# Software installation requirements

1. The compilation environment for GAS is Visual Studio 2019 (Community version).

2. GAS is based on the open-source software OpenCV 3.6, so you must configure the OpenCV runtime environment before you can run the software. See https://blog.csdn.net/ChenYijia\_123/article/details/126155435 for configuration instructions.

# . Photo shooting requirements

1. The camera is mounted vertically downwards on a tripod to keep the lens perpendicular to the capture plane.

2. Prior to the shooting, each sample to be photographed is equipped with a calibrator (e.g., a square piece of paper of known size in red) which serves to establish a direct relationship between the pixel size and the actual metric size, which allows the shot to be taken at any height independent of the focal length of the digital camera. In addition, to ensure that the calibrator is not distorted during filming, it must be flattened before recording the image.

3. Filming in the laboratory and the field is always done in natural light. Each recording process is photographed three times, and the best images are then selected for post-analysis.

# How to operate the software

1. Run GAS, follow the prompts, enter the address of the image to be tested, and hit enter.

2. Follow the prompts to enter the area of the calibrator (in cm2).

3. Follow the prompts to pick up the calibrator with the mouse in the gravel image that pops up. Click the "Esc" key on the keyboard to exit after picking. 4.

4. Follow the prompts to enter the grayscale image segmentation threshold (usually 70~135) and click enter to see if the result is satisfactory. If satisfied, enter y. If not, enter n and click enter to continue entering the segmentation threshold until you get a satisfactory result.

5. Follow the prompts to enter the Canny upper and lower thresholds (the upper threshold is 190~255, and the lower threshold is 5~135) and click enter to see if the result is satisfactory. If satisfied, enter y. If not, enter n and click enter to continue entering the segmentation threshold until you get a satisfactory result.

6. After completing the above settings, click Enter to complete the automatic image segmentation.