

CS354

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A Brief History of Object Recognition/Detection

- Color indexing:
 - Swain, Michael J., and Dana H. Ballard. "Color indexing." *International journal of computer vision* 7.1 (1991): 11-32.
- Keypoint Feature Detection and Matching. E.g.:
 - Lowe, David G. "Distinctive image features from scale-invariant keypoints." *International journal of computer vision* 60.2 (2004): 91-110.
- Convolutional Neural Networks (ConvNets) Review:
 - LeCun, Yann, Yoshua Bengio, and Geoffrey Hinton. "Deep learning." *Nature* 521.7553 (2015): 436-444.

Feature Based Object Recognition

- Basic Steps:
 - Detect Keypoints
 - Calculate feature vectors
 - Look for matching features
 - Infer object location and pose from matches (generally not 3d)

SIFT Based Object Detection

- Scale-invariant feature transform (SIFT)
- Detect Keypoints
 - Look for peaks in the difference of gaussian at multiple scales.
 - [Gaussian Pyramids Tutorial](#)
 - [SIFT Tutorial](#)
- Assign an orientation
 - Use a histogram of image gradients...
- Calculate feature vectors/descriptors
 - [Distinctive Image Features from Scale-Invariant Keypoints](#), David Lowe, 2004.