

A curated list of awesome computer vision resources

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...



jbhuan0604 ...

on 29 Sep 2021 🕒

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# Awesome Computer Vision:

A curated list of awesome computer vision resources, inspired by [awesome-php](#).

For a list people in computer vision listed with their academic genealogy, please visit [here](#)

## Contributing

Please feel free to send me [pull requests](#) or email ([jbhuan@vt.edu](mailto:jbhuan@vt.edu)) to add links.

## Table of Contents

- [Awesome Lists](#)
- [Books](#)
- [Courses](#)
- [Papers](#)
- [Software](#)
- [Datasets](#)
- [Pre-trained Computer Vision Models](#)
- [Tutorials and Talks](#)
- [Resources for students](#)

- [Blogs](#)
- [Links](#)
- [Songs](#)

## Awesome Lists

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- [Awesome Machine Learning](#)
- [Awesome Deep Vision](#)
- [Awesome Domain Adaptation](#)
- [Awesome Object Detection](#)
- [Awesome 3D Machine Learning](#)
- [Awesome Action Recognition](#)
- [Awesome Scene Understanding](#)
- [Awesome Adversarial Machine Learning](#)
- [Awesome Adversarial Deep Learning](#)
- [Awesome Face](#)
- [Awesome Face Recognition](#)
- [Awesome Human Pose Estimation](#)
- [Awesome medical imaging](#)
- [Awesome Images](#)
- [Awesome Graphics](#)
- [Awesome Neural Radiance Fields](#)
- [Awesome Implicit Neural Representations](#)
- [Awesome Neural Rendering](#)
- [Awesome Public Datasets](#)
- [Awesome Dataset Tools](#)
- [Awesome Robotics Datasets](#)
- [Awesome Mobile Machine Learning](#)
- [Awesome Explainable AI](#)
- [Awesome Fairness in AI](#)
- [Awesome Machine Learning Interpretability](#)
- [Awesome Production Machine Learning](#)
- [Awesome Video Text Retrieval](#)
- [Awesome Image-to-Image Translation](#)
- [Awesome Image Inpainting](#)
- [Awesome Deep HDR](#)
- [Awesome Video Generation](#)

- [Awesome GAN applications](#)
- [Awesome Generative Modeling](#)
- [Awesome Image Classification](#)
- [Awesome Deep Learning](#)
- [Awesome Machine Learning in Biomedical\(Healthcare\) Imaging](#)
- [Awesome Deep Learning for Tracking and Detection](#)
- [Awesome Human Pose Estimation](#)
- [Awesome Deep Learning for Video Analysis](#)
- [Awesome Vision + Language](#)
- [Awesome Robotics](#)
- [Awesome Visual Transformer](#)
- [Awesome Embodied Vision](#)
- [Awesome Anomaly Detection](#)
- [Awesome Makeup Transfer](#)
- [Awesome Learning with Label Noise](#)

## README.md

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- [Awesome Deep Learning](#)
- [Awesome Image Distortion Correction](#)
- [Awesome Neuron Segmentation in EM Images](#)
- [Awesome Delineation](#)
- [Awesome ImageHarmonization](#)
- [Awesome GAN Training](#)
- [Awesome Document Understanding](#)

## Books

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### Computer Vision

- [Computer Vision: Models, Learning, and Inference](#) - Simon J. D. Prince 2012
- [Computer Vision: Theory and Application](#) - Rick Szeliski 2010
- [Computer Vision: A Modern Approach \(2nd edition\)](#) - David Forsyth and Jean Ponce 2011
- [Multiple View Geometry in Computer Vision](#) - Richard Hartley and Andrew Zisserman 2004
- [Computer Vision](#) - Linda G. Shapiro 2001
- [Vision Science: Photons to Phenomenology](#) - Stephen E. Palmer 1999
- [Visual Object Recognition synthesis lecture](#) - Kristen Grauman and Bastian Leibe 2011
- [Computer Vision for Visual Effects](#) - Richard J. Radke, 2012

- [High dynamic range imaging: acquisition, display, and image-based lighting](#) - Reinhard, E., Heidrich, W., Debevec, P., Pattanaik, S., Ward, G., Myszkowski, K 2010
- [Numerical Algorithms: Methods for Computer Vision, Machine Learning, and Graphics](#) - Justin Solomon 2015
- [Image Processing and Analysis](#) - Stan Birchfield 2018
- [Computer Vision, From 3D Reconstruction to Recognition](#) - Silvio Savarese 2018

## OpenCV Programming

- [Learning OpenCV: Computer Vision with the OpenCV Library](#) - Gary Bradski and Adrian Kaehler
- [Practical Python and OpenCV](#) - Adrian Rosebrock
- [OpenCV Essentials](#) - Oscar Deniz Suarez, M<sup>a</sup> del Milagro Fernandez Carrobles, Noelia Vallez Enano, Gloria Bueno Garcia, Ismael Serrano Gracia

