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A Cloud-Based Image Distribution and Reconstruction using Improved POB Number System

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Abstract: ***Today, The Multimedia Content Has Been Growing Rapidly. So, There Came A Necessity To Secure The Ever Growing Multimedia Content, Especially Images. Cloud Can Be A Good Solution To Store This Ever Growing Content But Still Cloud Has Its Disadvantages Since Third Parties Involved In It. So Image Sharing Over The Cloud As Pixels Came Into Existence. The Tampering Has Become Very Easy With The Evolution Of Many Editing Tools. So, Securing The Image Has Become Very Important. In This Paper, We Have Proposed An Improved Pob Number System To Distribute The Image Over The Cloud And Reconstruct The Image Whenever Needed. This Makes The Image More Secure As The Intruder Can't Get Hold Of The Complete Information Of The Picture. This Maintains The Confidentiality Of The Image.***

I. INTRODUCTION:

For a while now, maintaining confidentiality of the image content over the cloud has been a problem since many people can have access to it. So image distribution came into the picture to maintain confidentiality. Over the time many algorithms have been proposed to distribute the image at pixel level, the recent one being POB number system. POB Number system divides the pixel into secret shares and retrieves whenever needed. First Pixel is converted into binary representation which eventually is divided into shares. A 8 bit binary pixel value is converted into 9 bit value by inserting a bit in random in order to represent the number less than 9cr which is explained clearly in the preliminaries. If we insert the bit in random then reconstruction of the image becomes difficult as we need to remove that particular bit. So, in this paper we have proposed a definite pattern to insert and remove the bit while distributing and reconstructing the image respectively.

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POB number system is explained in detail in the preliminaries section followed by the proposed methodology and algorithm discussed in later sections.

II. PRELIMINARIES:

POB Number System:

The System is denoted by POB (n, r) with two non negative integral parameters where n>=r. In this number system 1,2,…..ncr-1 values can be represented using ncr pob number system. The POB number can be obtained as follows where bj is the binary bit at position j.

$$V(B) = \sum_{j=0}^{n-1} b_j \binom{j}{c_j}, \text{where } c_j = \sum_{i=0}^{j} b_i$$

The reason why we use a (9,r) number system is that a pixel values are represented in range of 0-255. Here we divide the pixel into two share values so we should be able to represent the half of the values. And to do that we use (9,r) POB number system as we can represent the values less than or equal to 9cr-1. And in the place of r we use either 4 or 5 since 9c4 and 9c5 gives the same value which is a maximum one. The 8 bit is made into a 9 bit number by inserting a bit following a definite pattern which makes the reconstruction easy.

III. RELATED WORK:

In Literature review we have gone through different papers that proposed POB number system as the optimal algorithm for image distribution. In 2009 Sreekarkumar et al. [1-3]developed POB number system which divides the pixel of an image into shares. These shares will be stored in cloud and retrieved whenever necessary. With time modifications are made to this POB Number system to make it a improved one. The recent one is proposed by Y.Xiang etal. In this paper it is proposed that first pixel is converted into binary equivalent,which then dived into binary values on which pob is applied.

From these papers we can obtain the properties of POB number system as follows:

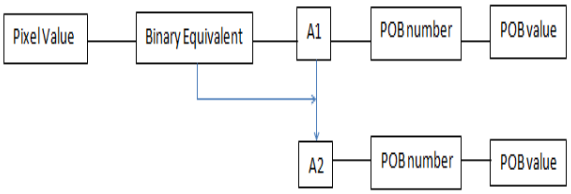
(1) Given two positive integral values n and r such that n≥r, there will be exactlyncr-1 members in the POB(n,r) number system.

(2) For the POB(n,r) number system, the decimal equivalents corresponding to POB values range from 0 toncr-1.

IV. PROPOSED METHODOLOGY:

Distribution and reconstruction of the image over cloud:

- First each pixel is converted into it's equivalent binary number.
- Then the binary number is divided into two parts A1 and A2.
- If uth bit of binary equivalent is 0,then replace uth bit of A1 is 1, otherwise count the no.of 1's from first bit, if it is odd uth bit of A1 is 0 else 1.
- A2 is obtained by performing XOR operation between A1 and the binary equivalent.
- Then a bit has been inserted to make it a (9,r) pob number system.
- Now the 9 bit binary number is converted into POB value



The blue line represents the XOR operation performed between binary equivalent and A1

A.Distribution of Image:

1. With the help of binary equivalent we obtain A1 and A2 values.
2. After obtaining A1 and A2 Values we need to add a bit to make it a nine bit number.
3. First count the no.of 1's.
4. If count=n, then insert the bit in the nth bit of the number.

