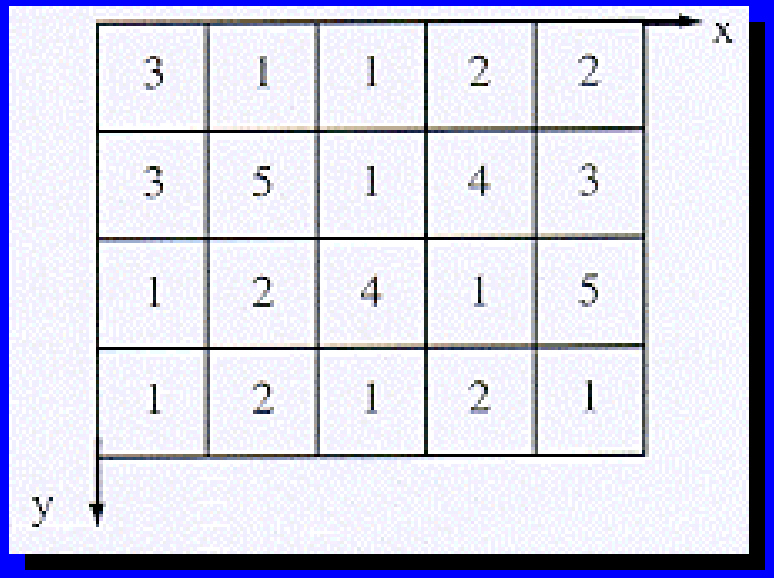
Question

Given the 4x5 pixels image below,



Question

Use dynamic programming to derive the optimum continuous line P with the following criteria:

-P is a raw vector composed of 5 pixels

-P minimizes the function below:

$$f(P) = -\sum_{x=1}^{5}(C_{grad}(p_x) + C_{int}(p_x)) + \sum_{x=2}^{5} C_{cont}(p_x, p_{x-1})$$

$$(p_1 \ldots, p_5 \in P)$$

Question

where:

C_{grad} is computed using operator $\begin{bmatrix} 1 \\ \boxed{0} \\ -1 \end{bmatrix}$

C_{int} is computed using operator $\begin{bmatrix} 1 \\ \boxed{1} \end{bmatrix}$

C_{cont} is computed using $(\Delta y)^2$, where Δy is the difference of y coordinates of two adjacent pixels on the line

Question

Tip: for the computation of C_{grad} and C_{int}, at border pixels, add extra rows [3 1 1 2 2] and [1 2 1 2 1] on top and bottom of the image, respectively