2D Colour Barcode Steganography

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Abstract – A barcode is a visual representation of data; the data usually describes something about the object that carries the barcode. 2D colour barcode consists of representation of data of coloured rectangles of equal width based on the RGB model. Steganography is a practice of concealing messages or information within other non-secret text or data in order to give protection to the data from the third person. Steganography takes cryptography a step farther by hiding an encrypted message so that no one suspects it exists. 2D method will be used in the process of transmission of data which makes it difficult to decode for a third person because it makes use of representation of the data in the form of coloured barcodes of encrypted RGB values. This paper gives the brief introduction about the project which shows how 2D coloured barcodes are used in data hiding using steganography using MATLAB.

Keywords: steganography, colour barcode, 2Ds

I. INTRODUCTION TO STEGANOGRAPHY

Steganography is a method of hiding the data in a message in order to give security to the data. It is the practice of concealing a file, message, image or video within another file. The word steganography combines the Greek word *steganos* meaning "covered, concealed or protected" and *graphein* meaning "writing".

The advantage of steganography over cryptography alone is that the intended secret message does not attract attention to itself as an object of security. It includes the concealment of information within computer files.

The first recorded uses of steganography can be tracked back to 440 BC. Here are some examples:

- Demaratus sent a warning about a forthcoming attack to Greece by writing it directly on the wooden backing of a wax tablet before applying beeswax to its surface.
- Ancient Chinese wrote messages on fine silk, which was then crunched into a tiny ball and covered in wax. The messenger then swallowed the ball of wax.
- Special inks were important steganographic tools even during Second World War. During Second World War, a technique was developed to photographically shrink a page of text into a dot less than one millimeter in diameter and then hide this microdot.

II. LITERATURE SURVEY

A. 2D Colour Barcodes

A 2D colour barcode consists of coloured vertical rectangles each of equal width based on the RGB model. It is the digital form of steganography which converts a piece of text into coloured barcodes and thus hides the data in the form of these barcodes, whose colour depends upon the character in the text.

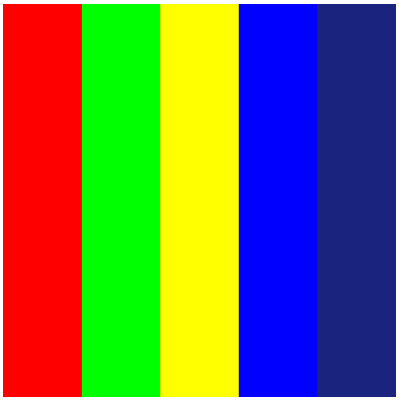

Fig 1: 2D Colour Barcode

B. Advantages of 2D Colour Barcode Steganography

1. Converts the text into coloured barcode format which is unreadable to the third person.
2. Every bar in the coloured barcode represents a character of the given text and a unique colour is designated to every unique character.
3. It can be used to encode upper and lowercase alphabets as well as numerical characters.
4. The colour code to each character is known only to the first and second person between which the transmission of information takes place.

C. Drawbacks of 2D Colour Barcode Steganography

Every unique character of the input text is designated with a unique colour. The colour of the bars is a measure of parameter for determining the encoded character by the decoder. For consecutively repeating characters, the colour of consecutive bars in the barcode is same, so the decoder recognizes only the unique character based upon its colour and does not counts the number of times it is repeated.

III. PROPOSED SYSTEM

There are mainly two phase.
A) Encoding Process: Conversion of text into 2D coloured barcode.
B) Decoding Process: RGB extraction of 2D coloured barcode back into the text.

A. Encoding Process

The encoding process consists of certain steps as follows:

Step 1: Take input from user.