Example:

1. Let us consider the 8 bit number as 01101101
2. Count the no.of 1's
3. Count becomes 5 as there are 5 no.of 1's.
4. Insert 1 in the 5th bit of the number.
5. .So the number becomes 011011101 which is a 9 bit one.

After making it a 9 bit number we will use the formula of pob number system to obtain the share.

B. Reconstruction of the image:

1. To reconstruct the image we obtain the shares and transform them into corresponding POB number for which an algorithm is already proposed.
2. Now after obtaining the shares we remove a bit from each share to obtain A1 and A2.
3. To remove a bit we count the no.of 1's.
4. If count=n, then remove (n-1)th bit from the obtained A1 and A2 values.
5. Now,XOR the A1 and A2 values to obtain the binary equivalent.
6. Convert binary number into pixel value.

Example:

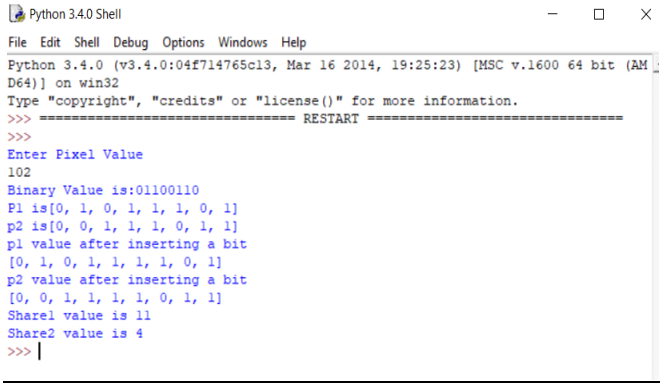
1. Consider 011011101 as the obtained POB number A1.
2. Count the no.of 1's
3. In this case count becomes 6.
4. So remove the 5th bit.
5. Finally the number becomes 01101101.
6. The same procedure has to be followed for A2 also.

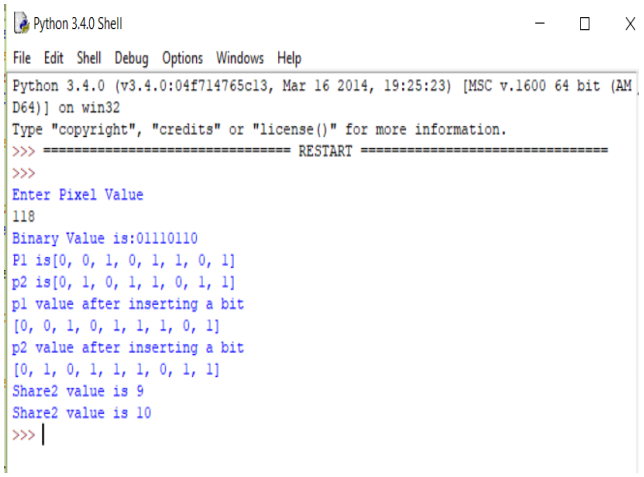
V. ALGORITHM:POBSHARES

Input: Pixel values of Image of size mxn .
Output: POB Share values.

1. Intialize sum=0,count=0.
2. Now take pixel values of image as input.
3. Convert the pixel values into binary values
4. Obtain A1 and A2 values from binary values.
5. Count no.of 1's in A1 and assign the value to count.
6. If count is n then add 1 bit in the nth position.
7. The obtained value is B1
8. Repeat steps 5 and 6 to obtain B2 value.
9. Now Apply POB number system to obtain share values and vice versa.
10. While reconstructing the image remove (n-1)th bit from B1 and B2 values.

VI. RESULTS :





VII. CONCLUSION:

This paper presented the development of the Image distribution system by making modifications while inserting a bit to the POB number system which is already published. It makes the distribution and reconstruction of image easy while making a 8 bit number to nine bit number. The intruder still can make modifications to the divided pixel even he could not get the hold of the whole image.

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