Course Syllabus & Content Release Schedule

Month 1

- 1.1: Loading, displaying, and saving images (https://gurus.pyimagesearch.com?p=397)
- 1.2: Image basics (https://gurus.pyimagesearch.com?p=399)
- 1.3: Drawing (https://gurus.pyimagesearch.com?p=401)
- 1.4: Basic image processing (https://gurus.pyimagesearch.com?p=403)
- 1.4.1: Translation (https://gurus.pyimagesearch.com?p=723)
- 1.4.2: Rotation (https://gurus.pyimagesearch.com?p=726)
- 1.4.3: Resizing (https://gurus.pyimagesearch.com?p=729)
- 1.4.4: Flipping (https://gurus.pyimagesearch.com?p=732)
- 1.4.5: Cropping (https://gurus.pyimagesearch.com?p=735)
- 1.4.6: Image arithmetic (https://gurus.pyimagesearch.com?p=738)
- 1.4.7: Bitwise operations (https://gurus.pyimagesearch.com?p=741)
- 1.4.8: Masking (https://gurus.pyimagesearch.com?p=744)
- 1.4.9: Splitting and merging channels (https://gurus.pyimagesearch.com?p=747)
- 1.5: Kernels (https://gurus.pyimagesearch.com?p=1018)
- 1.6: Morphological operations (https://gurus.pyimagesearch.com?p=405)
- 1.7: Smoothing and blurring (https://gurus.pyimagesearch.com?p=407)
- 1.8: Lighting and color spaces (https://gurus.pyimagesearch.com?p=409)
- 1.9: Thresholding (https://gurus.pyimagesearch.com?p=411)
- 1.10: Gradients and edge detection (https://gurus.pyimagesearch.com?p=414)
- 1.10.1: Gradients (https://gurus.pyimagesearch.com?p=1098)

- 1.10.2: Edge detection (https://gurus.pyimagesearch.com?p=1115)
- 1.11: Contours (https://gurus.pyimagesearch.com?p=416)
- 1.11.1: Finding and drawing contours (https://gurus.pyimagesearch.com?p=982)
- 1.11.2: Simple contour properties (https://gurus.pyimagesearch.com?p=984)
- 1.11.3: Advanced contour properties (https://gurus.pyimagesearch.com?p=986)
- 1.11.4: Contour approximation (https://gurus.pyimagesearch.com?p=988)
- 1.11.5: Sorting contours (https://gurus.pyimagesearch.com?p=990)
- 1.12: Histograms (https://gurus.pyimagesearch.com?p=418)
- 1.13: Connected-component labeling (https://gurus.pyimagesearch.com?p=2836)
- 10.1: What are image descriptors, feature descriptors, and feature vectors? (https://gurus.pyimagesearch.com?p=627)
- 10.2: Color channel statistics (https://gurus.pyimagesearch.com?p=629)
- 10.3: Color histograms (https://gurus.pyimagesearch.com?p=631)
- 11.1: Measuring distance from camera to object in image (https://gurus.pyimagesearch.com?p=651)

Month 2

- 4.1: A high level overview of image classification (https://gurus.pyimagesearch.com?p=491)
- 4.1.1: What is image classification? (https://gurus.pyimagesearch.com?p=1396)
- 4.1.2: Types of learning (https://gurus.pyimagesearch.com?p=1858)
- 4.2: The image classification pipeline (https://gurus.pyimagesearch.com?p=493)
- 4.3: k-Nearest Neighbor classification (https://gurus.pyimagesearch.com?p=495)
- 6.1: What is ANPR? (https://gurus.pyimagesearch.com?p=541)
- 9.1: Installing OpenCV on your Raspberry Pi (https://gurus.pyimagesearch.com?p=611)
- 10.4: Hu Moments (https://gurus.pyimagesearch.com?p=639)
- 10.5: Zernike Moments (https://gurus.pyimagesearch.com?p=641)
- 10.6: Haralick texture (https://gurus.pyimagesearch.com?p=635)
- 10.7: Local Binary Patterns (https://gurus.pyimagesearch.com?p=633)
- 10.8: Histogram of Oriented Gradients (https://gurus.pyimagesearch.com?p=637)
- 11.2: Face detection in images (https://gurus.pyimagesearch.com?p=654)

