Assignment 3

BARCODE

CODEC

1. Background

This is a simplified Barcodes reader task, which is an **individual assignment**.

Barcodes are widely used in product packaging. When shopping, the cashier scans those barcodes of the products you purchase to directly read and input their price to the system (Fig.1). Read more about it here or if keen for exhaustive details here.

Fig.1. Barcodes are commonly used in products to ease retrieving data (e.g., price, URL, expiration, product origin).

2. Simplified System Simulation using Computer Vision

2.1. ENCODER

Step 1: Create an empty canvas of size *400 X 800 (**canvas** width x height).*

Step 2: Define variables and step. Let *Step = 9* pixels (space between bars).

Bar Height: Let the height of the bar be fixed from row 10 to row 350. Let an empty space between words be denoted by a shorter bar from row 150 to row 250.

Bar width: Empty space has a fixed width of 1 pixel. All other **alphabets** (ignore case) will have their corresponding bar width equals to the position of that alphabet+1. For example, character "A" or "a" must have a bar of width 2 pixels and character "S" or "s" must have a bar width of 20 pixels (position 19+1). See Fig.2. and Fig.3 for a visual explanation.

Step 3: loop through the entered string character by character and encode (draw) the barcode according to the specification provided in Step 2.

Step 4: Write the result to the disk as in image (*output.png* format, **avoid JPG/JPEG**).

2.2. DECODER

Step 1: Read the *output.png* image.

Step 2: Scan the image horizontally through the middle line (row 200) and follow the below algorithm to reconstruct the Barcode string (str):

```
Set the string Str = "";

Scan the middle line (i.e., at row 200) and calculate the width (w) of each
bar.

IF w == 1 # is empty space -short bar-
   Append space into the string Str;
Else # is a character
   Match the character corresponding to that width, append the char to the
   string Str.
End IF;
```

3. What to submit to Canvas?

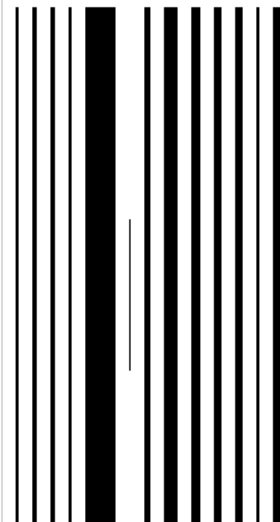Please submit to Canvas the following files:

A) The encoder file -written in Python or MATLAB-

   **encode** ('Abbas Cheddad') //Writes "*Output.png*" image to disk.

B) The decoder file -written in Python or MATLAB-:

        Str = **decode**('Output.png')

// Str must be the same as the one entered, ignore case (no numerical values)

Example (get the image from Canvas – assignment 3 page):

Fig.2. The exact Output.png (400x800 pixels) that encodes the string "*Abbas Cheddad*". **This barcode is provided to you to use it in testing (the string represents my name as shown in Fig. 3).**
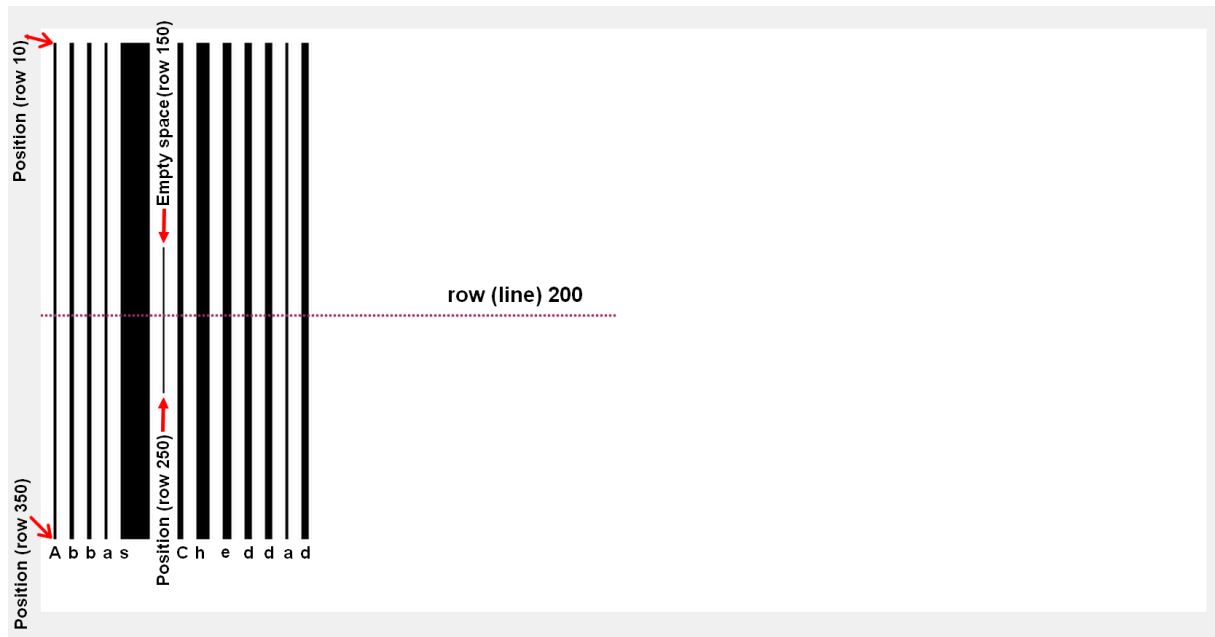
Fig. 3. The output of Fig.2 is explained here (image enlarged to help you understand the details).