uCertify

Course Outline

Image Processing Masterclass with Python

04 Aug 2025

1. Exercises, Quizzes, Flashcards & Glossary

   Number of Questions
2. Expert Instructor-Led Training
3. ADA Compliant & JAWS Compatible Platform
4. State of the Art Educator Tools
5. Award Winning Learning Platform (LMS)
6. Chapter & Lessons

   Syllabus

   Chapter 1: Preface

   Chapter 2: Basic Image and Video Processing

   Chapter 3: More Image Transformation and Manipulation

   Chapter 4: Sampling, Convolution, Discrete Fourier, Cosine and Wavelet Transform

   Chapter 5: Discrete Cosine/Wavelet Transform and Deconvolution

   Chapter 6: Image Enhancement

   Chapter 7: More Image Enhancement

   Chapter 8: Face Image Processing

   Videos and How To

1. Expert Instructor-Led Training

uCertify uses the content from the finest publishers and only the IT industry's finest instructors. They have a minimum of 15 years real-world experience and are subject matter experts in their fields. Unlike a live class, you can study at your own pace. This creates a personal learning experience and gives you all the benefit of hands-on training with the flexibility of doing it around your schedule 24/7.

2. ADA Compliant & JAWS Compatible Platform

uCertify course and labs are ADA (Americans with Disability Act) compliant. It is now more accessible to students with features such as:

- Change the font, size, and color of the content of the course
- Text-to-speech, reads the text into spoken words
- Interactive videos, how-tos videos come with transcripts and voice-over
- Interactive transcripts, each word is clickable. Students can clip a specific part of the video by clicking on a word or a portion of the text.

JAWS (Job Access with Speech) is a computer screen reader program for Microsoft Windows that reads the screen either with a text-to-speech output or by a Refreshable Braille display. Student can easily navigate uCertify course using JAWS shortcut keys.

3.  State of the Art Educator Tools

uCertify knows the importance of instructors and provide tools to help them do their job effectively. Instructors are able to clone and customize course. Do ability grouping. Create sections. Design grade scale and grade formula. Create and schedule assessments. Educators can also move a student from self-paced to mentor-guided to instructor-led mode in three clicks.

4.  Award Winning Learning Platform (LMS)

uCertify has developed an award winning, highly interactive yet simple to use platform. The SIIA CODiE Awards is the only peer-reviewed program to showcase business and education technology's finest products and services. Since 1986, thousands of products, services and solutions have been recognized for achieving excellence. uCertify has won CODiE awards consecutively for last 7 years:

- **2014**
    1. Best Postsecondary Learning Solution

- **2015**
    1. Best Education Solution
    2. Best Virtual Learning Solution
    3. Best Student Assessment Solution

4. Best Postsecondary Learning Solution
5. Best Career and Workforce Readiness Solution
6. Best Instructional Solution in Other Curriculum Areas
7. Best Corporate Learning/Workforce Development Solution

- **2016**
  1. Best Virtual Learning Solution
  2. Best Education Cloud-based Solution
  3. Best College and Career Readiness Solution
  4. Best Corporate / Workforce Learning Solution
  5. Best Postsecondary Learning Content Solution
  6. Best Postsecondary LMS or Learning Platform
  7. Best Learning Relationship Management Solution

- **2017**
  1. Best Overall Education Solution
  2. Best Student Assessment Solution
  3. Best Corporate/Workforce Learning Solution
  4. Best Higher Education LMS or Learning Platform

- **2018**
  1. Best Higher Education LMS or Learning Platform
  2. Best Instructional Solution in Other Curriculum Areas
  3. Best Learning Relationship Management Solution

- **2019**
  1. Best Virtual Learning Solution
  2. Best Content Authoring Development or Curation Solution
  3. Best Higher Education Learning Management Solution (LMS)

- **2020**
  1. Best College and Career Readiness Solution
  2. Best Cross-Curricular Solution
  3. Best Virtual Learning Solution

5. Chapter & Lessons

uCertify brings these textbooks to life. It is full of interactive activities that keeps the learner engaged. uCertify brings all available learning resources for a topic in one place so that the learner can efficiently learn without going to multiple places. Challenge questions are also embedded in the chapters so learners can attempt those while they are learning about that particular topic. This helps them grasp the concepts better because they can go over it again right away which improves learning.

Learners can do Flashcards, Exercises, Quizzes and Labs related to each chapter. At the end of every lesson, uCertify courses guide the learners on the path they should follow.

Syllabus

- Introduction
- Applying Euclidean and Affine transformation on an image
- Implement image transformation with warping/inverse warping using scikit-image and scipy.ndimage
- Image projection with homography using scikit-image
- Detecting Colors and Changing Colors of Objects with OpenCV-Python
- Detecting Covid-19 Virus Objects with Colors in the HSV Colorspace
- Finding duplicate and similar images with hashing
- Summary
- Questions
- References

Chapter 4: Sampling, Convolution, Discrete Fourier, Cosine and Wavelet Transform

- Introduction
- Fourier Transform Basics
- Sampling to increase/decrease the resolution of an image
- Denoising an image with LPF/Notch filter in the Frequency domain
- Blurring an Image with an LPF in the Frequency Domain
- Edge detection with high pass filters (HPF) in the frequency domain

- Implementation of homomorphic filters
- Summary
- Questions
- References

Chapter 5: Discrete Cosine/Wavelet Transform and Deconvolution

- Introduction
- Template matching with phase-correlation in the frequency domain
- Image compression with the Discrete Cosine Transform (DCT)
- Image denoising with Discrete Cosine Transform (DCT)
- Deconvolution for image deblurring
- Image Denoising With Wavelets
- Image fusion with wavelets
- Secure spread spectrum digital watermarking with the DCT
- Questions
- References

Chapter 6: Image Enhancement

- Introduction

- Image Enhancement Filters with PIL for noise removal and smoothing
- Unsharp masking to sharpen an image
- Averaging of images to remove random noise
- Image denoising with curvature-driven algorithms
- Contrast stretching/histogram equalization with opencv-python
- Fingerprint cleaning and minutiaes extraction
- Edge detection with LOG/zero-crossing, canny versus holistically-nested
- Summary
- Questions
- References

Chapter 7: More Image Enhancement

- Object detection with Hough transform and colors
- Object Saliency Map, Depth Map, And Tone Map (HDR) With OpenCV-python
- Pyramid blending
- Image Super Resolution with Deep Learning Model (SRGAN)
- Low-Light Image Enhancement Using CNNs
- Realistic Image Dehazing Using Deep Neural Net
- Distributed image processing with Dask

- Summary
- Questions
- References

Chapter 8: Face Image Processing

- Introduction
- Face morphing with dlib, scipy.spatial, and opencv-python
- Facial Landmark Detection with Deep Learning Models
- Implementation of face swapping
- Implementation of face parsing
- Face recognition with FisherFaces
- Face detection and recognition with Microsoft Cognitive Vision APIs
- Summary
- Questions
- References