## Machine Learning

- [Pattern Recognition and Machine Learning](#) - Christopher M. Bishop 2007
- [Neural Networks for Pattern Recognition](#) - Christopher M. Bishop 1995
- [Probabilistic Graphical Models: Principles and Techniques](#) - Daphne Koller and Nir Friedman 2009
- [Pattern Classification](#) - Peter E. Hart, David G. Stork, and Richard O. Duda 2000
- [Machine Learning](#) - Tom M. Mitchell 1997
- [Gaussian processes for machine learning](#) - Carl Edward Rasmussen and Christopher K. I. Williams 2005
- [Learning From Data](#)- Yaser S. Abu-Mostafa, Malik Magdon-Ismail and Hsuan-Tien Lin 2012
- [Neural Networks and Deep Learning](#) - Michael Nielsen 2014
- [Bayesian Reasoning and Machine Learning](#) - David Barber, Cambridge University Press, 2012

## Fundamentals

- [Linear Algebra and Its Applications](#) - Gilbert Strang 1995

## Courses

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### Computer Vision

- [EENG 512 / CSCI 512 - Computer Vision](#) - William Hoff (Colorado School of Mines)
- [Visual Object and Activity Recognition](#) - Alexei A. Efros and Trevor Darrell (UC Berkeley)

- [Computer Vision](#) - Steve Seitz (University of Washington)
- Visual Recognition [Spring 2016](#), [Fall 2016](#) - Kristen Grauman (UT Austin)
- [Language and Vision](#) - Tamara Berg (UNC Chapel Hill)
- [Convolutional Neural Networks for Visual Recognition](#) - Fei-Fei Li and Andrej Karpathy (Stanford University)
- [Computer Vision](#) - Rob Fergus (NYU)
- [Computer Vision](#) - Derek Hoiem (UIUC)
- [Computer Vision: Foundations and Applications](#) - Kalanit Grill-Spector and Fei-Fei Li (Stanford University)
- [High-Level Vision: Behaviors, Neurons and Computational Models](#) - Fei-Fei Li (Stanford University)
- [Advances in Computer Vision](#) - Antonio Torralba and Bill Freeman (MIT)
- [Computer Vision](#) - Bastian Leibe (RWTH Aachen University)
- [Computer Vision 2](#) - Bastian Leibe (RWTH Aachen University)
- [Computer Vision](#) Pascal Fua (EPFL):
- [Computer Vision 1](#) Carsten Rother (TU Dresden):
- [Computer Vision 2](#) Carsten Rother (TU Dresden):
- [Multiple View Geometry](#) Daniel Cremers (TU Munich):

## **Computational Photography**

- [Image Manipulation and Computational Photography](#) - Alexei A. Efros (UC Berkeley)
- [Computational Photography](#) - Alexei A. Efros (CMU)
- [Computational Photography](#) - Derek Hoiem (UIUC)
- [Computational Photography](#) - James Hays (Brown University)
- [Digital & Computational Photography](#) - Fredo Durand (MIT)
- [Computational Camera and Photography](#) - Ramesh Raskar (MIT Media Lab)
- [Computational Photography](#) - Irfan Essa (Georgia Tech)
- [Courses in Graphics](#) - Stanford University
- [Computational Photography](#) - Rob Fergus (NYU)
- [Introduction to Visual Computing](#) - Kyros Kutulakos (University of Toronto)
- [Computational Photography](#) - Kyros Kutulakos (University of Toronto)
- [Computer Vision for Visual Effects](#) - Rich Radke (Rensselaer Polytechnic Institute)
- [Introduction to Image Processing](#) - Rich Radke (Rensselaer Polytechnic Institute)

## **Machine Learning and Statistical Learning**

- [Machine Learning](#) - Andrew Ng (Stanford University)
- [Learning from Data](#) - Yaser S. Abu-Mostafa (Caltech)

- [Statistical Learning](#) - Trevor Hastie and Rob Tibshirani (Stanford University)
- [Statistical Learning Theory and Applications](#) - Tomaso Poggio, Lorenzo Rosasco, Carlo Ciliberto, Charlie Frogner, Georgios Evangelopoulos, Ben Deen (MIT)
- [Statistical Learning](#) - Genevera Allen (Rice University)
- [Practical Machine Learning](#) - Michael Jordan (UC Berkeley)
- [Course on Information Theory, Pattern Recognition, and Neural Networks](#) - David MacKay (University of Cambridge)
- [Methods for Applied Statistics: Unsupervised Learning](#) - Lester Mackey (Stanford)
- [Machine Learning](#) - Andrew Zisserman (University of Oxford)
- [Intro to Machine Learning](#) - Sebastian Thrun (Stanford University)
- [Machine Learning](#) - Charles Isbell, Michael Littman (Georgia Tech)
- [\(Convolutional\) Neural Networks for Visual Recognition](#) - Fei-Fei Li, Andrej Karpathy, Justin Johnson (Stanford University)
- [Machine Learning for Computer Vision](#) - Rudolph Triebel (TU Munich)

