ABSTRACT

Information and Communication Technology (ICT) has advanced significantly, streamlining various tasks. However, the ease of communication has introduced concerns, particularly regarding data authenticity. Security, a critical factor in data authenticity, has become a major challenge. Quantum watermarking offers a promising solution for this problem in the next generation of technology, providing superior security compared to classical watermarking. This thesis proposes a novel quantum watermarking method employing Taylor sequence modification and rotation gates for watermark embedding. Prior to embedding, images are converted into the quantum domain using the Flexible Representation of Quantum Images (FRQI). The phase representations of both the host and watermark pixels are then calculated. A Taylor sequence is used to modify the watermarked phase, and the difference between the host and watermarked phases is determined. Several rotation gates are applied to modify the host phase on the quantum circuit. After the embedding process, the watermarked quantum images are reconstructed into classical images. Experimental results demonstrate the imperceptibility of the watermark, measured by Peak Signal to Noise Ratio-H (PSNR-H), and its robustness, measured by Peak Signal to Noise Ratio-W (PSNR-W). PSNR-H values ranged from 10 to 80 dB, while PSNR-W values reached up to 20 dB. Notably, even when PSNR-H is infinite, the watermark can still be detected and is subjectively visible to the human eye, making this method unique.

Keywords: Quantum watermarking, FRQI, Taylor Series.