

COMP 9517 Computer Vision

Feature Description

Image Representation

- Histogram: probability or count of data in each bin

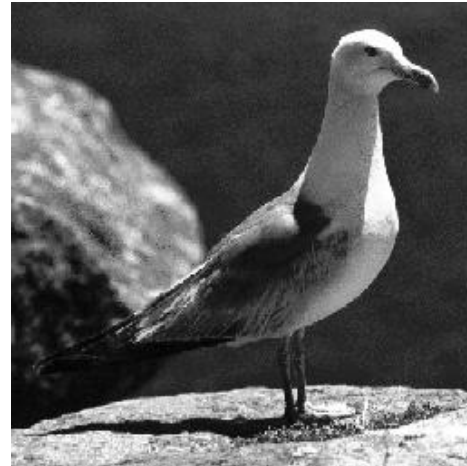
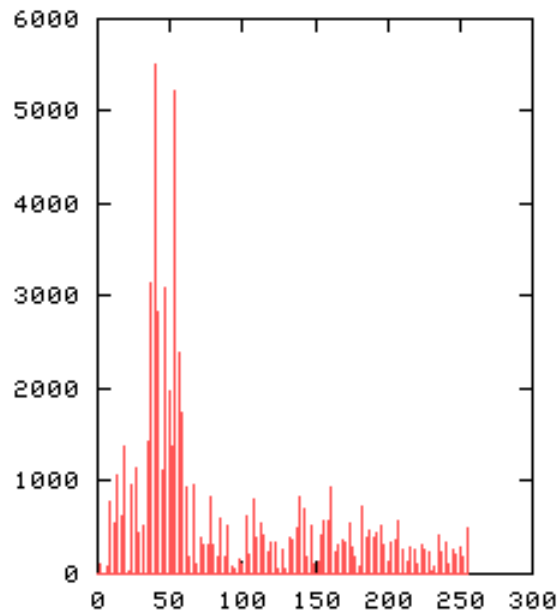


Image Representation

- Histogram of oriented gradients

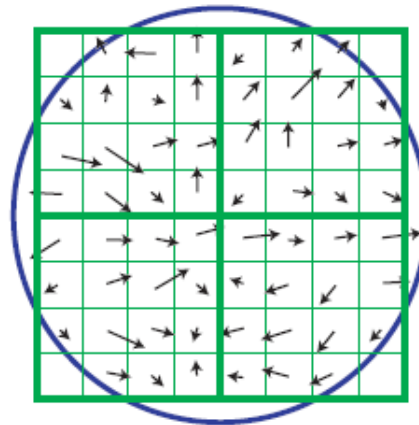
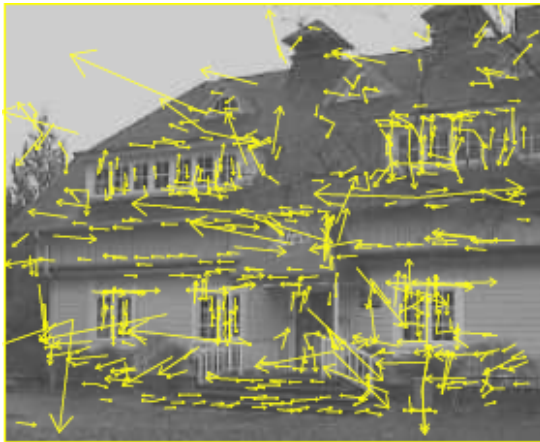
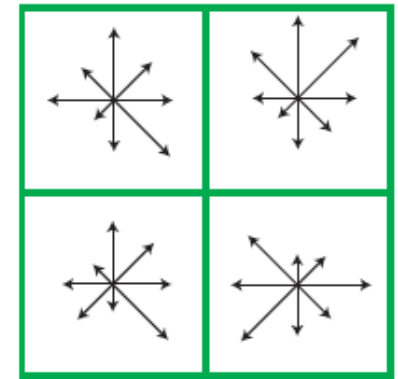