## Optimization

- [Convex Optimization I](#) - Stephen Boyd (Stanford University)
- [Convex Optimization II](#) - Stephen Boyd (Stanford University)
- [Convex Optimization](#) - Stephen Boyd (Stanford University)
- [Optimization at MIT](#) - (MIT)
- [Convex Optimization](#) - Ryan Tibshirani (CMU)

## Papers

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### Conference papers on the web

- [CVPapers](#) - Computer vision papers on the web
- [SIGGRAPH Paper on the web](#) - Graphics papers on the web
- [NIPS Proceedings](#) - NIPS papers on the web
- [Computer Vision Foundation open access](#)
- [Annotated Computer Vision Bibliography](#) - Keith Price (USC)
- [Calendar of Computer Image Analysis, Computer Vision Conferences](#) - (USC)

### Survey Papers

- [Visionbib Survey Paper List](#)
- [Foundations and Trends® in Computer Graphics and Vision](#)
- [Computer Vision: A Reference Guide](#)

# Pre-trained Computer Vision Models

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- [List of Computer Vision models](#) These models are trained on custom objects

## Tutorials and talks

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### Computer Vision

- [Computer Vision Talks](#) - Lectures, keynotes, panel discussions on computer vision
- [The Three R's of Computer Vision](#) - Jitendra Malik (UC Berkeley) 2013
- [Applications to Machine Vision](#) - Andrew Blake (Microsoft Research) 2008
- [The Future of Image Search](#) - Jitendra Malik (UC Berkeley) 2008
- [Should I do a PhD in Computer Vision?](#) - Fatih Porikli (Australian National University)
- [Graduate Summer School 2013: Computer Vision](#) - IPAM, 2013

### Recent Conference Talks

- [CVPR 2015](#) - Jun 2015
- [ECCV 2014](#) - Sep 2014
- [CVPR 2014](#) - Jun 2014
- [ICCV 2013](#) - Dec 2013
- [ICML 2013](#) - Jul 2013
- [CVPR 2013](#) - Jun 2013
- [ECCV 2012](#) - Oct 2012
- [ICML 2012](#) - Jun 2012
- [CVPR 2012](#) - Jun 2012

### 3D Computer Vision

- [3D Computer Vision: Past, Present, and Future](#) - Steve Seitz (University of Washington) 2011
- [Reconstructing the World from Photos on the Internet](#) - Steve Seitz (University of Washington) 2013

### Internet Vision

- [The Distributed Camera](#) - Noah Snavely (Cornell University) 2011
- [Planet-Scale Visual Understanding](#) - Noah Snavely (Cornell University) 2014
- [A Trillion Photos](#) - Steve Seitz (University of Washington) 2013

### Computational Photography

- [Reflections on Image-Based Modeling and Rendering](#) - Richard Szeliski (Microsoft Research) 2013
- [Photographing Events over Time](#) - William T. Freeman (MIT) 2011
- [Old and New algorithm for Blind Deconvolution](#) - Yair Weiss (The Hebrew University of Jerusalem) 2011
- [A Tour of Modern "Image Processing"](#) - Peyman Milanfar (UC Santa Cruz/Google) 2010
- [Topics in image and video processing](#) Andrew Blake (Microsoft Research) 2007
- [Computational Photography](#) - William T. Freeman (MIT) 2012
- [Revealing the Invisible](#) - Frédo Durand (MIT) 2012
- [Overview of Computer Vision and Visual Effects](#) - Rich Radke (Rensselaer Polytechnic Institute) 2014

## **Learning and Vision**

- [Where machine vision needs help from machine learning](#) - William T. Freeman (MIT) 2011
- [Learning in Computer Vision](#) - Simon Lucey (CMU) 2008
- [Learning and Inference in Low-Level Vision](#) - Yair Weiss (The Hebrew University of Jerusalem) 2009

## **Object Recognition**

- [Object Recognition](#) - Larry Zitnick (Microsoft Research)
- [Generative Models for Visual Objects and Object Recognition via Bayesian Inference](#) - Fei-Fei Li (Stanford University)

## **Graphical Models**

- [Graphical Models for Computer Vision](#) - Pedro Felzenszwalb (Brown University) 2012
- [Graphical Models](#) - Zoubin Ghahramani (University of Cambridge) 2009
- [Machine Learning, Probability and Graphical Models](#) - Sam Roweis (NYU) 2006
- [Graphical Models and Applications](#) - Yair Weiss (The Hebrew University of Jerusalem) 2009

## **Machine Learning**

- [A Gentle Tutorial of the EM Algorithm](#) - Jeff A. Bilmes (UC Berkeley) 1998
- [Introduction To Bayesian Inference](#) - Christopher Bishop (Microsoft Research) 2009
- [Support Vector Machines](#) - Chih-Jen Lin (National Taiwan University) 2006
- [Bayesian or Frequentist, Which Are You?](#) - Michael I. Jordan (UC Berkeley)

