

## **Digital image watermarking based on angle quantization in discrete contourlet transform**

### **ABSTRACT**

A robust and transparent watermarking scheme based on contourlet transform and quantization index modulation is proposed in this paper. In proposal algorithm, after taking contourlet, the coefficients are divided into three quadrants by using the symmetric property of the contourlet coefficients, then the angle coefficients are modulated for each of three points. The experimental results revealed that if the information of the image is utilized to determine the watermark and by using quantization index modulation properties, a higher robustness and more effective imperceptibility in proposed algorithm are achieved.

**Keyword:** Contourlet transform; Digital watermarking; Lagrange method; Quantization index modulation