**電腦視覺**

**Homework 9**

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Description

This is the report for the ninth homework for Computer Vision 2019. It is completed in full.

The environment used is Windows, with the code being written in Python 3 with the cv2 module.

Methodology

The method described in the slides (on the homework website) is followed.

The resulting Python program, **hw9.py**, and save seven images: "robert", "prewitt", "sobel", "frei", "kirsch", "robinson", "nevatiababu" and then a ".bmp" at the end of each.

The thresholds follow the suggested values on the homework webpage.

Each border is extended using BORDER\_REPLICATE, i.e. the method in the slides.

Code Fragment

The fragment shows only the Roberts operator as most of the operations are the same, barring minor variations:

1. **def** roberty(img, threshold: int=30):
2. extended = cv2.copyMakeBorder(img, 0, 1, 0, 1, cv2.BORDER\_REPLICATE).astype(np.short)
3. new\_img = img.copy(); h, w = new\_img.shape[:2]
4. r1\_meow = np.array([[-1, 0], [0, 1]])
5. r2\_meow = np.array([[0, -1], [1, 0]])
6. **for** i **in** range(h):
7. **for** j **in** range(w):
8. r1 = np.sum(extended[i:i+2,j:j+2] \* r1\_meow)
9. r2 = np.sum(extended[i:i+2,j:j+2] \* r2\_meow)
10. new\_img[i,j] = 0 **if** math.sqrt(r1\*\*2 + r2\*\*2) >= threshold **else** 255
11. **return** new\_img

Images

Each image is identified via its edge detection operator and the threshold used:

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| --- | --- | --- |
| Roberts (30) | Prewitt (24) | Sobel (38) |
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| --- | --- | --- |
| Frei and Chen (30) | Kirsch (135) | Robinson (43) |
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| Nevatia-Babu (12500) |
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