## **Optimization**



- [Optimization Algorithms in Machine Learning](#) - Stephen J. Wright (University of Wisconsin-Madison)
- [Convex Optimization](#) - Lieven Vandenbergh (University of California, Los Angeles)
- [Continuous Optimization in Computer Vision](#) - Andrew Fitzgibbon (Microsoft Research)
- [Beyond stochastic gradient descent for large-scale machine learning](#) - Francis Bach (INRIA)
- [Variational Methods for Computer Vision](#) - Daniel Cremers (Technische Universität München) (lecture 18 missing from playlist)

## Deep Learning

- [A tutorial on Deep Learning](#) - Geoffrey E. Hinton (University of Toronto)
- [Deep Learning](#) - Ruslan Salakhutdinov (University of Toronto)
- [Scaling up Deep Learning](#) - Yoshua Bengio (University of Montreal)
- [ImageNet Classification with Deep Convolutional Neural Networks](#) - Alex Krizhevsky (University of Toronto)
- [The Unreasonable Effectiveness Of Deep Learning](#) Yann LeCun (NYU/Facebook Research) 2014
- [Deep Learning for Computer Vision](#) - Rob Fergus (NYU/Facebook Research)
- [High-dimensional learning with deep network contractions](#) - Stéphane Mallat (Ecole Normale Supérieure)
- [Graduate Summer School 2012: Deep Learning, Feature Learning](#) - IPAM, 2012
- [Workshop on Big Data and Statistical Machine Learning](#)
- [Machine Learning Summer School](#) - Reykjavik, Iceland 2014
  - [Deep Learning Session 1](#) - Yoshua Bengio (University of Montreal)
  - [Deep Learning Session 2](#) - Yoshua Bengio (University of Montreal)
  - [Deep Learning Session 3](#) - Yoshua Bengio (University of Montreal)

## Software

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### Annotation tools

- [Comma Coloring](#)
- [Annotorious](#)
- [LabelME](#)
- [gtmaker](#)

### External Resource Links

- [Computer Vision Resources](#) - Jia-Bin Huang (UIUC)
- [Computer Vision Algorithm Implementations](#) - CVPapers

- [Source Code Collection for Reproducible Research](#) - Xin Li (West Virginia University)
- [CMU Computer Vision Page](#)

## **General Purpose Computer Vision Library**

- [Open CV](#)
- [mexopencv](#)
- [SimpleCV](#)
- [Open source Python module for computer vision](#)
- [ccv: A Modern Computer Vision Library](#)
- [VLFeat](#)
- [Matlab Computer Vision System Toolbox](#)
- [Piotr's Computer Vision Matlab Toolbox](#)
- [PCL: Point Cloud Library](#)
- [ImageUtilities](#)

## **Multiple-view Computer Vision**

- [MATLAB Functions for Multiple View Geometry](#)
- [Peter Kovesi's Matlab Functions for Computer Vision and Image Analysis](#)
- [OpenGV](#) - geometric computer vision algorithms
- [MinimalSolvers](#) - Minimal problems solver
- [Multi-View Environment](#)
- [Visual SFM](#)
- [Bundler SFM](#)
- [openMVG: open Multiple View Geometry](#) - Multiple View Geometry; Structure from Motion library & softwares
- [Patch-based Multi-view Stereo V2](#)
- [Clustering Views for Multi-view Stereo](#)
- [Floating Scale Surface Reconstruction](#)
- [Large-Scale Texturing of 3D Reconstructions](#)
- [Awesome 3D reconstruction list](#)

## **Feature Detection and Extraction**

- [VLFeat](#)
- [SIFT](#)
  - David G. Lowe, "Distinctive image features from scale-invariant keypoints," International Journal of Computer Vision, 60, 2 (2004), pp. 91-110.
- [SIFT++](#)

- [BRISK](#)
  - Stefan Leutenegger, Margarita Chli and Roland Siegwart, "BRISK: Binary Robust Invariant Scalable Keypoints", ICCV 2011
- [SURF](#)
  - Herbert Bay, Andreas Ess, Tinne Tuytelaars, Luc Van Gool, "SURF: Speeded Up Robust Features", Computer Vision and Image Understanding (CVIU), Vol. 110, No. 3, pp. 346--359, 2008
- [FREAK](#)
  - A. Alahi, R. Ortiz, and P. Vandergheynst, "FREAK: Fast Retina Keypoint", CVPR 2012
- [AKAZE](#)
  - Pablo F. Alcantarilla, Adrien Bartoli and Andrew J. Davison, "KAZE Features", ECCV 2012
- [Local Binary Patterns](#)

## High Dynamic Range Imaging

- [HDR\\_Toolbox](#)

## Semantic Segmentation

- [List of Semantic Segmentation algorithms](#)

## Low-level Vision

### Stereo Vision

- [Middlebury Stereo Vision](#)
- [The KITTI Vision Benchmark Suite](#)
- [LIBELAS: Library for Efficient Large-scale Stereo Matching](#)
- [Ground Truth Stixel Dataset](#)

