An Enhancement of digital image steganography based on PVD and modulo operation using histogram

With the help of Dual PDMO and Single APVD.

Major Techniques used:

# PDMO (Pixel Differencing Modulo Operation)

PDMO is a technique used mostly in steganography to embed or conceal a value within a picture. It is hidden in such a way that it is visually hard to determine whether the image contains any value. To accomplish this, we first compute the difference between the pixel values and then apply modulus, so that we can determine the value of the difference using certain rules, which we will cover later. This value is then used to embed the binary bits.

## PDMO Process

Assume that there are two pixels to which the PDMO approach should be applied. The following are the specifics of the techniques:

1. Calculate the difference in pixels . Additionally, if a negative difference occurs, it will be trivial to adjust its absolute value, as symmetry dictates that all conceivable values are equally relevant. .
2. Consider and to be the number of secret data bits to be implanted on the pixels and . Using the difference value , determine and as and bits, respectively, from Table I.

Table 1 RANGE TABLE FOR THIS METHOD

|  |  |  |
| --- | --- | --- |
| 1. Range ( |  |  |
| 1. Capacity, |  |  |

1. Find the remainders and using following rules:
2. Convert and which is a part of binary secret message, to decimal say and respectively. Compute the difference values and as
3. Apply the specified criteria to the pixels andat the first level to obtain the consequent pixels and .
4. Calculate as new difference value.   
   If apply following,  
   and if apply following,
5. To resolve the condition of FOB, apply the following:
6. The modified pixels are and.

# APVD (Average Pixel Value Differencing)

Initially, two pixels (and) are required for computing the average of the pixels' values (), and a third pixel () is required for applying PVD. Thus, we will want three pixels in total. The following are the steps for applying the APVD:

1. The average () of two pixels (and) is calculated