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14.2.8 Comparing the first derivatives

Figure 14.12 Shows the two first-order partial derivatives and and the gradient. If we compare the two partial derivatives we se that the x-derivative Seems to emphasise vertical edges while the y derivative Seems the emphasise horizontal edges. This is precisely what we must expect. The x derivative is large when the difference beetween neighbours Pixels in the x-direction is large, whic is the case a cross a vertical edge. The y-derivative enchaenes horizontal edges for a

14.2.9 Second-order derivatives

To compute the three second order derivatives we apply the corresponding computational molecules which we described in section 13.2

Observation 14.15 (Second order derivatives of an image). The Second order derivatives of an image P can be computed by apliying the computational molecubs

$$\frac{\partial^2 P}{\partial x^2} : \begin{pmatrix} 0 & 0 & 0 \\ -1 & 2 & -1 \\ 0 & 0 & 0 \end{pmatrix},$$

$$\frac{\partial^2 P}{\partial y \partial x} : \frac{1}{4}\begin{pmatrix} -1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & -1 \end{pmatrix},$$

$$\frac{\partial^2 P}{\partial y^2} : \begin{pmatrix} 0 & 1 & 2 \\ 0 & 2 & 0 \\ 0 & -1 & 0 \end{pmatrix}$$