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A Novel Data Embedding Method in RGB Color Component Bit Planes

Introduction

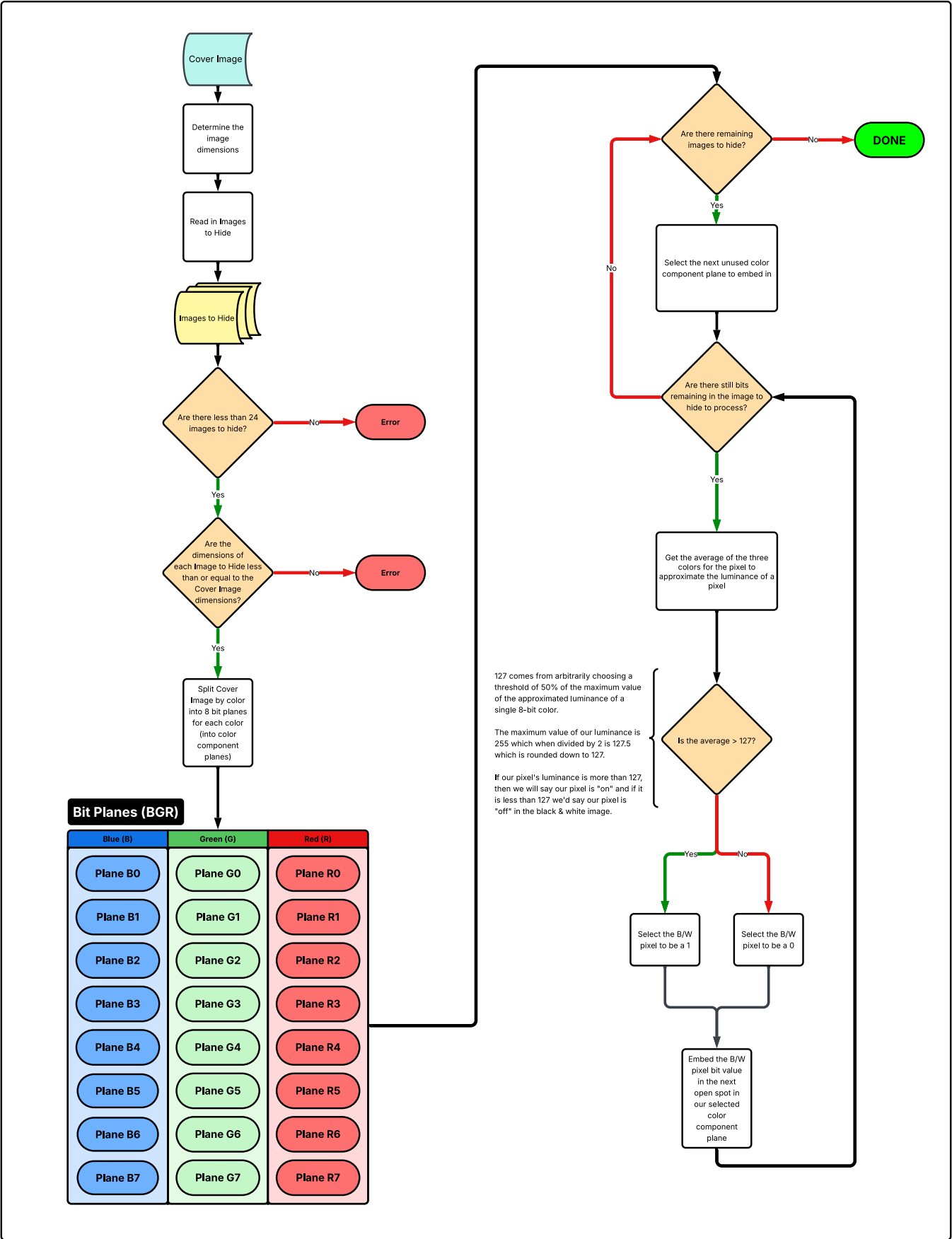
We are developing a steganographic program designed to embed multiple black and white images derived from full-color input images within the individual bit planes of each color component (referred to as color component planes) in a 24-bit color bitmap. Our approach involves distributing the binary data of each black and white image across the bit planes of the red, green, and blue channels in a linear fashion [1]. This method will result in a modified cover image, potentially rendered in grayscale, or black and white, depending on the use of upper bit planes. The primary objective of this project is to implement a novel technique for concealing multiple images within a single bitmap file. Additionally, we aim to perform statistical analysis on the output, evaluating practical payload capacity, the visual detectability of the embedded data, and the overall effectiveness of the cover image as a steganographic medium.

The program will accept full-color images to hide in a full-color cover image and take the most significant bit of each pixel of the images to be hidden and derive an appropriate black and white image for the given bits. This black and white image will then be embedded within a color component bit plane in the cover image. The embedding pattern is taking advantage of similar patterns as that to Least Significant Bit replacement and encoding per color channel [2].

