

# Department of Mathematical Sciences Colloquium

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## *3-D and Scientific Data Compression Based on JPEG 2000*

The state-of-the-art lossy image compression method JPEG 2000 (J2K) has been extended in the Part 2 of the standard to deal with multiple images such as multi-spectral satellite image sets. A vertical or cross-component decorrelation pre-processing transform step is also part of the standard. In our research, we use J2K Part 2 (J2KP2) to compress gridded scientific 3-D data sets, such as meteorological data, in optimal ways that can minimize the mean-squared-error (MSE) distortion for a chosen global average bit-rate (bits per sample value over the entire 3-D data set). This is the subject of the first half of the talk.

We have also incorporated J2KP2 into an approach that can be used to compress scientific data in such a way that the Maximum Absolute Error (MAE) is bounded by a user specified limit. Alternatively, the MAE can be minimized for a user-specified global average bit-rate. In this residual coding method, lossy compression is applied to the original data using J2KP2, while lossless compression is employed on the quantized residuals (the difference between the original and the lossy decompressed data). The lowest bit-rate or MAE is achieved by optimizing the allocation of the desired total bit rate between the two contributing rates corresponding to the lossy and the lossless compression steps. The methodology for achieving minimum bit-rate or MAE and results for 3-D meteorological data are presented in the second half of the talk.

**Friday, November 16, 2007 at 3 pm in Bell Hall 143  
The University of Texas at El Paso**

Refreshments will be served in front of the colloquium room, 15 minutes before the start of the colloquium.

For further information, please contact Dr. Pavel Solin, Bell Hall 220. Phone: (915) 747-6770, email: [solin@utep.edu](mailto:solin@utep.edu).