**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上升，選取到的keypoints數量減少，並且留下的keypoints在那些變化更為明顯的邊界上。

**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 | 183851 |
| R\*0.1+G\*0.0+B\*0.9 | 77884 |
| 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最低的guidance image在邊界及不同區塊都有更明顯的分別，而cost最高的則讓整體有點混合在一起，與原圖的特徵相差較大。

|  |  |  |
| --- | --- | --- |
| 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最高的guidance image在對應原圖不同顏色的邊界顯得很不明顯，沒辦法清楚分出區塊，而cost最低的guidance image 則還能有明顯邊緣與對比，因此做為guidance效果最好。

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

在jbf中，每個pixel需要計算window size\*window size個pixel疊加的資訊才能得到，因此我將每個pixel在filter的window中，對應到相同位移的pixel一起計算，如此一來就可以平行算出整張圖片對應filter中同樣位移的圖片，最後再將這些圖片疊加即可，過程中僅需用到2個for loop來算出window size\*window size數量的圖片。