Month 3

- 3.1: What is Content-Based Image Retrieval? (https://gurus.pyimagesearch.com?p=457)
- 3.2: Your first image search engine (https://gurus.pyimagesearch.com?p=459)
- 4.4: Common machine learning algorithms for image classification (https://gurus.pyimagesearch.com?p=501)
- 4.4.1: Logistic regression (https://gurus.pyimagesearch.com?p=1873)
- 4.4.2: Support Vector Machines (https://gurus.pyimagesearch.com?p=1875)
- 4.4.3: Decision trees (https://gurus.pyimagesearch.com?p=1877)
- 4.4.4: Random forests (https://gurus.pyimagesearch.com?p=1879)
- 6.2: The problem with ANPR datasets (https://gurus.pyimagesearch.com?p=543)
- 6.3: Localizing license plates in images (https://gurus.pyimagesearch.com?p=545)
- 9.2: Setting up your Raspberry Pi Camera (https://gurus.pyimagesearch.com?p=613)
- 9.3: Accessing the Raspberry Pi camera and video stream (https://gurus.pyimagesearch.com?p=615)
- 10.9: Understanding local features (https://gurus.pyimagesearch.com?p=643)
- 10.10: Keypoint detectors (https://gurus.pyimagesearch.com?p=645)
- 10.10.1: FAST (https://gurus.pyimagesearch.com?p=1903)
- 10.10.2: Harris (https://gurus.pyimagesearch.com?p=1909)
- 10.10.3: GFTT (https://gurus.pyimagesearch.com?p=1907)
- 10.10.4: DoG (https://gurus.pyimagesearch.com?p=1901)
- 10.10.5: Fast Hessian (https://gurus.pyimagesearch.com?p=1905)
- 10.10.6: STAR (https://gurus.pyimagesearch.com?p=1915)
- 10.10.7: MSER (https://gurus.pyimagesearch.com?p=1911)
- 10.10.8: Dense (https://gurus.pyimagesearch.com?p=1899)
- 10.10.9: BRISK (https://gurus.pyimagesearch.com?p=1897)
- 10.10.10: ORB (https://gurus.pyimagesearch.com?p=1913)

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- 2.1: What are object detectors? (https://gurus.pyimagesearch.com?p=425)
- 2.1.1: An introduction to object detection (https://gurus.pyimagesearch.com?p=2958)
- 2.1.2: Template matching (https://gurus.pyimagesearch.com?p=2845)
- 2.2: Object detection: The easy way (https://gurus.pyimagesearch.com?p=427)
- 2.2.1: How to install dlib (https://gurus.pyimagesearch.com?p=2852)
- 2.2.2: Object detection made easy (https://gurus.pyimagesearch.com?p=2961)
- 3.3: The 4 steps of building any image search engine (https://gurus.pyimagesearch.com?

p=461)

- 3.3.1: Defining your image descriptor (https://gurus.pyimagesearch.com?p=1949)
- 3.3.2: Feature extraction and indexing (https://gurus.pyimagesearch.com?p=1951)
- 3.3.3: Defining your similarity metric (https://gurus.pyimagesearch.com?p=1953)
- 3.3.4: Searching (https://gurus.pyimagesearch.com?p=1955)
- 4.5: k-means clustering (https://gurus.pyimagesearch.com?p=497)
- 6.4: Segmenting characters from the license plate (https://gurus.pyimagesearch.com?p=547)
- 10.11: Local invariant descriptors (https://gurus.pyimagesearch.com?p=647)
- 10.11.1: SIFT (https://gurus.pyimagesearch.com?p=1917)
- 10.11.2: RootSIFT (https://gurus.pyimagesearch.com?p=1919)
- 10.11.3: SURF (https://gurus.pyimagesearch.com?p=1921)
- 10.11.4: Real-valued feature extraction and matching (https://gurus.pyimagesearch.com?p=3034)
- 11.3: Face detection in video (https://gurus.pyimagesearch.com?p=656)

Month 5

- 2.3: Sliding windows and image pyramids (https://gurus.pyimagesearch.com?p=431)
- 2.3.1: Image pyramids (https://gurus.pyimagesearch.com?p=1827)
- 2.3.2: Sliding windows (https://gurus.pyimagesearch.com?p=1825)
- 3.4: The bag of (visual) words model (https://gurus.pyimagesearch.com?p=3371)
- 3.5: Extracting keypoints and local invariant descriptors (https://gurus.pyimagesearch.com?p=465)
- 3.6: Clustering features to form a codebook (https://gurus.pyimagesearch.com?p=467)
- 3.7: Visualizing words in a codebook (https://gurus.pyimagesearch.com?p=470)
- 5.1: What is face recognition? (https://gurus.pyimagesearch.com?p=529)
- 5.2: LBPs for face recognition (https://gurus.pyimagesearch.com?p=535)
- 6.5: Scissoring the license plate characters (https://gurus.pyimagesearch.com?p=549)
- 10.12: Binary descriptors (https://gurus.pyimagesearch.com?p=1895)
- 10.12.1: What are binary descriptors? (https://gurus.pyimagesearch.com?p=3296)
- 10.12.2: BRIEF (https://gurus.pyimagesearch.com?p=1923)
- 10.12.3: ORB (https://gurus.pyimagesearch.com?p=1925)
- 10.12.4: BRISK (https://gurus.pyimagesearch.com?p=1927)
- 10.12.5: FREAK (https://gurus.pyimagesearch.com?p=1929)

