22/10/2012

0112541
Programming Languages – I
Assignment - 2
(Due 02/11/2012 – 23:59h)

Q1

Write a C program which implements the RLE (Run Length Encoding) algorithm on a given matrix.

- The program should encode and decode the given matrix.
- The RLE algorithm should run either vertically or horizontally depending on the user input.
- The following inputs should be given by the user.
  - The matrix dimensions
  - The running direction of the RLE algorithm (vertical or horizontal)
- The values stored in the matrix should be randomized (Values could be either 0 or 1)
- The program should first encode the randomized matrix and then decode the compressed array into a new matrix.
- The program should allocate memory dynamically.

Your algorithm should give the outputs specified below:

- The randomized matrix
- The compressed array
- The decoded matrix
- The compression ratio

You should exploit functions while coding your program.

For example, some functions could be

- readInputs()
- randomizeMatrix()

- encodeRLE()
- decodeRLE()
- compressionRatio()

You should also report;

- The details and the goals of the RLE algorithm
- The list of your functions with the parameters.

Run-length Encoding (RLE) Algorithm

Run-length encoding (RLE) is a very simple form of data compression in which runs of data (that is, sequences in which the same data value occurs in many consecutive data elements) are stored as a single data value and count, rather than as the original run. This is most useful on data that contains many such runs: for example, simple graphic images such as icons, line drawings, and animations. It is not useful with files that don't have many runs as it could greatly increase the file size.

Example

1	1	1	1	1
1	1	0	0	0
0	0	1	1	1

Horizontally:

7	1	5	0	3	1

Vertically:

2	1	1	0	2	1	1	0	1	1	1	0	2	1	1	0	2	1	1	0	1	1

The compression ratio (horizontally): 1- (6/15) => 0.6
The compression ratio (vertically): 1-(22/15) => -0.46

Note: Use reasonable variable names.

ATTENTION

Do not forget to read the document “ASSIGNMENT RULES”, located in my website.