

Computer Vision Coaching Roadmap

A structured learning path from CV fundamentals to production systems — the exact skills, tools, and milestones to become a computer vision engineer.

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Computer Vision Expertise: Teaching & Coaching Services

Welcome to my professional computer vision teaching service. I offer personalized coaching, tutoring, and online sessions to help you master image processing and computer vision.

About Me

I am an experienced computer vision educator with deep expertise across the entire computer vision pipeline. My teaching approach emphasizes building strong foundations while connecting theory to practical applications. I help students develop both theoretical understanding and hands-on implementation skills.

Teaching Philosophy

My teaching is built around:

- Connecting theoretical concepts to real-world applications
- Progressive skill building from fundamentals to advanced topics
- Hands-on projects that reinforce learning
- Personalized guidance based on your background and goals

Services Offered

- **One-on-One Tutoring:** Personalized sessions tailored to your learning pace and specific interests
- **Group Workshops:** Collaborative learning environments focused on specific topics
- **Project-Based Coaching:** Guidance on implementing computer vision in your specific applications
- **Code Reviews:** Analysis of your implementations with suggestions for improvement
- **Career Guidance:** Mentorship for those pursuing computer vision careers

My Computer Vision Roadmap

My comprehensive teaching curriculum follows the roadmap below, which I adapt based on your specific goals and background:

1. Fundamentals

I begin by ensuring you understand how images are formed, represented, and processed digitally. We'll explore:

- Camera systems and how light becomes digital data
- Various color models and their applications
- How resolution and bit depth impact image quality

2. Image Processing Foundations

Next, we build essential processing skills: - Filtering techniques to enhance images and extract features - Thresholding methods to separate regions of interest - Morphological operations for shape analysis - Histogram analysis for understanding image characteristics - Feature detection to identify key points in images

3. Object Detection & Recognition

We'll explore both classical and modern approaches: - Traditional computer vision algorithms - Deep learning architectures and their applications - Object detection frameworks like YOLO and R-CNN - Segmentation techniques for precise object boundaries

4. 3D Vision & Depth

Understanding the 3D world from 2D images: - Stereo vision principles and implementation - Structure from Motion techniques - Working with depth sensors - SLAM systems for mapping environments

5. Advanced Topics

Based on your interests, we can explore: - Camera calibration and geometry - Motion analysis and optical flow - Image and video compression - Real-time processing optimization - Multi-camera systems - Specialized applications in autonomous vehicles, medical imaging, etc.

Learning Approach

My teaching combines: - **Theoretical Lessons:** Understanding underlying principles - **Coding Demonstrations:** Seeing concepts implemented in real-time - **Guided Exercises:** Practice with immediate feedback - **Projects:** Real-world applications to cement your knowledge - **Review Sessions:** Reinforcement of challenging concepts

Tools & Frameworks

I provide instruction in industry-standard tools: - Python with OpenCV, NumPy, and PIL - Deep learning frameworks (TensorFlow, PyTorch) - MATLAB for certain applications - Specialized libraries like scikit-image and SimpleITK

Getting Started

To begin your computer vision learning journey: 1. Schedule an initial consultation to discuss your background and goals 2. Receive a customized learning plan based on your needs 3. Begin regular sessions following our personalized roadmap 4. Practice with carefully designed assignments between sessions 5. Track your progress with periodic assessments

Contact Information

Ready to advance your computer vision skills? Contact me to schedule your consultation and begin your journey toward expertise in this exciting field.

my roadmap to become expert in computer vision which i teach, coach, tutor, online session ## 1.

Fundamentals - Image Formation: Cameras, lenses, sensors, and lighting conditions. - **Image Representation:** Pixels, color models (RGB, HSV, YCbCr, etc.), and grayscale images. - **Sampling & Quantization:** Resolution, bit depth, and effects on image quality.

2. Image Processing

- **Filtering:** Convolution, Gaussian blur, edge detection (Sobel, Canny).
 - **Thresholding:** Otsu's method, adaptive thresholding.
 - **Morphological Operations:** Erosion, dilation, opening, closing.
 - **Histogram Analysis:** Contrast enhancement, histogram equalization.
 - **Feature Detection:** SIFT, SURF, ORB, FAST, Harris corner detector.
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3. Object Detection & Recognition

- **Traditional Approaches:** Haar cascades, HOG + SVM, template matching.
 - **Deep Learning-Based:**
 - CNN architectures: ResNet, VGG, EfficientNet.
 - Object detection: YOLO, Faster R-CNN, SSD.
 - Semantic segmentation: U-Net, DeepLab.
 - Instance segmentation: Mask R-CNN.
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4. Depth Estimation & 3D Vision

- **Stereo Vision:** Disparity maps, epipolar geometry.
 - **Structure from Motion (SfM):** Recovering 3D from 2D images.
 - **Depth Sensors:** LiDAR, Intel RealSense, Kinect, Time-of-Flight (ToF) cameras.
 - **SLAM (Simultaneous Localization and Mapping):** ORB-SLAM, LSD-SLAM.
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5. Camera Calibration & Geometry

- **Intrinsic & Extrinsic Parameters:** Focal length, principal point, distortion coefficients.
 - **Homographies & Transformations:** Perspective warp, affine transformations.
 - **Epipolar Geometry:** Fundamental matrix, essential matrix, rectification.
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6. Optical Flow & Motion Analysis

- **Dense vs Sparse Optical Flow:** Lucas-Kanade, Farneback, Horn-Schunck.
 - **Background Subtraction:** MOG2, KNN.
 - **Action Recognition:** Pose estimation, LSTMs, 3D CNNs.
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7. Image & Video Compression

- **JPEG, PNG:** Lossy and lossless compression.
 - **H.264, H.265 (HEVC):** Video encoding standards.
 - **Depth Map Compression:** MPEG Depth Estimation.
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8. Real-Time Processing & Edge AI

- **Hardware Acceleration:** CUDA, TensorRT, OpenVINO.
 - **Optimized Frameworks:** TFLite, ONNX Runtime, OpenCV DNN.
 - **Embedded Systems:** NVIDIA Jetson, Raspberry Pi, FPGAs.
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9. Multi-Camera Systems & Sensor Fusion

- **Camera Synchronization:** Hardware and software approaches.
 - **Multi-View Geometry:** 3D reconstruction, triangulation.
 - **Sensor Fusion:** IMU + camera, LiDAR + camera fusion.
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10. Applications

- **Autonomous Vehicles:** Lane detection, object tracking.
- **Medical Imaging:** MRI/CT image analysis, anomaly detection.
- **Surveillance:** Face recognition, crowd analysis.
- **AR/VR:** Pose tracking, spatial mapping.