### Optical Flow

- [Middlebury Optical Flow Evaluation](#)
- [MPI-Sintel Optical Flow Dataset and Evaluation](#)
- [The KITTI Vision Benchmark Suite](#)
- [HCI Challenge](#)
- [Coarse2Fine Optical Flow - Ce Liu \(MIT\)](#)
- [Secrets of Optical Flow Estimation and Their Principles](#)
- [C++/MatLab Optical Flow by C. Liu \(based on Brox et al. and Bruhn et al.\)](#)
- [Parallel Robust Optical Flow by Sánchez Pérez et al.](#)

## Image Denoising

BM3D, KSVD,

## Super-resolution

- [Multi-frame image super-resolution](#)
  - Pickup, L. C. Machine Learning in Multi-frame Image Super-resolution, PhD thesis 2008
- [Markov Random Fields for Super-Resolution](#)
  - W. T Freeman and C. Liu. Markov Random Fields for Super-resolution and Texture Synthesis. In A. Blake, P. Kohli, and C. Rother, eds., Advances in Markov Random Fields for Vision and Image Processing, Chapter 10. MIT Press, 2011
- [Sparse regression and natural image prior](#)
  - K. I. Kim and Y. Kwon, "Single-image super-resolution using sparse regression and natural image prior", IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 32, no. 6, pp. 1127-1133, 2010.
- [Single-Image Super Resolution via a Statistical Model](#)
  - T. Peleg and M. Elad, A Statistical Prediction Model Based on Sparse Representations for Single Image Super-Resolution, IEEE Transactions on Image Processing, Vol. 23, No. 6, Pages 2569-2582, June 2014
- [Sparse Coding for Super-Resolution](#)
  - R. Zeyde, M. Elad, and M. Protter On Single Image Scale-Up using Sparse-Representations, Curves & Surfaces, Avignon-France, June 24-30, 2010 (appears also in Lecture-Notes-on-Computer-Science - LNCS).
- [Patch-wise Sparse Recovery](#)
  - Jianchao Yang, John Wright, Thomas Huang, and Yi Ma. Image super-resolution via sparse representation. IEEE Transactions on Image Processing (TIP), vol. 19, issue 11, 2010.
- [Neighbor embedding](#)
  - H. Chang, D.Y. Yeung, Y. Xiong. Super-resolution through neighbor embedding. Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR), vol.1, pp.275-282, Washington, DC, USA, 27 June - 2 July 2004.
- [Deformable Patches](#)
  - Yu Zhu, Yanning Zhang and Alan Yuille, Single Image Super-resolution using Deformable Patches, CVPR 2014
- [SRCNN](#)
  - Chao Dong, Chen Change Loy, Kaiming He, Xiaoou Tang, Learning a Deep Convolutional Network for Image Super-Resolution, in ECCV 2014
- [A+: Adjusted Anchored Neighborhood Regression](#)
  - R. Timofte, V. De Smet, and L. Van Gool. A+: Adjusted Anchored Neighborhood Regression for Fast Super-Resolution, ACCV 2014

- [Transformed Self-Exemplars](#)
  - Jia-Bin Huang, Abhishek Singh, and Narendra Ahuja, Single Image Super-Resolution using Transformed Self-Exemplars, IEEE Conference on Computer Vision and Pattern Recognition, 2015

## Image Deblurring

### Non-blind deconvolution

- [Spatially variant non-blind deconvolution](#)
- [Handling Outliers in Non-blind Image Deconvolution](#)
- [Hyper-Laplacian Priors](#)
- [From Learning Models of Natural Image Patches to Whole Image Restoration](#)
- [Deep Convolutional Neural Network for Image Deconvolution](#)
- [Neural Deconvolution](#)

### Blind deconvolution

- [Removing Camera Shake From A Single Photograph](#)
- [High-quality motion deblurring from a single image](#)
- [Two-Phase Kernel Estimation for Robust Motion Deblurring](#)
- [Blur kernel estimation using the radon transform](#)
- [Fast motion deblurring](#)
- [Blind Deconvolution Using a Normalized Sparsity Measure](#)
- [Blur-kernel estimation from spectral irregularities](#)
- [Efficient marginal likelihood optimization in blind deconvolution](#)
- [Unnatural L0 Sparse Representation for Natural Image Deblurring](#)
- [Edge-based Blur Kernel Estimation Using Patch Priors](#)
- [Blind Deblurring Using Internal Patch Recurrence](#)

### Non-uniform Deblurring

- [Non-uniform Deblurring for Shaken Images](#)
- [Single Image Deblurring Using Motion Density Functions](#)
- [Image Deblurring using Inertial Measurement Sensors](#)
- [Fast Removal of Non-uniform Camera Shake](#)

## Image Completion

- [GIMP Resynthesizer](#)
- [Priority BP](#)
- [ImageMelding](#)
- [PlanarStructureCompletion](#)

## Image Retargeting

- [RetargetMe](#)

