	183
<i>Luigi Cinque and Sergio De Agostino</i>	
La Sapienza University	

Session 6

Image Coding on Quincunx Lattice with Adaptive Lifting and Interpolation.....	193
<i>Xiangjun Zhang, Xiaolin Wu, and Feng Wu[†]</i>	
McMaster University, [†] Microsoft Research Asia	

Improved Resolution Scalability for Bi-level Image Data in JPEG2000.....	203
<i>Rahul Raguram, Michael W. Marcellin, and Ali Bilgin</i>	
University of Arizona	
Memory-Efficient Image Codec Using Line-Based Backward Coding of Wavelet Trees	213
<i>Linning Ye, Jiangling Guo[†], Brian Nutter, and Sunanda Mitra</i>	
Texas Tech University, [†] Beijing Institute of Technology at Zhuhai	
Nonuniform Compression in Databases with Haar Wavelet.....	223
<i>S. Chen and A. Nucci[†]</i>	
Rutgers University, [†] Narus, Inc.	
Four-Dimensional Wavelet Compression of 4-D Medical Images Using Scalable 4-D SBHP	233
<i>Ying Liu and William A. Pearlman</i>	
Rensselaer Polytechnic Institute	

Session 7

Bayesian Detection in Bounded Height Tree Networks.....	243
<i>Wee-Peng Tay, John N. Tsitsiklis, and Moe Z. Win</i>	
Massachusetts Institute of Technology	
On Multi-stage Sequential Coding of Correlated Sources	253
<i>Jia Wang, Xiaolin Wu[†], Jun Sun, and Sonyu Yu</i>	
Shanghai Jiao Tong University, [†] McMaster University	
High-Rate Analysis of Systematic Lossy Error Protection of a Predictively Encoded Source.....	263
<i>Shantanu Rane, David Rebollo-Monedero, and Bernd Girod</i>	
Stanford University	

Session 8

Type-Based Compression of XML Data	273
<i>Christopher League and Kenjone Eng</i>	
Long Island University	
Algorithms and Hardware Structures for Unobtrusive Real-Time Compression of Instruction and Data Address Traces	283
<i>Milena Milenkovic, Aleksandar Milenkovic[†], and Martin Burtscher[‡]</i>	
IBM, Austin, Texas, [†] University of Alabama in Huntsville, [‡] Cornell University	
High Throughput Compression of Double-Precision Floating- Point Data	293
<i>Martin Burtscher and Paruj Ratanaworabhan</i>	
Cornell University	

Session 9

Distortion-Complexity Optimization of the H.264/MPEG-4 AVC Encoder Using the GBFOS Algorithm	303
<i>Rahul Vanam, Eve A. Riskin, Sheila S. Hemami[†], and Richard E. Ladner</i>	
University of Washington, [†] Cornell University	
Bit Allocation Based on Motion Vector Analysis for H.264/AVC	313
<i>Hussain M. Mohammed, Nikolaus Färber, and Herbert Thoma</i>	
Fraunhofer Institute of Integrated Circuits	
Lossless and Near-Lossless Audio Compression Using Integer- Reversible Modulated Lapped Transforms	323
<i>Henrique S. Malvar</i>	
Microsoft Research	

Session 10

Exploiting Prior Knowledge in the Recovery of Signals from Noisy Random Projections	333
<i>Javier Garcia-Frias and Iñaki Esnaola</i>	
University of Delaware	
Bounds to the Rate Distortion Tradeoff of the Binary Markov Source	343
<i>Dinkar Vasudevan</i>	
Swiss Federal Institute of Technology	
Transmission over Slowly Fading Channels Using Unreliable Quantized Feedback	353
<i>Siavash Ekbatani, Farzad Etemadi, and Hamid Jafarkhani</i>	
University of California, Irvine	
Joint Optimization of Distributed Broadcast Quantization Systems for Classification	363
<i>Michael A. Lexa and Don H. Johnson</i>	
Rice University	

Poster Session

(listed alphabetically by first author)

Lossless Compression of Colour Video Sequence Using Optimal Prediction Theory – Octopus.....	375
<i>Stefano Andriani^{†‡} and Giancarlo Calvagno[†]</i>	
[†] University of Padova, [‡] University of New South Wales	
A Distortion Optimal Rate Allocation Algorithm for Transmission of Embedded Bitstreams over Noisy Channels.....	376
<i>Amir H. Banihashemi and Ahmad Hatam</i>	
Carleton University	
A Modified BISK Algorithm for 3D Dual-Tree Wavelet Transform Coding	377
<i>Joseph B. Boettcher and James E. Fowler</i>	
Mississippi State University	
Quantization of Sparse Representations.....	378
<i>Petros Boufounos and Richard Baraniuk</i>	
Rice University	
Bit Recycling with Prefix Codes	379
<i>Danny Dubé and Vincent Beaudoin</i>	
Université Laval	
Optimal Rate and Power Allocation for Layered Transmission with Superposition Coding.....	380
<i>Farzad Etemadi and Hamid Jafarkhani</i>	
University of California, Irvine	
VLR-Based Optimal Positioning of Resynchronization Markers	381
<i>Yong Fang and Jechang Jeong</i>	
Hanyang University	
The Model Based Similarity Metric	382
<i>Lionel Gueguen[†] and Mihai Datcu^{†‡}</i>	
[†] Get - Télécom Paris, [‡] German Aerospace Center DLR	
Optimal Source-Channel Decoder for Correlated Markov Sources over Additive Markov Channels	383
<i>M. A. Haleem and K. P. Subbalakshmi</i>	
Stevens Institute of Technology	
Applying Tunstall Coding in the Existing SEED Format for Seismographic Data.....	384
<i>Edwin S. Hong and Shu-Fang Newman</i>	
University of Washington, Tacoma	
Power Preserving 2:1 Bandwidth Reduction Mappings	385
<i>Amir Ingber and Meir Feder[†]</i>	
Amimon, [†] Tel-Aviv University	
Compression for Low Power Consumption in Battery-Powered Handsets	386
<i>Mayumi Kato and Chia-Tien Dan Lo</i>	
The University of Texas at San Antonio	

