

Day 9 In-class image processing competition

Theme: Image Interpolation

KE Unit7, Developing Intelligent Systems for Performing Business Analytics, Year 2018

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IMPORTANT NOTICE

*It is OPTIONAL for you to attend this competition.
This competition is NOT continuous assessment of this course.
No mark will be given.
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Introduction

Image interpolation is a key computer vision task with the aim to enlarge the input image to construct another high-resolution image. In this competition, you need to develop an image interpolation algorithm, then apply the algorithm on the input test image (say, image0_input.png) to construct a 2*2 higher-resolution image, and finally compare the constructed image with the ground truth image (say, image0_truth.png) to evaluate the PSNR performance. You need to submit the average PSNR performance of your developed algorithm on 7 test images, which are available in IVLE, and they are selected from the dataset used in CVPR challenge and illustrated in Appendix 1. An example of Python code is provided in Appendix 2.

Submission guideline

- Submit “your average PSNR + your class” in IVLE discussion forum, for example: “33.9474, Saturday class”. No need to submit any sourcecode, just one line of text message works.
- Multiple submission/attempts are allowed.
- You need to submit a single PSNR value, which is the average PSNR for all 7 test images.
- Your submitted PSNR value should have 4 decimal places, say, 33.9474.
- **Deadline: 17 August 2018 (Friday), 23:59hr.**

Evaluation criterion

- The submission with higher PSNR value wins.
- For the submissions with same PSNR values, the earlier submission wins.
- You can use your own algorithm, or any open-source code downloaded from the Internet.
- You can use any programming language, such as Python, C/C++, Matlab, etc.
- You need to apply the same parameter setting in your algorithm for all 7 test images.
- You **cannot** use commercial software, such as Photoshop, and cloud-based API, such as AWS.
- You don’t need to submit your source code in IVLE; however, the Champion submission is required to share the source code that can reproduce the submission.

Award

- **The class Champion** (1 Champion for part-time students in Saturday class, 1 Champion for full-time students in Tuesday class) will be invited to share learning experience in this competition during the class.

Key reference

1. Conventional image interpolation provided by OPENCV, <http://tanbakuchi.com/posts/comparison-of-opencv-interpolation-algorithms/>
2. Advanced edge-adaptive image interpolation, see various algorithms available in Section “Image interpolation and super-resolution”, available at <https://xinli.faculty.wvu.edu/reproducible-research/reproducible-research-in-image-processing>
3. Learning-based image interpolation (also called single image super-resolution), <https://github.com/IvoryCandy/super-resolution>
4. CVPR challenge, <http://www.vision.ee.ethz.ch/ntire18/>

Appendix 1

The following seven test images used in the competition. All are gray-scale images.







Test image	Input image (resolution)	Ground truth image (resolution)
	Image0_input.png (256*256)	Image0_truth.png (512*512)
	Image1_input.png (128*128)	Image1_truth.png (256*256)
	Image2_input.png (176*144)	Image2_truth.png (352*288)
	Image3_input.png (293*195)	Image3_truth.png (586*390)

	Image4_input.png (250*240)	Image4_truth.png (500*480)
	Image5_input.png (256*256)	Image5_truth.png (512*512)
	Image6_input.png (256*256)	Image6_truth.png (512*512)

Appendix 2

A Python3 example code 'example.py' is provided in IVLE.

```
import cv2
import numpy as np
import math

def psnr(img1, img2):
    mse = np.mean( (img1 - img2) ** 2 )
    if mse == 0:
        return 100
    PIXEL_MAX = 255.0
    return 20 * math.log10(PIXEL_MAX / math.sqrt(mse))

psnr_result = [0] * 7
# Conduct test for all 7 test images
for i in range(7):
    # Load the ground truth image
    img_truth = cv2.imread('dataset\image_' + str(i) + '_truth.png')

    # Load the input low-resolution image
    img_input = cv2.imread('dataset\image_' + str(i) + '_input.png')

    # Use your own code here to perform 2*2 interpolation on the input image
    img_output = cv2.resize(img_input, None, fx=2, fy=2, interpolation = cv2.INTER_CUBIC)

    # Calculate the PSNR by comparing your output image and the ground truth image
    psnr_result[i] = psnr(img_truth, img_output)

# Submit the average PSNR for all 7 test images
print('Your need to submit average PSNR {:.4f} in IVLE forum'.format(np.mean(psnr_result)))
```