



COMPUTER NETWORKING LAB PROJECT

7,4 Algorithm - Hamming Code



BABAR SANKET -211IT015
JAHEER KHAN - 211IT026
SHUAIB JAWID - 211IT087



INTRODUCTION

In the late 1940's Richard Hamming recognized that the further evolution of computers required greater reliability , in particular the ability to not only detect errors, but correct them . His search for error-correcting codes led to the hamming codes,perfect 1-error correcting codes ,and the extended hamming codes .

1. Hamming code is a technique that is used for error detection and error correction.
2. It only detects single bit error.
3. Parity bits are added in data bits at the place at the 2^n .

Where $n = 0, 1, 2, 3, 4, \dots$

D7	D6	D5	P4	D3	P2	P1
1	0	1	1	0	1	1

IMPLEMENTATION

First we initialize an array to store the data inputted by the client and store the values. (i.e. for (7,4) hamming code we store data at 0,1,2,4 position/index as the 3,5,6 positions are to be occupied by the parity bits (P1,P2 and P4).

- If data is - 1101

INDEX - 0 1 2 3 4 5 6

1	1	0	P4	1	P2	P1
---	---	---	----	---	----	----

D7 D6 D5 D3

1. After that we calculate the even parity bits in the server side by using xor operation on the respective data bits .

`data[6] = data[4]^data[2]^data[0];`

`data[5] = data[4]^data[1]^data[0];`

`data[3] = data[2]^data[1]^data[0];`

2. Then we insert the following values at the respective position (i.e. for (7,4) at the position in the array at 3,5,6).

3. After calculating the values of parity bits and storing their value at their respective indices, the array is sent to server .

1	1	0	0	1	1	0
---	---	---	---	---	---	---

4. Now at the server side

After the data sent by the client is received without any error. The Server reads the data and displays the received data

5. To stimulate error correction-

We take a input - test array with a single bit error

For error correction of the test data-

We use- $p = 4*p_4 + 2*p_2 + p_1;$

Where p_4 , p_2 and p_1 are the evaluated values of parity bits P_4 , P_2 and P_1 respectively.

USES

1. Hamming codes are still widely used in computing , telecommunication ,and other applications.
2. Hamming codes also applied in
 - a). Data compression
 - b). Some solutions to the popular puzzle The Hat Game
 - c). Black Turbo Codes



THANKYOU