# Processing Edges in Horizontal Direction:

In this Step pixels in the image are processed in rows column by column. So each column has a **_sum value_** which is actually the sum of differences in each neighboring pixels of rows(Neighbors by **Rows** ~~not by Column~~ )

Let us Consider a Image 'I' (Data Form) :

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 2 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 3 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 4 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 5 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 6 | 0 | 0 | 0 | 168 | 168 | 168 | 168 | 168 | 133 | 0 |
| 7 | 0 | 0 | 0 | 133 | 88 | 133 | 133 | 133 | 255 | 255 |
| 8 | 0 | 0 | 0 | 168 | 88 | 133 | 133 | 133 | 255 | 255 |
| 9 | 0 | 0 | 0 | 133 | 133 | 133 | 133 | 133 | 255 | 255 |
| 10 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |

Pictorial View of the data shown above :
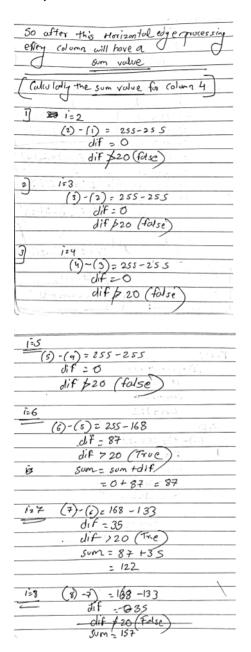


Processing Method:

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 2 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 3 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 4 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 5 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |
| 6 | 0 | 0 | 0 | 168 | 168 | 168 | 168 | 168 | 133 | 0 |
| 7 | 0 | 0 | 0 | 133 | 88 | 133 | 133 | 133 | 255 | 255 |
| 8 | 0 | 0 | 0 | 168 | 88 | 133 | 133 | 133 | 255 | 255 |
| 9 | 0 | 0 | 0 | 133 | 133 | 133 | 133 | 133 | 255 | 255 |
| 10 | 0 | 0 | 0 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |

Consider the 4th (Marked by Red) in the above Image Data :

**Algorithm:**

| | |
|---|---|
| max_horz = 0;<br>maximum = 0; | // Initialize the Variables required to find out peak values to 0 |
| **for i = 2:cols**<br>  sum = 0; | //As the Processing is done **Column by Column** the Outer loop **starts from 2** and **end at cols**<br>//The Sum value is Initialize to **0** |
|   **for j = 2:rows** | //As the **Pixels in the image are** **processed in rows** Column by Column therefore the Inner loop **starts from 2** and **end at rows** |
|     if(I(j, i) > I(j-1, i))<br>      difference = uint32(I(j, i) - I(j-1, i));<br>    else<br>      difference = uint32(I(j-1, i) - I(j, i));<br>    end | //This if statement compare the current pixel(according to the loop) with its preceding pixel(by row).<br>    1. **If the current pixel is bigger  (difference = current pixel - preceding pixel)**<br>    2. **If the current pixel is smaller (difference = preceding pixel-current pixel)** |
|     if(difference > 20)<br>      sum = sum + difference;<br>    end | //If Difference is **greater than 20** than it is added to the sum |
|   **end** | //Inner loop ends |
|   horz1(i) = sum; | //The sum value  for every column is than store in **horz1(column_no)** |
|   if(sum > maximum)<br>    max_horz = i;<br>    maximum = sum;<br>  end | //Sum value for every column is compared to **maximum(variable which stores the maximum sum value among every column).** If it is greater than<br>    1. max_horz = column_no<br>    2. Maximum =sum value |

| | |
|---|---|
| total_sum = total_sum + sum; | //Total sum calculates the **sum of all sum value of every column** in the image |
| end | //Outer loop ends |

**Examples :**

So after this Horizontal edge processing every column will have a sum value

Calculating the sum value for column 4

1] i=2

$(2) - (1) = 255 - 255$
dif = 0
dif $\not>$ 20 (false)

2] i=3

$(3) - (2) = 255 - 255$
dif = 0
dif $\not>$ 20 (false)

3] i=4

$(4) - (3) = 255 - 255$
dif = 0
dif $\not>$ 20 (false)

i=5

$(5) - (4) = 255 - 255$
dif = 0
dif $\not>$ 20 (false)

i=6

$(6) - (5) = 255 - 168$
dif = 87
dif > 20 (True)
sum = sum + dif
$= 0 + 87 = 87$

i=7   $(7) - (6) = 168 - 133$
dif = 35
dif > 20 (True)
sum = 87 + 35
$= 122$

i=8   $(8) - (7) = 168 - 133$
dif = 035
dif $\not>$ 20 (False)
sum = 157

If i=9

$$68$$

$(9) - (8) = 188 - 133$

dif = 035 ~~dif = 35 (false)~~

~~sum = 122~~

sum = 192

i=10

$(10) - (9) = 255 - 133$

dif = 122

sum = 192 + 122

= 314

Sum value for column
no 5