Modified Gabor Representation: A Powerful New Method forClassification and Compression of Audio, Images and Signals

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Overview

The Periodic Gabor with Biorthogonal Exchange (PGB) method is a cutting-edge technology for compressing and classifying audio, images, and signals. Developed as an enhancement to the Discrete Fourier Transform (DFT), PGB provides a stable, invertible, and highly efficient time-frequency representation that outperforms traditional techniques like the Short Time Fourier Transform (STFT) and Discrete Wavelet Transform (DWT). By addressing the instability and inefficiency of earlier Gabor methods, PGB introduces an innovative approach to signal processing. The method offers significant potential for revolutionizing applications in data compression and classification.

Applications

- Audio: Compresses audio with high fidelity and low computational load; outperforms STFT in classifying FSDKaggle2018, musical instruments, and complex sounds..
- Image Compression and classification: Achieves superior image reconstruction quality, retaining only 1% of coefficients with sharper results compared to traditional methods.
- Medical Imaging: Ideal for signals with large gradients, such as MRI data, due to its superior handling of signal sparsity.

Compression of the Lena image, retaining only 1% of the coefficients. PGB gives a significantly sharper image than STFT, while PG (Periodic Gabor without exchange) gives the poorest reconstruction.

Differentiation

- High Efficiency & Stability
- Superior Classification: Enhances neural network performance by extracting key signal features
- Versatility: Integrates seamlessly into existing workflows, replacing DFT/STFT/FFT across applications.
- Scalable Performance: PGB-Z variant matches FFT speed (NlnN) while supporting larger datasets.

Development Stage

The PGB method has demonstrated exceptional performance across multiple applications, including compression and classification of audio, images, and signals.