Algorithm Cheat Sheet

Canny Edge Detection

1. Gaussian smoothing
2. Gradient calculation (Sobel)
3. Non-maxima suppression
4. Double thresholding
5. Edge tracking by hysteresis

Harris Corner Detection

1. Compute image gradients (I_x, I_y)
2. Compute products (I_x^2, I_y^2, $I_x I_y$)
3. Apply Gaussian weighting
4. Compute $R = \det(M) - k \cdot (\text{trace}(M))^2$
5. Threshold and NMS

Hough Transform

1. Edge detection
2. For each edge pixel (x,y):
   - For θ = 0° to 180°:
     - $\rho = x \cdot \cos(\theta) + y \cdot \sin(\theta)$
     - Vote in accumulator[ρ,θ]

3. Find peaks in accumulator
4. Extract lines from peaks

RANSAC

1. Randomly sample minimum points
2. Fit model to sample
3. Count inliers (dist < threshold)
4. If inliers > best: save model
5. Repeat k times
6. Return best model

Non-Maxima Suppression

1. For each pixel with gradient M, θ:
2. Interpolate neighbors along θ
3. If M > both neighbors: keep
4. Else: suppress (set to 0)

SIFT (High-Level)

1. Scale-space extrema detection (DoG)
2. Keypoint localization & refinement
3. Orientation assignment
4. Descriptor generation (128D)

Gaussian Pyramid

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For each level k:
  1. Smooth with Gaussian
  2. Downsample by 2
  Size_k = Size_0 / 2^k
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Laplacian Pyramid

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For each level k:
  L_k = G_k - expand(G_{k+1})
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