

Q1)a) Consider the following 5\*5 image (I(x, y)). Apply the 3\*3 mask (created using first derivative of Guassian) and compute fx, fy, M and theta. (Hint: M = sqrt(fx\*fx + fy\*fy))

220	230	180	154	157
255	200	100	250	200
125	140	145	77	78
130	177	160	190	105
255	250	100	150	130

Hint for calculating fx and fy:

$$f_x(x, y) = f(x, y) * \left( \frac{-x}{\sigma^2} \right) e^{\frac{-(x^2+y^2)}{2\sigma^2}}$$

$$f_y(x, y) = f(x, y) * \left( \frac{-y}{\sigma^2} \right) e^{\frac{-(x^2+y^2)}{2\sigma^2}}$$

Masks are created using the following:

$$\left( \frac{-x}{\sigma^2} \right) e^{\frac{-(x^2+y^2)}{2\sigma^2}}$$

$$\left( \frac{-y}{\sigma^2} \right) e^{\frac{-(x^2+y^2)}{2\sigma^2}}$$

3*3 mask for creating fx	3*3 mask for creating fy
fx	fy

M	theta

b) Apply Non Maxima Suppression to M (calculated in part a) and generate a new matrix 'M1'.

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