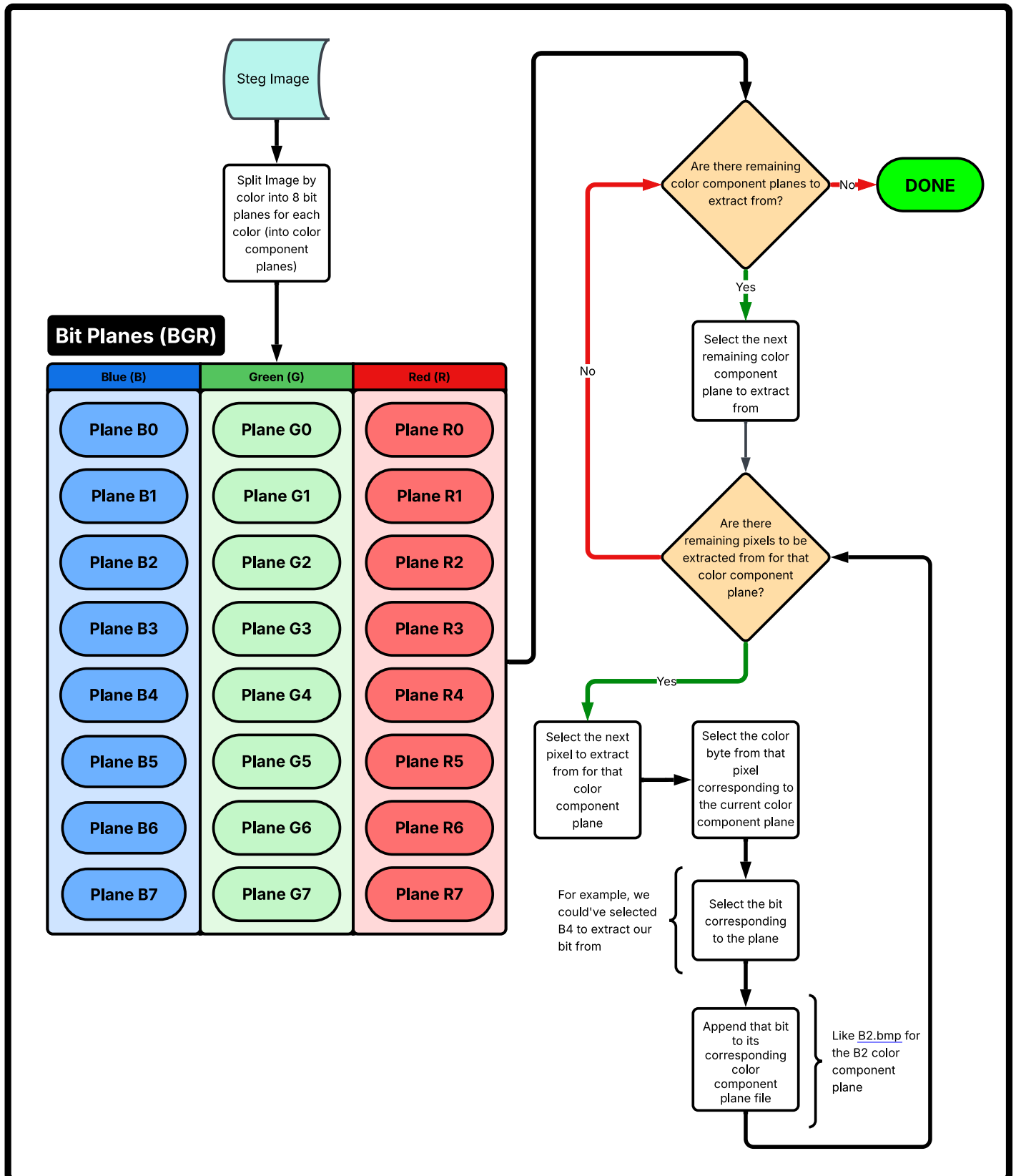
To extract the hidden data, the algorithm will accumulate each color component plane from a given image into its respective image file name. For instance, all bits in position 2 belonging to a blue color component as part of a given bit plane would be extracted to a file named B2 . bmp.

The functional block diagrams outlining the algorithm's steps are located in the next pages.

Hiding



Extraction



Bibliography

- [1] A. Singh and H. Singh, "An improved LSB based image steganography technique for RGB images," *2015 IEEE International Conference on Electrical, Computer and Communication Technologies (ICECCT)*, Coimbatore, India, pp. 1–4, May 2015, doi: [10.1109/ICECCT.2015.7226122](https://doi.org/10.1109/ICECCT.2015.7226122).
- [2] R. Dumre and A. Dave, "Exploring LSB Steganography Possibilities in RGB Images," *2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT)*, Kharagpur, India, pp. 1–7, Jul. 2021, doi: [10.1109/ICCCNT51525.2021.9579588](https://doi.org/10.1109/ICCCNT51525.2021.9579588).