

AIM:

program to implement error detection and correction using HAMMING code concepts. Make a test run to input data stream and verify error correction feature.

Error correction at Data Link Layer:

Hamming code is a set of error - correction codes that can be used to detect and correct the errors that can occur when the data is transmitted from the sender to the receiver. It is a technique developed by R.W. Hamming for error correction.

Create sender program with below features

- 1) Input to sender file should be a text of any length. Program should convert the text to binary.
- 2) Apply Hamming code concept on the binary data and add redundant bits to it.
- 3) Save this output in a file called channel

Create a receiver program with below features

- 1) Receiver program should read the input from channel file.
- 2) Apply Hamming code on the binary data to check for errors.
- 3) If there is an error, display the position of the error.
- 4) Else remove the redundant bits and convert the binary data to ASCII and display the output

CODE :

```

def encode(data):
    m = len(data);
    r = 0
    while (2**r) < (m+r+1)
        r += 1
    n = m+r
    code = ['0'] * n
    j = 0
    for i in range(1, n+1):
        if i > (i-1):
            code[-i] = data[-i-1]
            j += 1
    for i in range(r):
        pos = 2**r - (m + (r-i))
        s = 0
        for j in range(1, n+1):
            if j > pos:
                s += int(code[-j])
        code[-pos] = str(s)
    return ''.join(code).

```

def decode(code):

n = len(code)

r = 0

while 2\*\*r < n+1:

r += 1

for i in range(r):

pos = 2\*\*r - (m + (r-i))

s = 0

for j in range(1, n+1)

if j > pos:

$s^i = \text{int}(\text{code}[-i])$

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If  $s^i$ :

-- main --

data = '10011'.

Print ("Data: " + data)

code = encode (data)

Print ("Encoded: " + code)

code = code[:s] + ('1' if code[3] == '0' else '0')

Print ("Received: " + code + code[1:])

If error:

Print ("Error at position: " + err)

code = code[:len(code) - err] + ('1' if code  
[len(code) - err:] == '0' else '0')

= '0' else '0') + code(len(code) - err + 1)

Print ("Corrected: " + code)

else

Print ("No error")

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Output:

Enter Binary data: 011001001110

Encoded : 00110010011111010

No error

decode : 011001001110

Result: Hence the error detection and correction using Hamming code is done successfully.