

CURVELET TRANSFORM AS AN EXTENSION OF WAVELET TRANSFORM AND ITS OPERATIONAL CALCULUS

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ABSTRACT. In image and signal processing, the wavelet transform is frequently employed. However, it has the drawback of having weak directionality, which has limited its use in many applications. A recent addition to the wavelet transform, the curvelet transform attempts to address crossing phenomena that occur along curved edges in 2-D images.

As an extension of the wavelet transform, we discuss various curvelet transform features in this paper. There are numerous uses for the curvelet and wavelet transforms in image and signal processing.

1. INTRODUCTION

A multi-scale geometric analysis tool for images is the wavelet transform. Its uses in the field of image denoising are numerous, and the advantage of the wavelet transform is that it can reflect one-dimensional continuous signal singularity while preserving the singularity of the edge of two-dimensional images, such as a variety of straight lines, curves, etc. In a higher-dimensional plane, it is difficult to use the wavelet transform to express its features [10]. Wavelet analysis is useful for modelling acoustic scattering and sonar [6]. The curvelet transform, a new multi-scale representation suitable for objects that smooth away discontinuities across curves, was introduced by Candes and Donoho (1999) [7]. Wavelet-based multi-resolution approaches have close ties to optical data analysis, biological and computer vision, image and signal processing, and scientific computing. Wavelet functions are used as the object in multi-resolution analysis to specify the signal as a collection of its successive approximations[1]. Wavelets use the multi-resolution technique, which is deeply related to signal processing [2]. Ridgelets are specially adapted only to

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