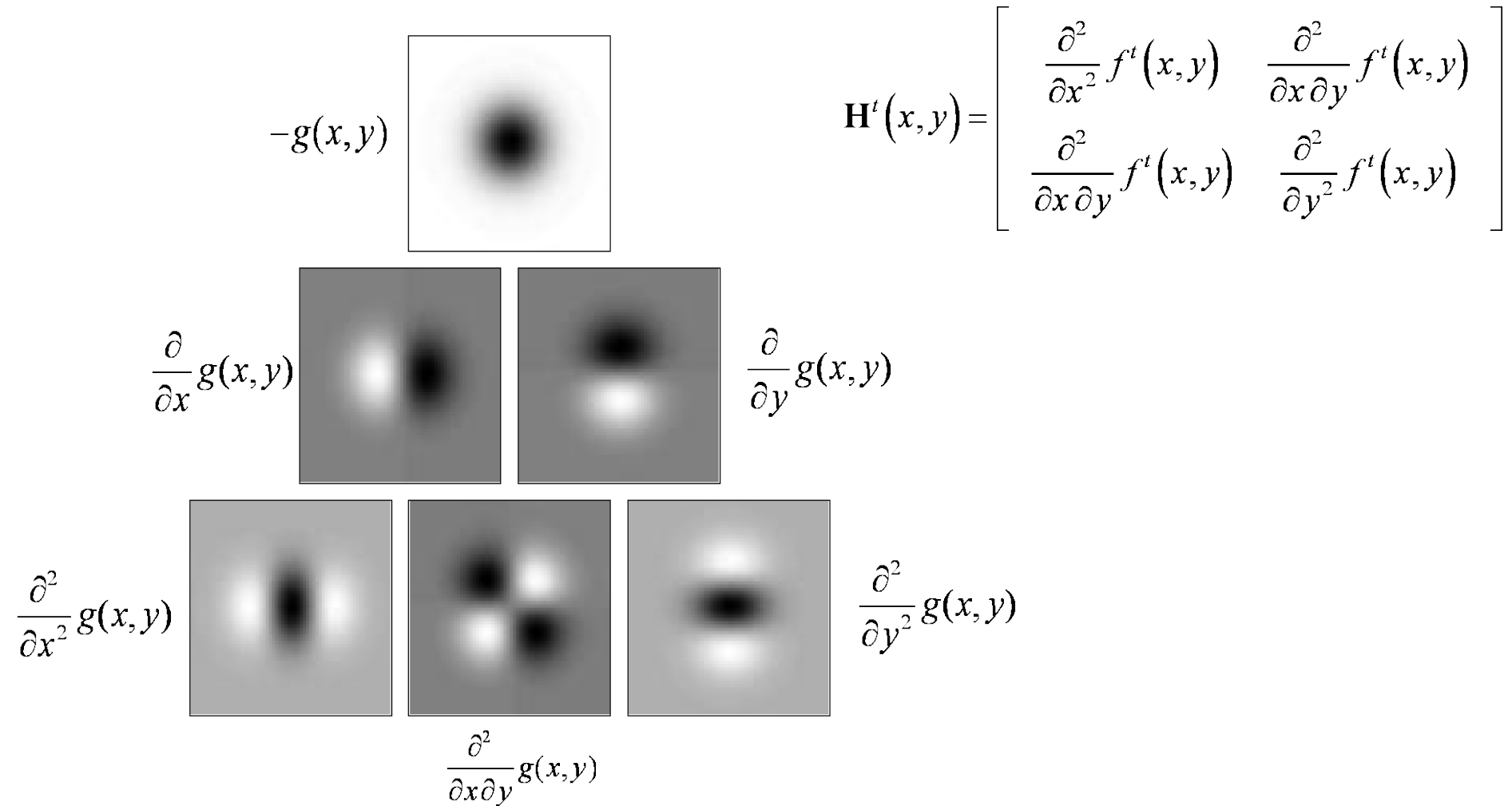
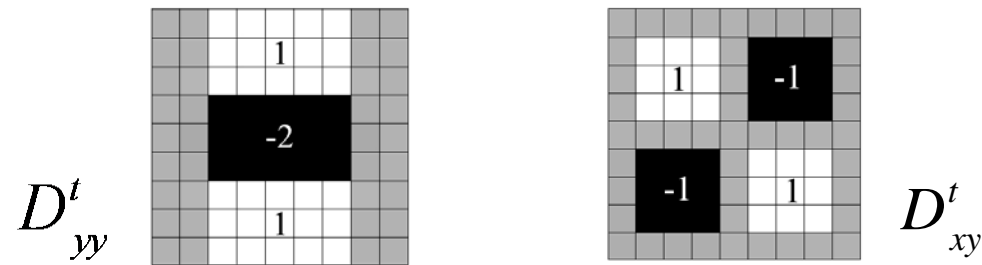


# Hessian keypoints in scale space



# SURF keypoint detection

- SURF – Speeded Up Robust Features [*Bay, Tuytelaars, Van Gool, ECCV 2006*]
- No subsampling – all resolution levels at full spatial resolution
- Simple approximation of scale space Gaussian derivatives using integral images



- Determinant of Hessian

$$\det(\mathbf{H}^t) \approx D^t_{xx} D^t_{yy} - \left(0.9 D^t_{xy}\right)^2$$

- Non-maximum suppression in 3x3x3  $[x, y, t]$  neighborhood
- Interpolation of maximum of  $\det(\mathbf{H})$  in image space  $x, y$  and scale  $t$

# SURF keypoints



# SIFT keypoints



# SURF keypoints



# SIFT keypoints

