Homework 2

NYCU Computer Vision 2024 Spring

Student ID : 312605001 / Student Name : 歐庭維

1. Image Stitching
2. Base task

Stitch 2 image

一張含有 草, 戶外, 體育場地, 天空 的圖片

自動產生的描述

Stitch 3 image

一張含有 草, 戶外, 螢幕擷取畫面, 體育場地 的圖片

自動產生的描述

1. Challenging task

一張含有 戶外, 建築, 樹狀, 螢幕擷取畫面 的圖片

自動產生的描述

1. My Complementation
2. Stitching Pipline

一張含有 文字, 螢幕擷取畫面, 圖表, 行 的圖片

自動產生的描述

1. SIFT

I use OpenCV “SIFT\_create” to get the key point position and its descriptor in this part.

一張含有 文字, 螢幕擷取畫面, 字型 的圖片

自動產生的描述

1. KNN

In my first trial, I use “cv.BFMatcher / knnMatch” to find the same kp between two image.

一張含有 文字, 螢幕擷取畫面, 字型 的圖片

自動產生的描述

I also tried to implement the knn matcher by myself. The threshold remains the same, and the output stitched image look the same.

一張含有 文字, 螢幕擷取畫面 的圖片

自動產生的描述

1. Homography matrix

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自動產生的描述

After obtaining good matches, the next step is to calculate the homography matrix between two images. It's important to remember to standardize the homography matrix

before returning it.

一張含有 文字, 螢幕擷取畫面 的圖片

自動產生的描述

1. RANSAC

一張含有 文字, 螢幕擷取畫面 的圖片

自動產生的描述

Due to numerous misaligned pairs, I resort to using RANSAC (Random Sample Consensus) to find the best homography matrix. After conducting several trials, I found that setting the parameters "ransac\_threshold=5" and "iteration=1000" consistently yields stable results in each case.

1. Cylinder projection

After many trial, I have determined that setting the focal length to 4000 produces the best results in this particular context.一張含有 文字, 螢幕擷取畫面, 字型 的圖片

自動產生的描述

|  |  |
| --- | --- |
| Focal = 1200 | Focal = 2200 |
|  |  |

1. Crop image

I stitch each image from left to right, so the left image will be distorted. So I crop the distorted part after stitching each images.

一張含有 文字, 螢幕擷取畫面, 字型 的圖片

自動產生的描述

1. Remove Black Border

To address the sharp edge at the jointed place when stitching two images together, I employ the "medianBlur" technique to smooth out the transition and create a more seamless blend.

一張含有 字型, 文字, 螢幕擷取畫面, 圖形 的圖片

自動產生的描述

1. Stitching IMG

In this part, I use “cv.warpPerspective” to transfer the image by the best homography matrix and stitching the left and right image together.

一張含有 文字, 螢幕擷取畫面, 行, 圖表 的圖片

自動產生的描述

一張含有 文字, 螢幕擷取畫面 的圖片

自動產生的描述

1. Discuss different blending method result.
2. Considering the Brightness

I noticed significant differences in the ISO values in the challenge task, which could lead to abnormal stitching results. Therefore, before stitching each image, I calculate the brightness of each one and find the average brightness. Then, I calibrate each image to the same brightness to address this issue.

|  |  |
| --- | --- |
| Considering Brightness | Without Considering Brightness |
| 一張含有 戶外, 建築, 樹狀, 螢幕擷取畫面 的圖片  自動產生的描述 | 一張含有 樹狀, 戶外, 建築, 螢幕擷取畫面 的圖片  自動產生的描述 |

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自動產生的描述

1. Distorted issue in the base case

Since I stitched the first two photos together before overlaying them with the others, it causes the leftmost image (the first one) to be continuously affected by the homography matrix in subsequent processing, resulting in exaggerated deformations. To address this issue, I crop out the excessively deformed areas after each stitching process.

一張含有 草, 戶外, 體育場地, 人造草皮 的圖片

自動產生的描述