

# Bit Plane Approach for Watermarking

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**Abstract.** In this article, we present a novel bit plane-based watermarking method. In the presented method, an image is embedded in the least significant bit plane of the original contents.

**Keywords:** bit plane decomposition, color image, watermarking.

## 1 Introduction

A watermarking is a hidden however recognizable patterns in a contents. A bit plane of a digital discrete contents are set of bits point to a given bit plane in each of the binary numbers depicting the images [1]. In this article, we propose a watermarking method and study the influence between image size and performance.

The paper is divided as follows. In Section 2, bit plane representation concept is studied. In Section 3, the presented watermarking procedure is given. The experimental results are yielded in Section 4. Finally, in Section 5, we propose our conclusion remarks.

## 2 Bit Plane Representation

A bit plane is an important way in image processing to manipulate contents. Especially, watermarking can be conducted through bit plane [2-5]. In bit plane, there are only two levels, either zero or one [6-27]. Therefore each bit plane is represented by only one bit.

## 3 Watermarking Process

Watermarking is an important stage and verification procedure where a hidden watermark in the image or video contents contains. The best way for watermarking may take into account human visual system where human eye can distinguish the watermarked contents from the original contents.

$$0 \quad 1 \quad 2 \quad \dots \quad 7 \quad (2)$$

Here,  $\mathcal{R}_i$  can be substituted by watermarked contents.

#### 4 Performance Study

Figure 1 and Fig. 2 shows the performance results using LC images [28].

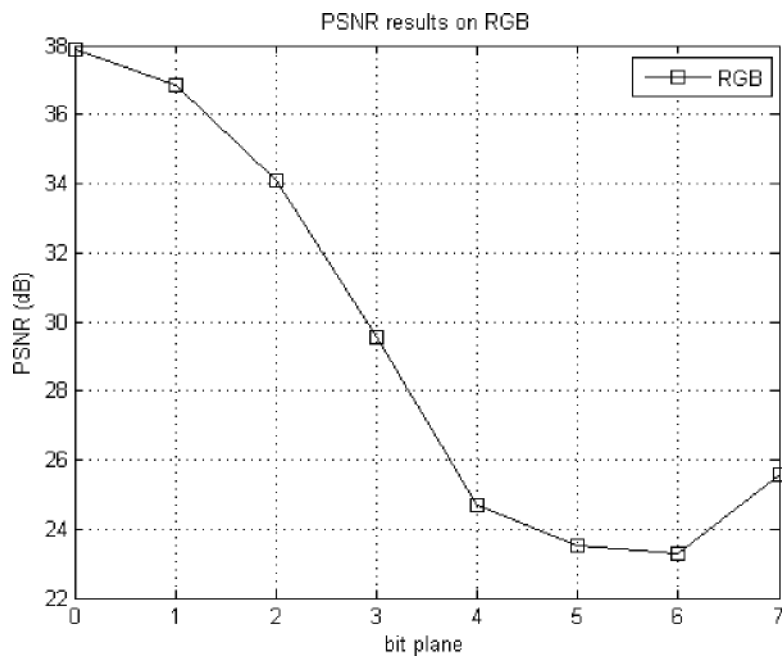
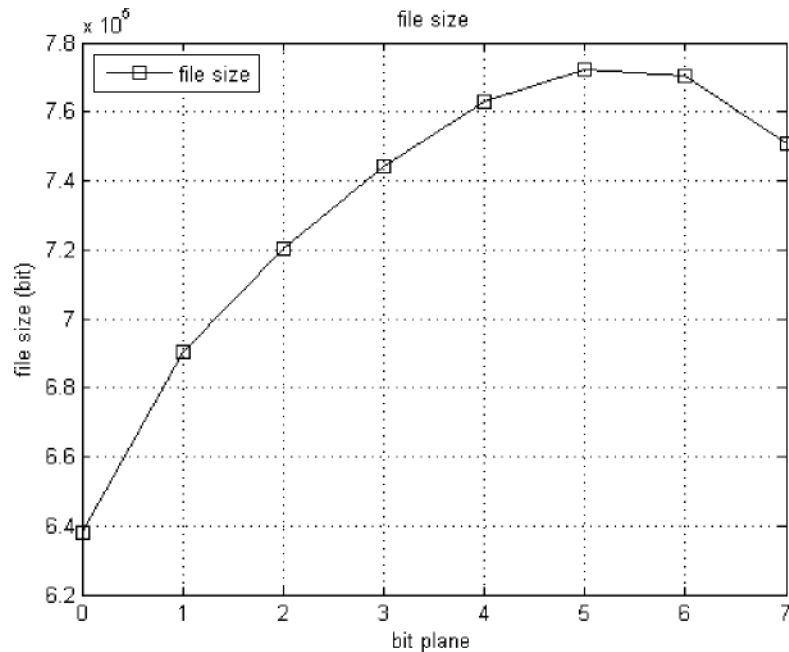


Fig. 1. Average PSNR result in RGB color image for different  $\mathcal{R}_i$ .

#### 5 Conclusions

In this study we proposed a novel bit plane-based watermarking algorithm.

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**Fig. 2.** Average file size in RGB color image for different  $\beta_i$ .

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