



Department of Software Engineering

CS 474: Computer Vision

Class: BESE-7

Lab 2: Image pyramid creation

Date: 4th Feb 2020

Time: 10:00 am-1:00 pm

Instructor: Dr. Muhammad Moazam Fraz

Lab Engineer: Ms Anum Asif

Course Learning Outcomes (CLOs)

Upon completion of the course, students should demonstrate the ability to:		PLO Mapping**	BT Level*
CLO 1	Understand computer vision algorithms and tools and techniques.	PLO 1	C2
CLO 2	Develop solutions for image/video understanding and recognition.	PLO 3	C3
CLO 3	Use modern tools to solve practical problems.	PLO 5	C5

* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain

○ Knowledge(C-1), Comprehension(C-2), Application(C-3), Analysis(C-4), Synthesis(C-5), Evaluation(C-6)

** PLOs are published on department website



Lab 3 : Image pyramid creation

Learning Outcome

CLO 1: Understand computer vision algorithms and tools and techniques.

Tools/Software Requirement

Python / MATLAB

Description

This lab will provide you an opportunity to review two ways to create image pyramids using Python, OpenCV, and sickit-image.

What are image pyramids?

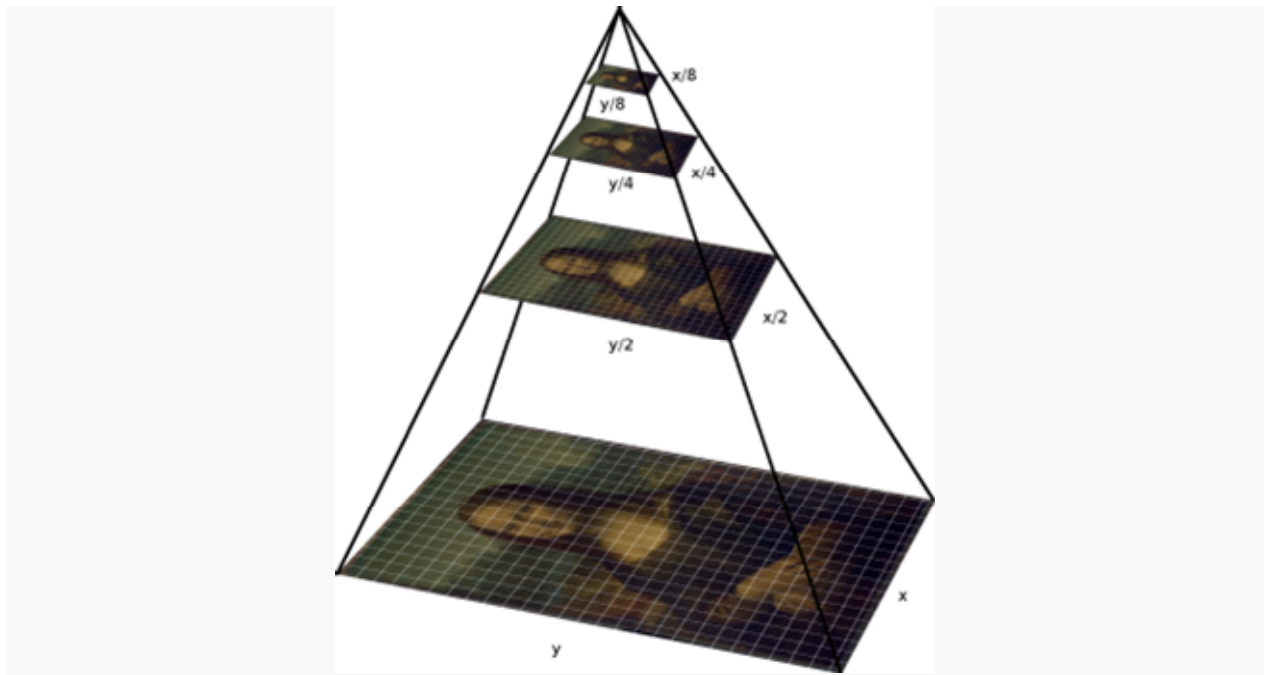


Figure : An example of an image pyramid. At each layer of the pyramid the image is downsized and (optionally) smoothed

An “image pyramid” is a **multi-scale representation** of an image. Utilizing an image pyramid allows us to **find objects in images at different scales** of an image. And when combined with a **sliding window** we can find objects in images in various locations.

At the bottom of the pyramid we have the original image at its original size (in terms of width and height). And at each subsequent layer, the image is resized (subsamped) and optionally smoothed (usually via Gaussian blurring). The image is progressively subsampled until some stopping criterion is met, which is normally a minimum size has been reached and no further subsampling needs to take place.



Lab Task

Load an image (any sample image) and experiment with pyramid creation.

How to create Image Pyramids?

Method #1: Image Pyramids with Python and OpenCV

start by importing the `imutils` package which contains a handful of image processing convenience functions that are commonly used such as resizing, rotating, translating, etc.

The package is also pip-installable:

```
$ pip install imutils
```

Write a python method, `pyramid`, which takes input parameters of the image, the scale and the stopping size of the smallest image in the pyramid.

```
def pyramid(image, scale=1.5, minSize=(30, 30)):
```

- This method should keep looping over the pyramid
- compute the new dimensions of the image and resize it
- if the resized image does not meet the supplied minimum size, then stop constructing the pyramid
- Display the image pyramid

Method #2: Image pyramids with Python + scikit-image

The second method to image pyramid construction utilizes Python and scikit-image.

The [scikit-image](#) library already has a built-in method for constructing image pyramids called `pyramid_gaussian`, which you can read more about [here](#).

You can also try the scikit-image's method `pyramid_laplacian(image)` and display its results

Deliverable

- Jupyter Notebook submitted on LMS