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Image bit depth plane digital watermarking for secured classified image data transmission

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Abstract

The demand for rapid use of Internet has increased many folds in distributed environments. It is easy for the custodian of the digital data to transfer images of classification across computers via internet. The information transmitted is not secured. Conventional encryption and decryption algorithms are vulnerable from the thefts of the digital data and do not protect the data from copying after the data is transmitted. The data prone to copyright thefts should be protected against manipulation, misuse and security breaks. First the image is classified using maximum likelihood classification and fuzzy model. Second, for transmission, with copyright information, image is secured, by image bit depth plane digital image watermarking. In this method, image is read and separated into n-bit planes. The accuracy is tested using visual interpretation and assessment. The application of this method is identification of ownership, claim of ownership, online transaction, digital content authorization, file reconstruction. This method is robust against intentional and unintentional attacks of malicious users.

Keywords: Information security;Data security Image processing; Fuzzy classification; Bit plane;Watermarking;

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1. Introduction

Now a days digital watermarking (visible and invisible)[34, 36]is in current research of information security, for addition of imperceptible information, such as hidden[26]author or copyright[3], logo information. Watermarking could also be used in multimedia[11, 14]. In digital data watermarking the content of the data is inserted as a signal without affecting the visual quality of the image for data security[16]. In digital watermarking, where the information is hidden, as watermark in various kinds of digital medias[18, 28], is termed as cover work[1, 5]. But the hidden[26, 13]information cannot be extracted by the malpractitioners easily by any negative means. Its major application is digital database content intellectual property rights. It cannot be authenticated[9] by the third party or agency, department[30]. But some Hidden visible watermarks[33, 35], most invisible watermarks areHidden. Secure spread spectrum watermarking is described for multimedia watermarking[37]; encryption algorithm is elaborated for target image classification based on the biological features[39]. For information security and access control robust biometric image watermarking finger print and face template protection is explained[40]. The quality of the image could be assessed by error visibility to structural similarity[42]. In Spatial Domain Watermarking method the Least Significant Bit (LSB) image, replaces the least significant bits of pixels selected to embed the information[43]. Feature extraction[20] and Classification, of the digital images possesses current features on the earth. In the fuzzy based classification feature is assigned to a class which has highest degree of membership. Automatic fuzzy clustering using modified differential evolution can be used for image classification[4]. Another Ensemble method for spectral-spatial classification of urban areas is using hyperspectral data[6]. A multiresolution modelling approach can be used for semi-automatic extraction of streets for mapping of urban areas[10, 12]. A fuzzy clustering based segmentation system is used as a support to diagnosis in medical imaging[8]. Efficient fuzzy clustering can be used for multispectral images[18]; extensive research is going on in the field of fuzzy classification, to solve various problems of classifications. Fuzziness is being used as theory in solving the problems of fuzzy classification.Fuzzy classification is used in various applications such as land use classification, hydro geomorphology, image classification, temperature setting etc.

The output needs to be secured before it is transmitted on the digital media. The Bit plane Digital Invisible watermarking is used here to protect the classified image output[7]. This data contains government data for planning. In Digital watermarking the classified image and the watermark image is embedded to form coded image. The new image with watermark is used for transition from source to the destination location via digital media. General users of the image do not know that the image is watermarked or not. In protected format, the image is transmitted from one location to another.

1.1. Requirement for Classification

Table 1. Details of training data imagery

Image	Classification image	Classified o/p image	Watermark image
Bands	4 (R,.G,,B, NIR)	3 (R.G,B)	3 (R,G,B)
Size	2.35 MB	29.5 KB	25.5 KB
Width	113 Pixel	113 Pixel	113 Pixel
Height	113 Pixel	113 Pixel	113 Pixel
Data type	8 bit	8 bit	8 bit
Format:	'png'	'png'	'png'