ITA06 Image Recognition and Understanding

Report 1: Image Feature and Detection

Objective: This exercise report to check how to use image feature and difference of each features. Please check the limitation of features.

Exercise Environment:

* You can use any image processing tools, but this course recommended to use OpenCV-Python or Matlab.
* Matlab can use on STD5,6. Also you can borrow from SSB.
  + Installation Video: <https://jp.mathworks.com/videos/how-to-install-matlab-1525083586145.html>
  + Primer for Image Processing toolbox: https://jp.mathworks.com/help/images/getting-started-with-image-processing-toolbox.html
* OpenCV-Python is also able to use on your computer if you can install them
  + Python Beginners Guide: <https://wiki.python.org/moin/BeginnersGuide>
  + Using Python on Windows: <https://docs.python.org/3.8/using/windows.html>
    - Now Python 3.9.0 is available, but I recommend using 3.8.6 now.
  + Please set paths.
  + OpenCV-Python installation: <https://pypi.org/project/opencv-python/>
  + OpenCV-Contrib-Python installation: <https://pypi.org/project/opencv-contrib-python/>
  + Some other libraries should be installed.
  + OpenCV Python Tutorial: <https://docs.opencv.org/4.4.0/d6/d00/tutorial_py_root.html>

Exercises: Extract image features from images

* + Please check this site: <https://docs.opencv.org/4.4.0/db/d27/tutorial_py_table_of_contents_feature2d.html> or <https://jp.mathworks.com/help/vision/feature-detection-and-extraction.html>
  + Construct some codes to extract image features about:
    - Harris Corner
    - SURF
    - ORB
    - MSER
    - KAZE or AKAZE
  + Please to check each method can pick up what feature on each pure image
    - Empty office
    - Plain road
    - Normal road
    - Forestry road
    - U-Aizu lecture room
    - U-Aizu
    - Manga Character
    - Persons
  + Please compare and discuss how to change the appearance of features with some noisy images (salt and pepper noise, gaussian blur) and pure images.
    - You can use matching between two images.
    - Compare with number of detected features and corresponding features
    - About Harris and MSER, can you do this work easily?