## Alpha Matting

- [Alpha Matting Evaluation](#)
- [Closed-form image matting](#)
- [Spectral Matting](#)
- [Learning-based Matting](#)
- [Improving Image Matting using Comprehensive Sampling Sets](#)

## Image Pyramid

- [The Steerable Pyramid](#)
- [CurveLab](#)

## Edge-preserving image processing

- [Fast Bilateral Filter](#)
- [O\(1\) Bilateral Filter](#)
- [Recursive Bilateral Filtering](#)
- [Rolling Guidance Filter](#)
- [Relative Total Variation](#)
- [L0 Gradient Optimization](#)
- [Domain Transform](#)
- [Adaptive Manifold](#)
- [Guided image filtering](#)

## Intrinsic Images

- [Recovering Intrinsic Images with a global Sparsity Prior on Reflectance](#)
- [Intrinsic Images by Clustering](#)

## Contour Detection and Image Segmentation

- [Mean Shift Segmentation](#)
- [Graph-based Segmentation](#)
- [Normalized Cut](#)
- [Grab Cut](#)
- [Contour Detection and Image Segmentation](#)
- [Structured Edge Detection](#)
- [Pointwise Mutual Information](#)

- [SLIC Super-pixel](#)
- [QuickShift](#)
- [TurboPixels](#)
- [Entropy Rate Superpixel](#)
- [Contour Relaxed Superpixels](#)
- [SEEDS](#)
- [SEEDS Revised](#)
- [Multiscale Combinatorial Grouping](#)
- [Fast Edge Detection Using Structured Forests](#)

## **Interactive Image Segmentation**

- [Random Walker](#)
- [Geodesic Segmentation](#)
- [Lazy Snapping](#)
- [Power Watershed](#)
- [Geodesic Graph Cut](#)
- [Segmentation by Transduction](#)

## **Video Segmentation**

- [Video Segmentation with Superpixels](#)
- [Efficient hierarchical graph-based video segmentation](#)
- [Object segmentation in video](#)
- [Streaming hierarchical video segmentation](#)

## **Camera calibration**

- [Camera Calibration Toolbox for Matlab](#)
- [Camera calibration With OpenCV](#)
- [Multiple Camera Calibration Toolbox](#)

## **Simultaneous localization and mapping**

### **SLAM community:**

- [openSLAM](#)
- [Kitti Odometry: benchmark for outdoor visual odometry \(codes may be available\)](#)

### **Tracking/Odometry:**

- [LIBVISO2: C++ Library for Visual Odometry 2](#)
- [PTAM: Parallel tracking and mapping](#)

- [KFusion](#): Implementation of KinectFusion
- [kinfu\\_remake](#): Lightweight, reworked and optimized version of Kinfu.
- [LVR-KinFu](#): kinfu\_remake based Large Scale KinectFusion with online reconstruction
- [InfiniTAM](#): Implementation of multi-platform large-scale depth tracking and fusion
- [VoxelHashing](#): Large-scale KinectFusion
- [SLAMBench](#): Multiple-implementation of KinectFusion
- [SVO](#): Semi-direct visual odometry
- [DVO](#): dense visual odometry
- [FOVIS](#): RGB-D visual odometry

#### **Graph Optimization:**

- [GTSAM](#): General smoothing and mapping library for Robotics and SFM -- Georgia Institute of Technology
- [G2O](#): General framework for graph optimization

#### **Loop Closure:**

- [FabMap](#): appearance-based loop closure system - also available in [OpenCV2.4.11](#)
- [DBow2](#): binary bag-of-words loop detection system

#### **Localization & Mapping:**

- [RatSLAM](#)
- [LSD-SLAM](#)
- [ORB-SLAM](#)

#### **Single-view Spatial Understanding**

- [Geometric Context](#) - Derek Hoiem (CMU)
- [Recovering Spatial Layout](#) - Varsha Hedau (UIUC)
- [Geometric Reasoning](#) - David C. Lee (CMU)
- [RGBD2Full3D](#) - Ruiqi Guo (UIUC)

#### **Object Detection**

- [INRIA Object Detection and Localization Toolkit](#)
- [Discriminatively trained deformable part models](#)
- [VOC-DPM](#)
- [Histograms of Sparse Codes for Object Detection](#)
- [R-CNN: Regions with Convolutional Neural Network Features](#)
- [SPP-Net](#)



- [BING: Objectness Estimation](#)
- [Edge Boxes](#)
- [ReInspect](#)

## **Nearest Neighbor Search**

### **General purpose nearest neighbor search**

- [ANN: A Library for Approximate Nearest Neighbor Searching](#)
- [FLANN - Fast Library for Approximate Nearest Neighbors](#)
- [Fast k nearest neighbor search using GPU](#)

### **Nearest Neighbor Field Estimation**

- [PatchMatch](#)
- [Generalized PatchMatch](#)
- [Coherency Sensitive Hashing](#)
- [PMBP: PatchMatch Belief Propagation](#)
- [TreeCANN](#)