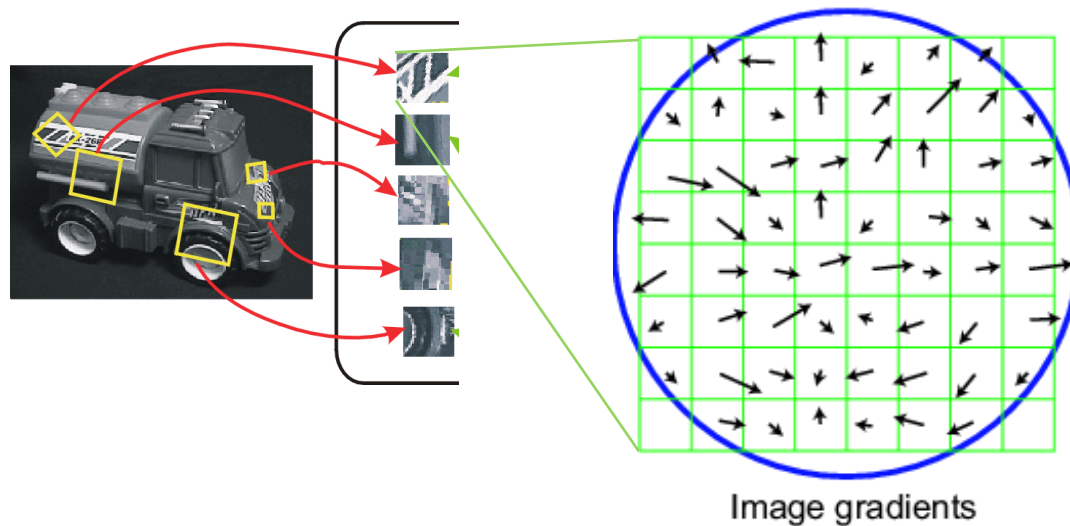
Image gradients



Keypoint descriptor

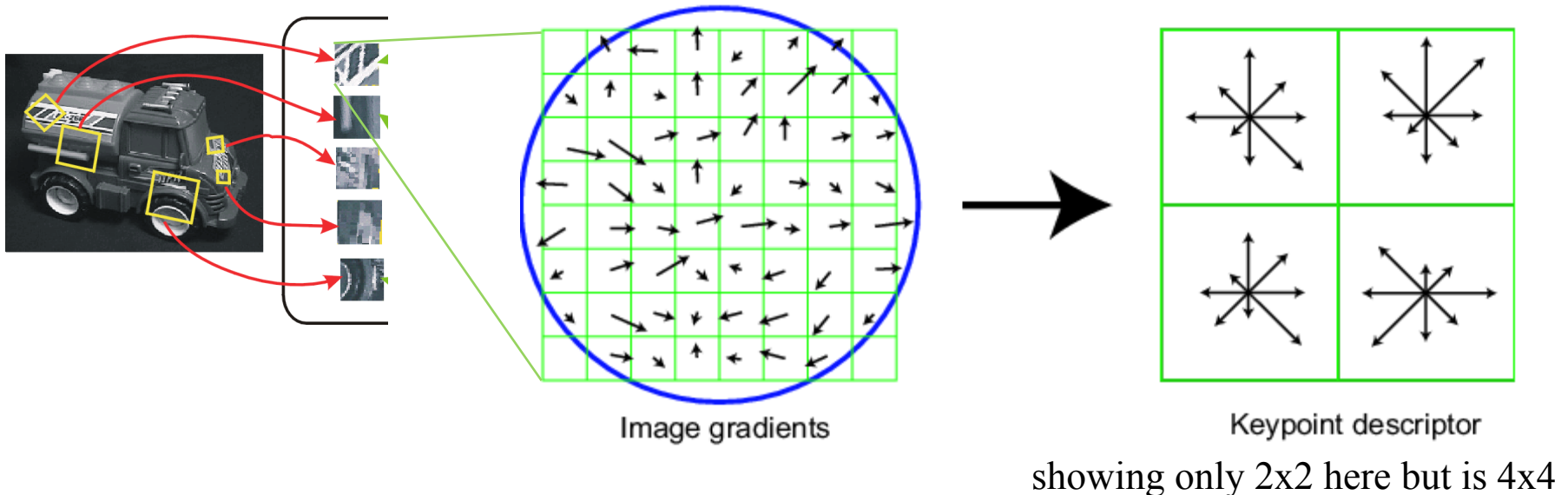
SIFT Vector

- Computed on rotated and scaled version of window according to computed orientation & scale
- Based on gradients weighted by a Gaussian of variance half the window