A New Approach to Decoding of BCH and Reed-Solomon Codes Using Syzygy	387
<i>Il Ho Kim and Hyoung June Ko</i>	
Yonsei University	
Fast Decoding of Fibonacci Encoded Texts	388
<i>Shmuel T. Klein</i>	
Bar Ilan University	
Comparison of Text Models for BWT	389
<i>Jan Lánský, Katsiaryna Chernik, and Zuzana Vlčková</i>	
Charles University	
Compression of a Set of Strings	390
<i>Jan Lánský and Michal Žemlička</i>	
Charles University	
Data Hiding Based Compression Mechanism for 3D Models	391
<i>Hui Li, Parag Agarwal, and Balakrishnan Prabhakaran</i>	
The University of Texas at Dallas	
Texture Classification Using VQ with Feature Extraction Based on Transforms Motivated by the Human Visual System	392
<i>Antonella Di Lillo, James A. Storer, and Giovanni Motta[†]</i>	
Brandeis University, [†] Bitfone Corporation	
New Fast Search Algorithm for Base Layer of H.264 Scalable Video Coding Extension.....	393
<i>Livio Lima, Daniele Alfonso[†], Luca Pezzoni[†], and Riccardo Leonardi</i>	
University of Brescia, [†] Advanced System Technology (AST) - STMicroelectronics	
Guided Quaternary Reaching Method for Wavelet-Based Image Compression	394
<i>Xiteng Liu</i>	
University of South Carolina	
Interference Multispectral Image Compression with Adaptive Distortion Control in Fourier Domain.....	395
<i>Jing Ma, Chengke Wu, Dong Chen, and Jie Guo</i>	
Xidian University	
An Efficient Implementation of Adaptive Prefix Coding	396
<i>Yakov Nekrich</i>	
University of Bonn	
An Efficient Algorithm for the Inverse ST Problem	397
<i>Ge Nong and Sen Zhang[†]</i>	
Sun-Yat Sen University, [†] SUNY College at Oneonta	
Memory-Efficient Decoding of Variable Length Codes for Monotonic Sources.....	398
<i>Yuriy A. Reznik</i>	
QUALCOMM Incorporated	
Practical Binary Adaptive Block Coder.....	399
<i>Yuriy A. Reznik</i>	
QUALCOMM Incorporated	

Hyperspectral Image Compression with Optimization for Spectral Analysis	400
<i>Kameron Romines and Edwin Hong</i>	
University of Washington, Tacoma	
Gaussian Golomb Codes	401
<i>Seishi Takamura and Yoshiyuki Yashima</i>	
NTT Cyber Space Laboratories	
Generalized Statistics Framework for Rate Distortion Theory	402
<i>R. C. Venkatesan</i>	
Systems Research Corporation	
Compression as Data Transformation	403
<i>Kiem-Phong Vo</i>	
AT&T Labs, Shannon Laboratory	
Advanced Optimizations for VQ Compression on Parallel Systems.....	404
<i>Akiyoshi Wakatani</i>	
Konan University	
The Wyner-Ziv Rate-Distortion Function of Multivariate Gaussian Sources and Its Application in Distributed Video Coding.....	405
<i>Peng Wang, Jia Wang, Songyu Yu, Erkang Chen, Xiaokang Yang, and Xiaodong Wang[†]</i>	
Shanghai Jiao Tong University, [†] Columbia University	
An Enhanced Robust Entropy Coder for Video Codecs Based on Context- Adaptive Reversible VLC	406
<i>Qiang Wang, Debin Zhao, Siwei Ma[†], and Wen Gao[†]</i>	
Harbin Institute of Technology, [†] Chinese Academy of Sciences	
Samplify: Real-Time Compression for Electronic Measurements	407
<i>Al Wegener</i>	
Samplify Systems, Inc.	
A Content-Based Robust Mode Decision Scheme for Internet Videophone Applications	408
<i>Jin Xu, Limin Sun, and Zhimei Wu</i>	
Chinese Academy of Sciences	
A Fast Lossless Codec of Continuous-Tone Images for Thin Client Computing	409
<i>Chun Yang, Yan Niu, Yubin Xia, and Xu Cheng</i>	
Peking University	
Dictionary-Based English Text Compression Using Word Endings.....	410
<i>Jeehong Yang and Serap Savari</i>	
University of Michigan	
Author Index.....	411