Navy Topic No: N96-254

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chaotic.com® provides practical solutions to the hardest problems in broadband signal processing and pattern recognition. Based on a synthesis of chaos theory and classical signal processing, its methods are the basis of new technologies for broadband passive and active sensors (sonar, radar) and agile spectrum usage in wireless communications.

chaotic.com® compresses high-entropy (textured) images that are "incompressible" with other methods. The company can extend active sensor detection ranges while reducing noise and clutter induced false alarms. It has also invented a complete theoretical and engineering description of agile airwave access for *ad hoc* networking.

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SBIR Investment: $817K

Non-SBIR Investment: $150K

Stochastic-Image Compression

About the Technology

The Navy has a critical need to rapidly move large, high-entropy (textured) images over bandwidth-limited channels. Many of these images, such as acoustic spectrograms (lofargrams), are textured with random-like components that cannot be compressed using existing algorithms. In this SBIR, chaotic.com® demonstrated real-time, 4:1 compression algorithms for lofargrams with no discernable loss of information. This was done by inserting *a priori* synthetic aperture radars knowledge of the detection and classification processing into the image-model extraction, compression, and rendering algorithms. These techniques can be easily extended to other types of images (such as synthetic aperture radars) that contain significant textured components important in feature recognition and classification.

Benefits to PEO C4I&Space and Other DOD Programs

As the demand for real-time imagery expands, image-file compression is the most cost-effective tool for conserving bandwidth. Many military sensors and imaging systems produce image-like products that have significant amounts of speckle and other textures that cannot be compressed using standard methods. These random-like features are vital clues to object identification and must be preserved. chaotic.com® techniques can substantially reduce the demands on bandwidth.

Why Stochastic-Image Compression Improves Technology

- Enables timely dissemination of critical, tactical products needed by the Fleet.
- Allows distributed analysis and multi-sensor correlation.
- Has the potential to transmit higher quality images.

Military and Commercial Significance

- Cost-effective alternative to increasing communication bandwidth.
- Can be easily adapted to surface, air, and submarine platforms for radar and other imaging systems. These techniques are especially applicable for unmanned air vehicle (UAV) imaging systems where weight and power are constrained.
- Also applicable to battlefield medicine (such as X-ray images) and fingerprints (for rapid identification).
- chaotic.com received a $150K Phase III award to demonstrate the algorithms for the Surveillance Towed Array Sensor System (SURTASS), which is an antisubmarine warfare surveillance system.