B.Tech Term Work

19ECE457 – Wavelets and Application

Data Compression Using Wavelets
- Audio Compression

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Data Compression:

Data compression is the process of reducing the size of data without significant loss of information. It is widely used in audio, video, image, and data transmission applications.

Need for Data Compression:

- Storage Efficiency
- Transmission Efficiency
- Cost Efficiency

Audio compression refers to the process of reducing the size of an audio file while attempting to preserve its quality.

Goal of our Project:

•To explore and implement **wavelet-based compression technique** for an given audio file.

• To evaluate the performance of wavelet compression using certain metrics.

Types of compression

Wavelet compression refers to techniques that use wavelet transforms for compressing data, often used in image, audio, and video processing. The two primary types of wavelet-based compression are lossy and lossless, each with distinct characteristics and applications.

Lossless Wavelet Compression

In lossless compression, the original data is perfectly reconstructed from the compressed data without any loss of information. It is suitable for applications where precision is critical, such as medical imaging or scientific data. Minimal or no thresholding.

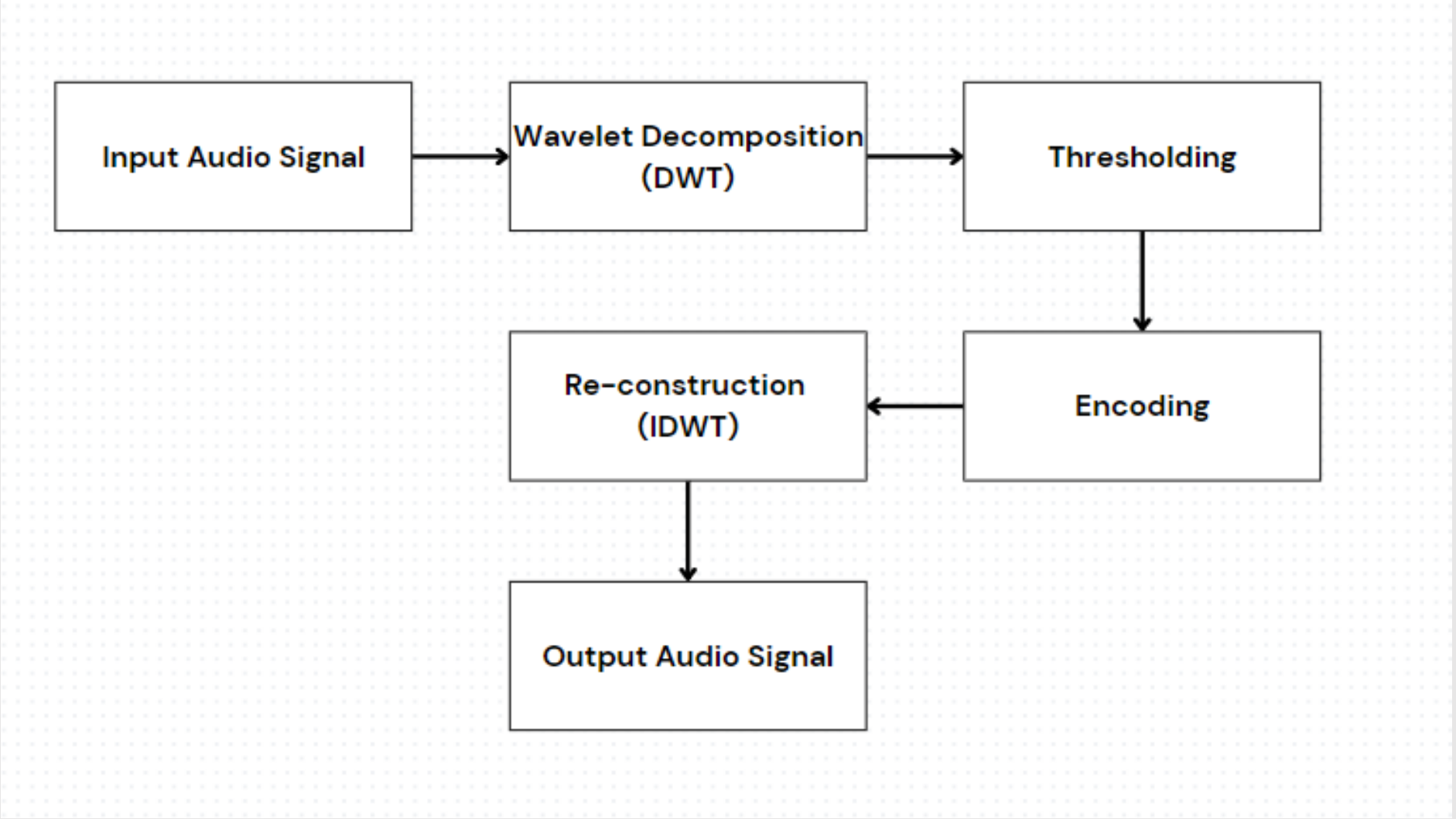
Lossy Wavelet Compression

In lossy compression, some data is discarded to achieve higher compression ratios. The decompressed data is an approximation of the original, with some loss of detail. Aggressive thresholding.

Comparison with Other Methods

Aspect	Wavelet Compression	Fourier-Based Compression
Domain	Time and frequency	frequency
Compression Ratio	Higher for similar quality	Lower
Noise removal	Effective	Less effective
Complexity	Higher	Lower
Signal	suite for non stationary signal	not suite for non stationary signals
Applications	Broad (image, audio, video)	Mostly images (e.g., JPEG)

Methodology:



Performance Metrics:

Compression Ratio (CR):

• Compression Ratio (CR) is a measure of how much the file size has been reduced after compression. A higher CR indicates better compression.

CR = Size of Original Signal / Size of Compressed Signal

Signal-to-Noise Ratio (SNR):

• Signal-to-Noise Ratio (SNR) is a measure of the ratio of the useful signal to the background noise in a signal. A higher SNR means the signal is clearer, with less noise.

•In the context of compression, a higher SNR means the compressed signal has preserved more of the original signal quality.