- 10.12.6: Binary feature extraction and matching (https://gurus.pyimagesearch.com?p=3310)
- 11.4: Object tracking in video (https://gurus.pyimagesearch.com?p=658)

Month 6

- 2.4: The 6-step framework (https://gurus.pyimagesearch.com?p=1838)
- 3.8: Vector quantization (https://gurus.pyimagesearch.com?p=472)
- 3.8.1: Going from multiple features to a single histogram (https://gurus.pyimagesearch.com?p=3783)
- 3.8.2: Forming a BOVW (https://gurus.pyimagesearch.com?p=3785)
- 4.6: Bag of visual words for classification (https://gurus.pyimagesearch.com?p=505)
- 5.3: The Eigenfaces algorithm (https://gurus.pyimagesearch.com?p=533)
- 8.1: Neural networks in a nutshell (https://gurus.pyimagesearch.com?p=582)
- 8.1.1: Introduction to neural networks (https://gurus.pyimagesearch.com?p=3720)
- 8.1.2: The Perceptron algorithm (https://gurus.pyimagesearch.com?p=3722)
- 8.1.3: Multi-layer networks (https://gurus.pyimagesearch.com?p=3724)
- 11.5: Identifying the covers of books (https://gurus.pyimagesearch.com?p=664)

Month 7

- 2.5: Preparing your experiment and training data (https://gurus.pyimagesearch.com?p=429)
- 2.6: Constructing your HOG descriptor (https://gurus.pyimagesearch.com?p=433)
- 2.7: The initial training phase (https://gurus.pyimagesearch.com?p=435)
- 2.8: Non-maxima suppression (https://gurus.pyimagesearch.com?p=1886)
- 3.9: Inverted indexes and searching (https://gurus.pyimagesearch.com?p=478)
- 3.9.1: What is Redis? (https://gurus.pyimagesearch.com?p=3788)
- 3.9.2: Building an inverted index (https://gurus.pyimagesearch.com?p=3790)
- 3.9.3: Performing a search (https://gurus.pyimagesearch.com?p=3792)
- 4.7: A different type of image pyramid (https://gurus.pyimagesearch.com?p=499)
- 4.7.1: Image pyramids for classification (https://gurus.pyimagesearch.com?p=1864)
- 4.7.2: PBOW (https://gurus.pyimagesearch.com?p=1868)
- 5.4: Preparing and pre-processing your own face data (https://gurus.pyimagesearch.com?p=531)

- 6.6: Our first try at recognizing license plate characters (https://gurus.pyimagesearch.com?p=551)
- 8.2: Introduction to deep learning (https://gurus.pyimagesearch.com?p=4033)
- 8.3: Setting up your deep learning development environment (https://gurus.pyimagesearch.com?p=591)
- 11.6: Plant classification (https://gurus.pyimagesearch.com?p=666)

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- 2.9: Hard-negative mining (https://gurus.pyimagesearch.com?p=439)
- 2.10: Re-training and running your classifier (https://gurus.pyimagesearch.com?p=443)
- 3.10: Evaluation (https://gurus.pyimagesearch.com?p=3794)
- 3.11: Tf-idf weighting (https://gurus.pyimagesearch.com?p=480)
- 4.8: Image classification example: Flowers-17 (https://gurus.pyimagesearch.com?p=507)
- 5.5: The complete face recognition pipeline (https://gurus.pyimagesearch.com?p=537)
- 6.7: Gathering our own license plate characters (https://gurus.pyimagesearch.com?p=553)
- 6.8: Improving our license plate classifier (https://gurus.pyimagesearch.com?p=555)
- 7.1: Introduction to Hadoop and MapReduce (https://gurus.pyimagesearch.com?p=563)
- 8.4: Deep Belief Networks (https://gurus.pyimagesearch.com?p=584)
- 8.4.1: Deep Belief Network basics (https://gurus.pyimagesearch.com?p=4019)
- 8.4.2: Training a Deep Belief Network (https://gurus.pyimagesearch.com?p=4021)
- 8.5: Convolutional Neural Networks (https://gurus.pyimagesearch.com?p=586)
- 8.5.1: A CNN primer (https://gurus.pyimagesearch.com?p=4023)
- 8.5.2: Training your first CNN (https://gurus.pyimagesearch.com?p=4025)
- 12.1: Introduction to PhoneGap (https://gurus.pyimagesearch.com?p=674)
- 12.2: Overview of PhoneGap (https://gurus.pyimagesearch.com?p=676)
- 12.3: PhoneGap environment setup (https://gurus.pyimagesearch.com?p=678)
- 12.4: PhoneGap “Hello, World” (https://gurus.pyimagesearch.com?p=680)

