



ARAB ACADEMY FOR SCIENCE, TECHNOLOGY AND MARITIME TRANSPORT
College of Engineering and Technology

**A Robust Multi-Level Steganography Model Using
Wavelet-Based Block Partition Modification**

A Thesis
Submitted in Partial Fulfillment to the Requirements
for the Master's Degree in
Computer Engineering

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ABSTRACT

An efficient steganography method is proposed for embedding secret messages into gray scale and RGB colored images. In this paper, a wavelet domain steganography is adopted for hiding a large amount of data with high security, good invisibility and no loss of secret message. The information is embedded in those areas of the host image that contains high texture to reduce visibility of the embedded information in the host image. The qualified significant wavelet coefficients and their texture and sensitivity to gray value variations across different coarse scales are utilized to determine the positions and the magnitudes to adaptively embed the secret message. We consider the highly textured areas near the edges in high frequency subbands in the wavelet domain. The transformed cover image is divided into number of joint non-overlapping 4×4 blocks in each layer (R, G, and B layers). A difference value is calculated from the values of the adjacent pixels in each block, producing the partitioned difference image (PDI). The wavelet subbands are selected to calculate the changes. The selection of the range intervals is based on the characteristics of human vision's sensitivity to gray value variations from smoothness to contrast. The number of bits which can be embedded in each block varies and is decided by the width of the range to which the difference value of the two pixels and block histogram peak (P_k) belongs to. The embedded secret message can be extracted from the resulting stego-image and the original cover image is reversed. The proposed model will produce a high-capacity image steganography technique with acceptable level of imperceptibility and distortion in the cover image and high level of overall security. This solution is independent of the nature of the data to be hidden and produces a stego image with minimum degradation. Experimental results show the feasibility of the proposed methods. Various statistics attacks were also conducted to collect related data to show the security of the method. The experimental results show that the algorithm has a high embedding capacity and a good invisibility. Moreover PSNR of cover image with stego-image shows better results compared with other existing steganography approaches.