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Comparative Analysis of Haar and Daubechies Wavelet for Hyper Spectral Image Classification

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Abstract. With the number of channels in the hundreds instead of in the tens Hyper spectral imagery possesses much richer spectral information than multispectral imagery. The increased dimensionality of such Hyper spectral data provides a challenge to the current technique for analyzing data. Conventional classification methods may not be useful without dimension reduction pre-processing. So dimension reduction has become a significant part of Hyper spectral image processing. This paper presents a comparative analysis of the efficacy of Haar and Daubechies wavelets for dimensionality reduction in achieving image classification. Spectral data reduction using Wavelet Decomposition could be useful because it preserves the distinction among spectral signatures. Daubechies wavelets optimally capture the polynomial trends while Haar wavelet is discontinuous and resembles a step function. The performance of these wavelets are compared in terms of classification accuracy and time complexity. This paper shows that wavelet reduction has more separate classes and yields better or comparable classification accuracy. In the context of the dimensionality reduction algorithm, it is found that the performance of classification of Daubechies wavelets is better as compared to Haar wavelet while Daubechies takes more time compare to Haar wavelet. The experimental results demonstrate the classification system consistently provides over 84% classification accuracy.

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