Month 9

- 2.11: Training your custom object detector (https://gurus.pyimagesearch.com?p=447)
- 2.12: Tips on training your own object detectors (https://gurus.pyimagesearch.com?p=453)

- 3.12: Spatial verification (https://gurus.pyimagesearch.com?p=474)
- 4.9: Image classification example: CALTECH-101 (https://gurus.pyimagesearch.com?p=521)
- 4.10: Tips on training your own image classifiers (https://gurus.pyimagesearch.com?p=525)
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- 7.2: Setting up Hadoop on your machine (https://gurus.pyimagesearch.com?p=567)
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- 8.6: Implementing CNN architectures (https://gurus.pyimagesearch.com?p=5269)
- 8.6.1: LeNet (https://gurus.pyimagesearch.com?p=5271)
- 8.6.2: KarpathyNet (https://gurus.pyimagesearch.com?p=5273)
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- 11.7: Handwriting recognition (https://gurus.pyimagesearch.com?p=668)
- 12.5: PhoneGap UI Setup (https://gurus.pyimagesearch.com?p=682)
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- 12.8: Display JSON response (https://gurus.pyimagesearch.com?p=688)
- 13.1: Introduction to hand gesture recognition (https://gurus.pyimagesearch.com?p=699)
- 13.2: Understanding convexity defects (https://gurus.pyimagesearch.com?p=701)

Month 10

- 7.4: Running computer vision jobs on MapReduce (https://gurus.pyimagesearch.com?p=571)
- 7.5: High-throughput face detection (https://gurus.pyimagesearch.com?p=575)
- 7.6: High-throughput feature extraction (https://gurus.pyimagesearch.com?p=577)
- 8.7: The OverFeat framework (https://gurus.pyimagesearch.com?p=595)
- 8.7.1: What is OverFeat? (https://gurus.pyimagesearch.com?p=5277)
- 8.7.2: OverFeat example: dogs and cats (https://gurus.pyimagesearch.com?p=5279)
- 8.7.3: OverFeat example: flower classification (https://gurus.pyimagesearch.com?p=5281)
- 8.7.4: OverFeat example: CALTECH-101 (https://gurus.pyimagesearch.com?p=5283)
- 8.8: Caffe example: CALTECH-256 (https://gurus.pyimagesearch.com?p=603)
- 8.9: Tips on training your own networks (https://gurus.pyimagesearch.com?p=607)

- 9.4: Home surveillance and motion detection (https://gurus.pyimagesearch.com?p=617)
- 9.5: Face recognition for security (https://gurus.pyimagesearch.com?p=619)
- 9.6: TBD (https://gurus.pyimagesearch.com?p=623)
- 12.9: Face detector app (https://gurus.pyimagesearch.com?p=690)
- 12.10: Packaging your app for the App Store (https://gurus.pyimagesearch.com?p=695)
- 13.3: Recognizing gestures (https://gurus.pyimagesearch.com?p=703)
- 13.4: Tips on hand gesture recognition (https://gurus.pyimagesearch.com?p=705)

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I'm ready! Let's go! (https://gurus.pyimagesearch.com/courses/pyimagesearch-gurus-course/)

Resources & Links

- PyImageSearch Gurus Community (https://community.pyimagesearch.com/)
- PyImageSearch Virtual Machine (https://gurus.pyimagesearch.com/pyimagesearch-virtual-machine/)
- Setting up your own Python + OpenCV environment (https://gurus.pyimagesearch.com/setting-up-your-python-opencv-development-environment/)
- Course Syllabus & Content Release Schedule (https://gurus.pyimagesearch.com/course-syllabus-content-release-schedule/)
- Member Perks & Discounts (https://gurus.pyimagesearch.com/pyimagesearch-gurus-discounts-perks/)
- Official OpenCV documentation (http://docs.opencv.org/index.html)

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