ABSTRACT

The primary challenge in digital image watermarking is to achieve imperceptibility and robustness under high payload with security provision. The practical framework presented in this thesis fulfills quality parameters and covers all important design issues of image watermarking. The work focuses on human visual system (HVS) and addresses discrete wavelet transform (DWT), discrete cosine transform (DCT), DWT-DCT, DWT-singular value decomposition (DWT-SVD), DWT-Discrete Fourier transform-SVD (DWT-DFT-SVD), DWT-fast Walsh Hadamard transform-SVD (DWT-FWHT-SVD) based image watermarking techniques. The 8 stages security with thresholding and randomization (8-SSTR) in DWT-DFT-SVD domain and highly secured Fibonacci Lucas rotation affine transform (FLRAT) are effectively implemented in this thesis. This thesis presents effective handling of color spaces (EHCS) in DWT-DFT-SVD domain. The color planes in red-green-blue (RGB), KarhunenLoeve average (KLA), YUV, YIQ, XYZ, UVW, YCbCr, RcGcBc and RsGsBs color spaces are effectively used for color image watermarking. The transmission of medical image in healthcare applications such as teleradiology, telepathy, telecare, telesurgery, teneurology demand high and guaranteed security. The region of interest (ROI) and region of non interest (RONI) of medical images need to handle carefully. This thesis presents effective handling of ROI and RONI (EHRR) in DWT-DCT domain. Also high degree of robustness for attacks (HDRA) in DWT-FWHT-SVD domain is achieved. The optimization
of imperceptibility and robustness under high payload using novel approach multiobjective evolutionary optimizer (MEO) in DWT-SVD domain, reduction of memory and bandwidth requirement using novel approach of image partitioning merging scheme (IPMS) are attractions of this thesis. The framework proposed in the thesis presents practical solutions to real world applications. The experimental results have demonstrated fulfilment of objectives and performance improvement over existing DWT based image watermarking techniques.

**Keywords:** Affine, Partitioning Merging, Fibonacci-Lucas, Fingerprinting, Medical, Multiobjective, Optimization, Scrambling, Wavelet.