## **Visual Tracking**

- [Visual Tracker Benchmark](#)
- [Visual Tracking Challenge](#)
- [Kanade-Lucas-Tomasi Feature Tracker](#)
- [Extended Lucas-Kanade Tracking](#)
- [Online-boosting Tracking](#)
- [Spatio-Temporal Context Learning](#)
- [Locality Sensitive Histograms](#)
- [Enhanced adaptive coupled-layer LGTracker++](#)
- [TLD: Tracking - Learning - Detection](#)
- [CMT: Clustering of Static-Adaptive Correspondences for Deformable Object Tracking](#)
- [Kernelized Correlation Filters](#)
- [Accurate Scale Estimation for Robust Visual Tracking](#)
- [Multiple Experts using Entropy Minimization](#)
- [TGPR](#)
- [CF2: Hierarchical Convolutional Features for Visual Tracking](#)
- [Modular Tracking Framework](#)

## **Saliency Detection**

## **Attributes**

## Action Reconition

## Egocentric cameras

## Human-in-the-loop systems

## Image Captioning

- [NeuralTalk](#) -

## Optimization

- [Ceres Solver](#) - Nonlinear least-square problem and unconstrained optimization solver
- [NLopt](#)- Nonlinear least-square problem and unconstrained optimization solver
- [OpenGM](#) - Factor graph based discrete optimization and inference solver
- [GTSAM](#) - Factor graph based lease-square optimization solver

## Deep Learning

- [Awesome Deep Vision](#)

## Machine Learning

- [Awesome Machine Learning](#)
- [Bob: a free signal processing and machine learning toolbox for researchers](#)
- [LIBSVM -- A Library for Support Vector Machines](#)

# Datasets

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## External Dataset Link Collection

- [CV Datasets on the web](#) - CVPapers
- [Are we there yet?](#) - Which paper provides the best results on standard dataset X?
- [Computer Vision Dataset on the web](#)
- [Yet Another Computer Vision Index To Datasets](#)
- [ComputerVisionOnline Datasets](#)
- [CVOnline Dataset](#)
- [CV datasets](#)
- [visionbib](#)
- [VisualData](#)

## Low-level Vision

### Stereo Vision

- [Middlebury Stereo Vision](#)
- [The KITTI Vision Benchmark Suite](#)
- [LIBELAS: Library for Efficient Large-scale Stereo Matching](#)
- [Ground Truth Stixel Dataset](#)

#### **Optical Flow**

- [Middlebury Optical Flow Evaluation](#)
- [MPI-Sintel Optical Flow Dataset and Evaluation](#)
- [The KITTI Vision Benchmark Suite](#)
- [HCI Challenge](#)

#### **Video Object Segmentation**

- [DAVIS: Densely Annotated Video Segmentation](#)
- [SegTrack v2](#)

#### **Change Detection**

- [Labeled and Annotated Sequences for Integral Evaluation of Segmentation Algorithms](#)
- [ChangeDetection.net](#)

#### **Image Super-resolutions**

- [Single-Image Super-Resolution: A Benchmark](#)

#### **Intrinsic Images**

- [Ground-truth dataset and baseline evaluations for intrinsic image algorithms](#)
- [Intrinsic Images in the Wild](#)
- [Intrinsic Image Evaluation on Synthetic Complex Scenes](#)

#### **Material Recognition**

- [OpenSurface](#)
- [Flickr Material Database](#)
- [Materials in Context Dataset](#)

#### **Multi-view Reconsturction**

- [Multi-View Stereo Reconstruction](#)

#### **Saliency Detection**

#### **Visual Tracking**

- [Visual Tracker Benchmark](#)
- [Visual Tracker Benchmark v1.1](#)
- [VOT Challenge](#)
- [Princeton Tracking Benchmark](#)
- [Tracking Manipulation Tasks \(TMT\)](#)

## **Visual Surveillance**

- [VIRAT](#)
- [CAM2](#)

## **Saliency Detection**

## **Change detection**

- [ChangeDetection.net](#)

## **Visual Recognition**

### **Image Classification**

- [The PASCAL Visual Object Classes](#)
- [ImageNet Large Scale Visual Recognition Challenge](#)

### **Self-supervised Learning**

- [PASS: An ImageNet replacement for self-supervised pretraining without humans](#)

### **Scene Recognition**

- [SUN Database](#)
- [Place Dataset](#)

### **Object Detection**

- [The PASCAL Visual Object Classes](#)
- [ImageNet Object Detection Challenge](#)
- [Microsoft COCO](#)

### **Semantic labeling**

- [Stanford background dataset](#)
- [CamVid](#)
- [Barcelona Dataset](#)
- [SIFT Flow Dataset](#)

## Multi-view Object Detection

- [3D Object Dataset](#)
- [EPFL Car Dataset](#)
- [KTTI Dection Dataset](#)
- [SUN 3D Dataset](#)
- [PASCAL 3D+](#)
- [NYU Car Dataset](#)

