DPT MATLAB Structure

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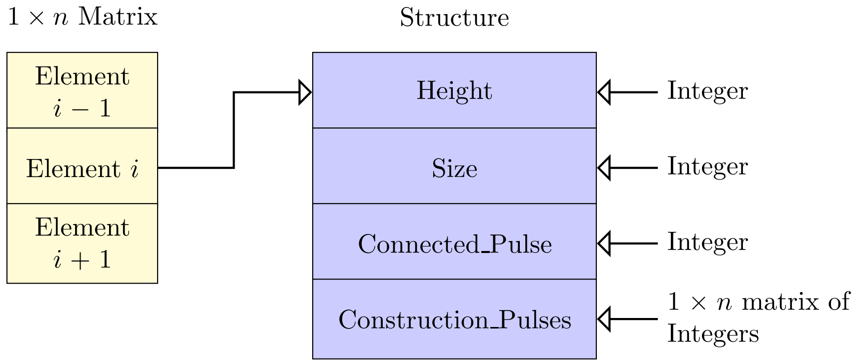
Data Structure



Explanation

The structure is as follow:

- Each entry(i) in the matrix is a struct and represents a pulse.
- All pulses with height 0 is position elements. A position element represents a pixel in the image(x, y) with relation to its index in the matrix, $Matrix(i)$. The relation for an image of size $img_{width} \times img_{height}$ is $x = i\%img_{width}$ and $y = floor(i/img_{width})$.
- This index(i) includes a border row of 0's at the top of the image and a border column of 0's on the right hand of the image. Thus modifying the size of your image to $(img_{width} + 1) \times (img_{height} + 1)$.
- The first $(img_{width} + 1) * (img_{height} + 1)$ elements in the matrix is all position elements.
- **Size** the number of elements that the pulse contain.
- **Height** :)
- **Connected_Pulse** the closest larger pulse which contains "this" pulse. Specified on the index of the matrix, $Matrix(i)$.
- **Construction_Pulses** The pulses who's union forms "this" pulse. Specified on the index of the matrix, $Matrix(i)$.

Example 1

We want to determine what pulses is at position $(10, 10)$ in an image of size 100×100.

1. Remember the added border nodes, thus a 101×101 images is used. And our new co-ordinates is $(10, 11)$.
2. In the matrix we start index $i_{old} = 101 * 11 + 10 = 1121$.
3. A pulse at position $(10, 10)$ is then the pulse at index i_{new} such that $i_{new} = Matrix(i_{old}).Connected\_Pulse$. To find all the pulses this process is repeated until $Matrix(i_{old}).Connected\_Pulse = 0$.

Example 2

We have a look in our Matrix and see a pulse of size 50 at $i_{old} = 10400$. We want to know where in our 100×100 image is the pulse located.

1. Remember the added border nodes, thus a 101×101 images is used.
2. We will now follow a path until we find a position element. Each element has a matrix of Construction_Pulses which will be used to create the path. The first step, go to a new entry $i_{new} = Matrix(i_{old}).Construction\_Pulses(k)$ where k is an element in the matrix of Construction_Pulses. Continue to go to a new entry until a position element is encountered.
3. Find all possible paths and record all position elements at the end of these paths.
4. All position elements can then be transformed into the (x, y) co-ordinate system of the image by using $x = i\%img_{width}$ and $y = floor(i/img_{width})$.