**Computer Vision HW1 Report**

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**Part 1.**

* **Visualize the DoG images of 1.png.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | DoG Image (threshold = 3) |  | DoG Image (threshold = 3) |
| DoG1-1.png |  | DoG2-1.png |  |
| DoG1-2.png |  | DoG2-2.png |  |
| DoG1-3.png |  | DoG2-3.png |  |
| DoG1-4.png |  | DoG2-4.png |  |

* **Use three thresholds (1,2,3) on 2.png and describe the difference.**

|  |  |
| --- | --- |
| Threshold | Image with detected keypoints on 2.png |
| 1 |  |
| 2 |  |
| 3 |  |

(describe the difference)

隨著threshold的提高，keypoints會變少，更能精確地抓到邊緣。相反地threshold較低的話，會導致keypoints抓到一些變化不大的地方，使得邊緣的檢測較為粗糙、不精準。

**Part 2.**

* **Report the cost for each filtered image.**

|  |  |
| --- | --- |
| Gray Scale Setting | Cost (1.png) |
| cv2.COLOR\_BGR2GRAY | 1207799 |
| R\*0.0+G\*0.0+B\*1.0 | 1439568 |
| R\*0.0+G\*1.0+B\*0.0 | 1305961 |
| R\*0.1+G\*0.0+B\*0.9 | 1393620 |
| R\*0.1+G\*0.4+B\*0.5 | 1279697 |
| R\*0.8+G\*0.2+B\*0.0 | 1127913 |

|  |  |
| --- | --- |
| Gray Scale Setting | Cost (2.png) |
| cv2.COLOR\_BGR2GRAY | 183850 |
| R\*0.1+G\*0.0+B\*0.9 | 77882 |
| R\*0.2+G\*0.0+B\*0.8 | 86023 |
| R\*0.2+G\*0.8+B\*0.0 | 188019 |
| R\*0.4+G\*0.0+B\*0.6 | 128341 |
| R\*1.0+G\*0.0+B\*0.0 | 110862 |

* **Show original RGB image / two filtered RGB images and two grayscale images with highest and lowest cost.**

|  |  |  |
| --- | --- | --- |
| Original RGB image (1.png) | Filtered RGB image and Grayscale image of  Highest cost | Filtered RGB image and Grayscale image of  Lowest cost |
|  |  |  |
|  |  |  |

(Describe the difference between those two grayscale images)

cost大的灰階圖難以看出顏色差異，導致一些原本是顏色差異很大的區塊卻看起來顏色相近。

而cost小的灰階圖可見紅色楓葉的部分較白較明顯，相較cost大的灰階圖較能看出顏色差異。

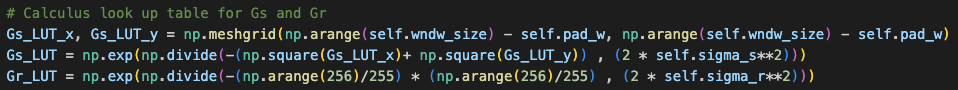
|  |  |  |
| --- | --- | --- |
| Original RGB image (2.png) | Filtered RGB image and Grayscale image of  Highest cost | Filtered RGB image and Grayscale image of  Lowest cost |
|  |  |  |
|  |  |  |

(Describe the difference between those two grayscale images)

cost大的灰階圖各種顏色的差異不明顯，如原圖方塊內的橘色和紫色在灰階圖卻看起來顏色相近。

而cost小的相較於cost大的灰階圖更能看出顏色差異，不論是方塊外的紅色與藍色，或是方塊內的橘色與紫色，都比起cost大的灰階圖更能看出色差。

* **Describe how to speed up the implementation of bilateral filter.**



利用look up table的方式可以節省計算，讓每次計算range kernel的時候都能回去查表，之後在算Gr的時候就不需要每格都去作計算。