## Fine-grained Visual Recognition

- [Fine-grained Classification Challenge](#)
- [Caltech-UCSD Birds 200](#)

## Pedestrian Detection

- [Caltech Pedestrian Detection Benchmark](#)
- [ETHZ Pedestrian Detection](#)

## Action Recognition

### Image-based

### Video-based

- [HOLLYWOOD2 Dataset](#)
- [UCF Sports Action Data Set](#)

## Image Deblurring

- [Sun dataset](#)
- [Levin dataset](#)

## Image Captioning

- [Flickr 8K](#)
- [Flickr 30K](#)
- [Microsoft COCO](#)

## Scene Understanding

# SUN RGB-D - A RGB-D Scene Understanding Benchmark Suite

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# NYU depth v2 - Indoor Segmentation and Support Inference from RGBD Images

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Aerial images

## Aerial Image Segmentation - Learning Aerial Image Segmentation From Online Maps

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### Resources for students

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#### Resource link collection

- [Resources for students](#) - Frédo Durand (MIT)
- [Advice for Graduate Students](#) - Aaron Hertzmann (Adobe Research)
- [Graduate Skills Seminars](#) - Yashar Ganjali, Aaron Hertzmann (University of Toronto)
- [Research Skills](#) - Simon Peyton Jones (Microsoft Research)
- [Resource collection](#) - Tao Xie (UIUC) and Yuan Xie (UCSB)

#### Writing

- [Write Good Papers](#) - Frédo Durand (MIT)
- [Notes on writing](#) - Frédo Durand (MIT)
- [How to Write a Bad Article](#) - Frédo Durand (MIT)
- [How to write a good CVPR submission](#) - William T. Freeman (MIT)
- [How to write a great research paper](#) - Simon Peyton Jones (Microsoft Research)
- [How to write a SIGGRAPH paper](#) - SIGGRAPH ASIA 2011 Course
- [Writing Research Papers](#) - Aaron Hertzmann (Adobe Research)
- [How to Write a Paper for SIGGRAPH](#) - Jim Blinn
- [How to Get Your SIGGRAPH Paper Rejected](#) - Jim Kajiya (Microsoft Research)
- [How to write a SIGGRAPH paper](#) - Li-Yi Wei (The University of Hong Kong)
- [How to Write a Great Paper](#) - Martin Martin Hering Hering--Bertram (Hochschule Bremen University of Applied Sciences)
- [How to have a paper get into SIGGRAPH?](#) - Takeo Igarashi (The University of Tokyo)
- [Good Writing](#) - Marc H. Raibert (Boston Dynamics, Inc.)
- [How to Write a Computer Vision Paper](#) - Derek Hoiem (UIUC)

- [Common mistakes in technical writing](#) - Wojciech Jarosz (Dartmouth College)

## Presentation

- [Giving a Research Talk](#) - Frédo Durand (MIT)
- [How to give a good talk](#) - David Fleet (University of Toronto) and Aaron Hertzmann (Adobe Research)
- [Designing conference posters](#) - Colin Purrington

## Research

- [How to do research](#) - William T. Freeman (MIT)
- [You and Your Research](#) - Richard Hamming
- [Warning Signs of Bogus Progress in Research in an Age of Rich Computation and Information](#) - Yi Ma (UIUC)
- [Seven Warning Signs of Bogus Science](#) - Robert L. Park
- [Five Principles for Choosing Research Problems in Computer Graphics](#) - Thomas Funkhouser (Cornell University)
- [How To Do Research In the MIT AI Lab](#) - David Chapman (MIT)
- [Recent Advances in Computer Vision](#) - Ming-Hsuan Yang (UC Merced)
- [How to Come Up with Research Ideas in Computer Vision?](#) - Jia-Bin Huang (UIUC)
- [How to Read Academic Papers](#) - Jia-Bin Huang (UIUC)

## Time Management

- [Time Management](#) - Randy Pausch (CMU)

## Blogs

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- [Learn OpenCV](#) - Satya Mallick
- [Tombone's Computer Vision Blog](#) - Tomasz Malisiewicz
- [Computer vision for dummies](#) - Vincent Spruyt
- [Andrej Karpathy blog](#) - Andrej Karpathy
- [AI Shack](#) - Utkarsh Sinha
- [Computer Vision Talks](#) - Eugene Khvedchenya
- [Computer Vision Basics with Python Keras and OpenCV](#) - Jason Chin (University of Western Ontario)

## Links

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- [The Computer Vision Industry](#) - David Lowe

- [German Computer Vision Research Groups & Companies](#)
- [awesome-deep-learning](#)
- [awesome-machine-learning](#)
- [Cat Paper Collection](#)
- [Computer Vision News](#)
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## Songs

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- [The Fundamental Matrix Song](#)
- [The RANSAC Song](#)
- [Machine Learning A Cappella - Overfitting Thriller](#)

## Licenses

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## Releases

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## Packages

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