

Assignment 7

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Problem Statement 1:

Transmit a binary message (from a sender to a receiver) using socket programming in C and report whether the received msg is correct or not; using the following error detection algorithms:

1. Single Parity Check
2. Two-dimensional Parity Check
3. Checksum
4. Cyclic Redundancy Check (CRC)

Solution:

Sample using CRC algorithm.

The screenshot shows a C++ program running in a terminal window, demonstrating a CRC error detection process between a sender and a receiver.

Sender Side (Left Panel):

```

~/D/a/q1 $ ./sender
Choose which algorithm to check:
1. Single Parity Check
2. Two-dimensional Parity Check
3. Checksum
4. Cyclic Redundancy Check (CRC)
4
Enter length of Divisor:
4
Enter Divisor:
1011
Enter Message length:
8
Enter the message to send
11111111
Remainder: 011
Message after CRC: 11111111011
1. Add an error
2. Transmit the message
2
Choose how to add an error
1. Manually add an error
2. Randomly add an error
2
Enter probability of induced error
0.6
Transmitted message: 10111001100
~/D/a/q1 $
  
```

Receiver Side (Right Panel):

```

~/D/a/q1 $ ./recetver
Divisor length recieved: 4
Divisor recieved: 1011
Recieved message: 10111001100
Remainder: 010
Error found
~/D/a/q1 $
  
```

Problem Statement 3 (Center Panel):

Write a C++ program to compress a message (or a code like hexadecimal, etc.) using the following algorithms:

1. Huffman
2. Shannon-Fano

(STL use is allowed and recommended in this question)

Note:

1. No message passing/transmission is required in this case.
2. The student shall present the compressed message along with the code used to compress the message.
3. The program should be user interactive with options to choose from the list which algorithm to use.
4. In this question the code for each symbol of encoded message would be same (provided correct implementation)

Choice of algorithm:

Problem Statement 2:

Transmit a binary message (from a sender to a receiver) using socket programming in C. Using Hamming code detect and correct errors in the transmitted message, if any.

Solution:

Error correction with 11111111

```
I ~/D/a/q2 ./client Thursday 03 October 2019 08:41:27 AM IST
Enter the size of the data word: 8
Enter bits separated by space
1 1 1 1 1 1 1 1
The number of redundancy bits is: 4
The encoded code word is: 1 1 1 1 0 1 1 1 1 1
Enter
1. Manually add errors
2. Add a random error
2
Flipping the 6 bit
1 1 1 1 0 1 0 1 0 1 1 1
Client : Sending the code word
Message from server : Read your message
I ~/D/a/q2

redundant bits 4
M (after encoding): 11000110101
M (transmitted, after adding error):
11001110101

Problem Statement 3:
Compress a message or a code like hexadecimal, etc.) using the following:
1. Huffman 2. Shannon (STL use is allowed and recommended)
Note:
1. No message passing/transmission is required.
2. The student shall present the compressed message as per the used algorithm (if any).
3. The program should be user interactive yet to be used of data compression.
This question the code for each symbol or encoded message would be same (provided correct implementation)

I ~/D/a/q2 ./server Thursday 03 October 2019 08:41:25 AM IST
The message from the client is 111101010111
The size of received encoded message is 12
Number of redundancy bits 4
1 1 1 1 0 1 0 1 0 1 1 1
Redundancy bits: 1 1 0
Assuming single error, the error location is 6
The data word is: 11111111
I ~/D/a/q2
```

Problem Statement 3:

Write a C++ program to compress a message (non-binary, can be anything like a text message or a code like hexadecimal, etc.) using the following data compression algorithm:

1. Huffman
2. Shannon-Fano

Solution:

Using huffman for test text.

```

C:\> -/D/a/q3 -./encoder a.txt
Select Encoding
1. Huffman
2. Shannon-Fano
1
Huffman Codes are :

h:11111
,:111100
v:1110111
m:1110110
g:1111010
9:111010
%:1110011
c:1110010
l:1110000
.:1110001
s:11011
p:01011
I:1111011
w:01010
a:1001
e:011
,:00
n:0100
l:1000
t:101
o:11000
r:11001
f:11010

Original string was :
It is a fact that 99% of the people, when given a pen to test, write their name first.

Encoded string is :
11110111010010001101100100100110101001111001010100101111100110100111010111010110011001100011010001011111101100010110111100001011111000001111100000101011110110100001
111010100011101110110100001001001011011010000101110110111100000101011001100010101100110111101110001100100010011110110011001100110011101111001
01
Encoded message length:340

Decoded string is :
It is a fact that 99% of the people, when given a pen to test, write their name first.


```