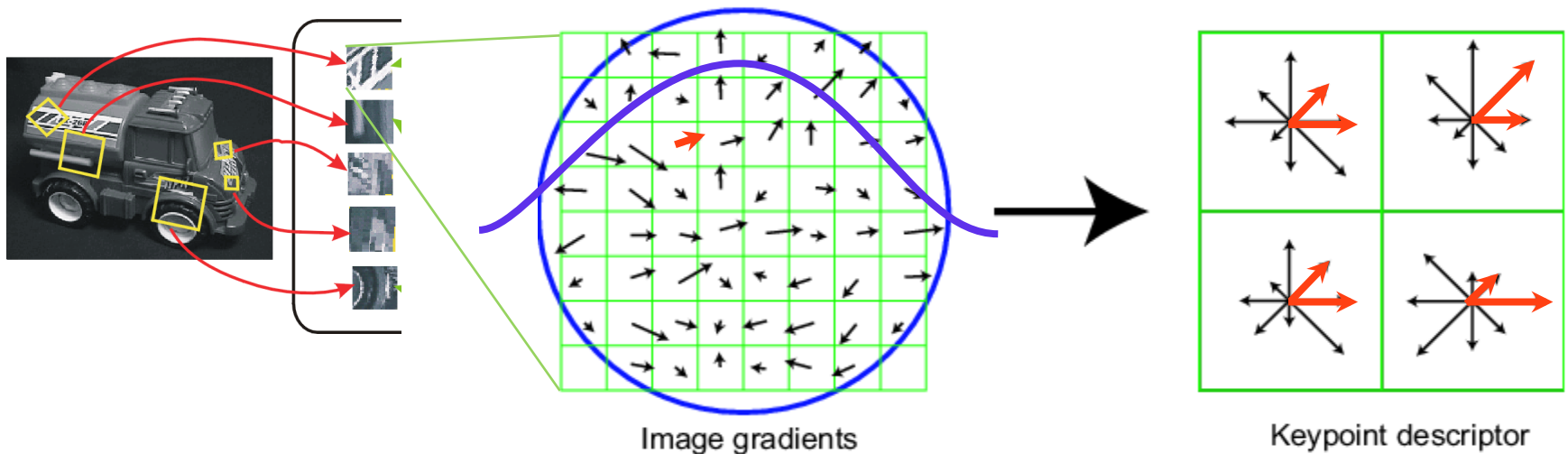
SIFT Vector

- 4x4 array of gradient orientation histogram weighted by magnitude
- 8 orientations x 4x4 array = 128 dimensions