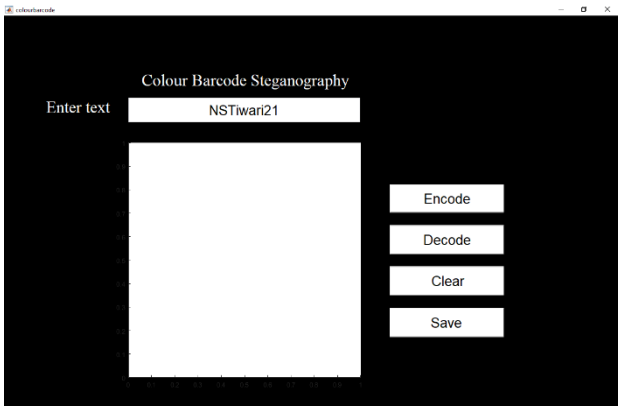

Fig 2: Screenshot of the input text

Step 2: Generate a 1024x1024 coloured matrix of datatype uint8 which designates the RGB values to every character of the input text. The range of uint8 datatype is 0 to 2^8-1 i.e. the values of 'R', 'G' & 'B' can range between 0 and 255.

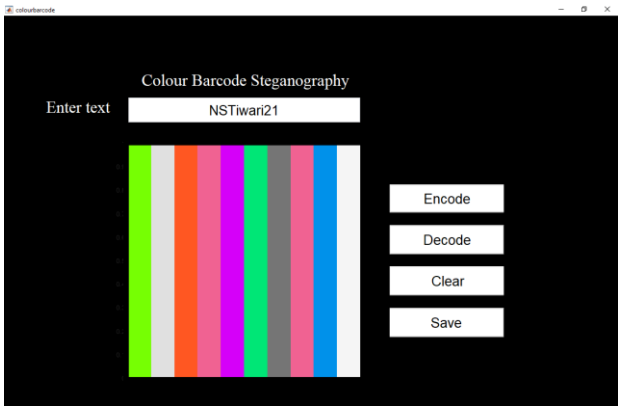

Fig 3: Screenshot of encoded text to 2D coloured barcode

Step 3: Save the image.

Fig 4: Saved Image

B. Decoding Process

The RGB image generated after encoding the text is then decoded as follows:

Step 1: Upload the saved stego image.

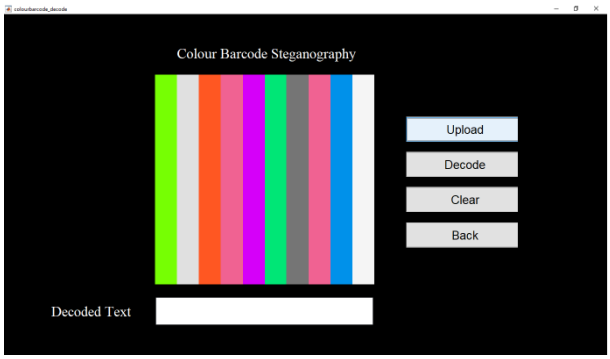

Fig 5: Screenshot of uploaded image.

Step 2: Process the image and extract the RGB values of each pixel of the image and map these values to their corresponding characters encoded during the Encoding Process.

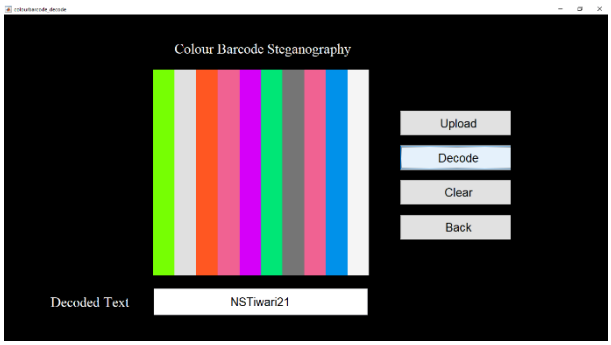

Fig 6: Screenshot of the text decoded.

IV. CONCLUSION

At first, the research experience in steganography took me in several directions until getting acquainted with the requirements to build up this project. The paper gives idea about how the data can be hidden using 2D colour barcode steganography where the barcode image is taken as the cover image. The paper also highlights how data can be encoded in its phases and the use of Image Processing to extract RGB values in order to decode the hidden message in the system.

There is more to be done to achieve more polished functionality of the project by overcoming the drawbacks. All source code and the documentation is freely available on my GitHub profile at https://www.github.com/NSTiwari/2D-Colour-Barcode-Steganography-using-MATLAB

V. REFERENCES

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