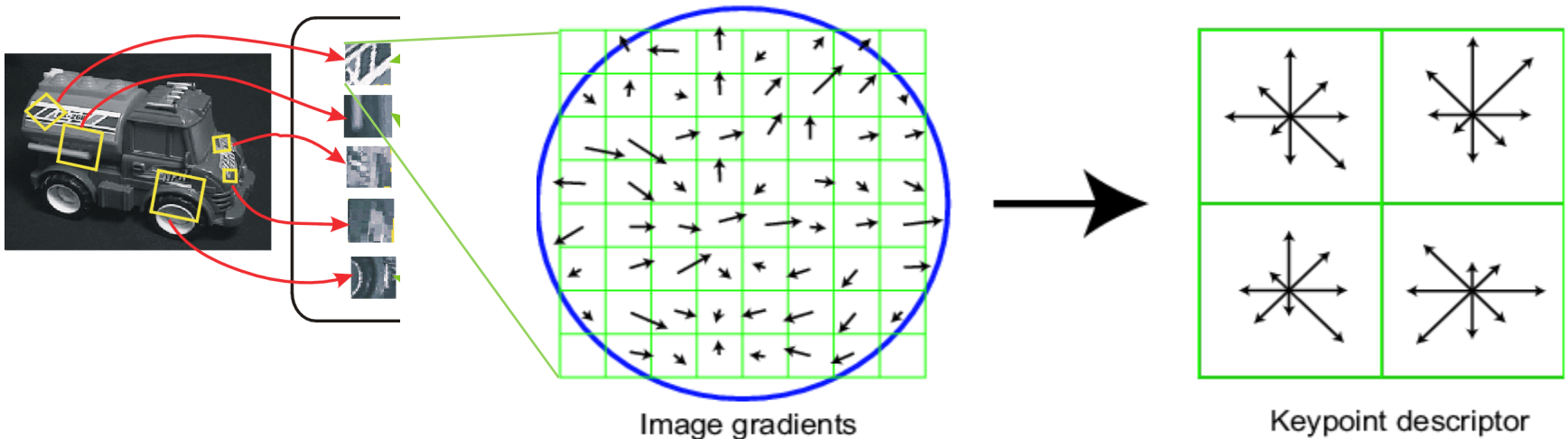
SIFT Vector

- Gaussian weighted
- Trilinear interpolation
 - a given gradient contributes to 8 bins: 4 in space x 2 in orientation



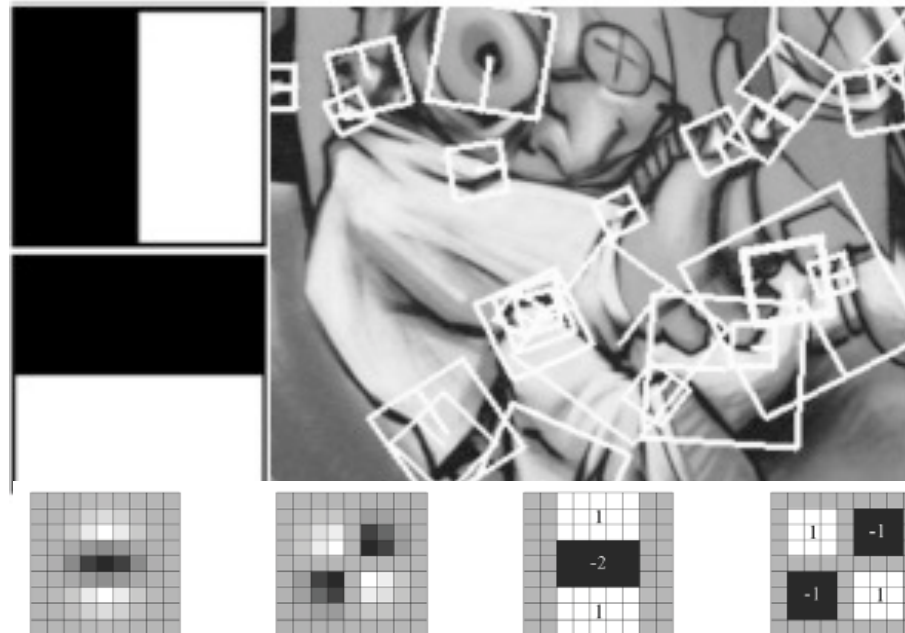
SIFT Vector

- 128-dim vector normalised to 1
- Threshold gradient magnitudes to avoid excessive influence of high gradients
 - after normalisation, clamp gradients >0.2
 - renormalise



SURF Descriptors

- Fast approximation of SIFT: efficient computation by 2D box filters and integral images
 - 6 times faster than SIFT
 - Equivalent quality for object identification



Local Descriptors

- Most features can be thought of as templates, histogram (counts), or combinations
- What are idea descriptors
 - Robust
 - Distinctive
 - Compact
 - Efficient

References and Acknowledgements

- Szeliski, Chapter 4
- Some content are extracted from the above resource and James Hays slides