1122 Digital Image Processing Assignment #6

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主題: **Run-Length Based Image Compression** 影像壓縮練習

專案目標:

計算圖片中大小木榫的數量。

開發環境:

- 用的作業系統:Windows
- 開發環境:VScode
- 用的套件:OpenCV, numpy
- 程式語言:Python 3.12.0

程式架構與功能說明:

- 讀取及預處理圖片
  - 轉成灰階

```
image = cv2.imread('wood-dowels.tif', cv2.IMREAD_COLOR)
gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
```

- 二值化:可提高準確性

```
_, binary = cv2.threshold(gray, 50, 255, cv2.THRESH_BINARY_INV)
```

- 形態學處理
  - 先侵蝕再膨脹以去除噪聲

```
kernel = np.ones((3, 3), np.uint8)
binary = cv2.erode(binary, kernel, iterations=1)
binary = cv2.dilate(binary, kernel, iterations=1)
```

- 高斯模糊去噪:平滑邊緣

```
blurred = cv2.GaussianBlur(gray, (9, 9), 2)
```

- 霍夫變換來偵測大小圓
  - 大小圓分開設定

```
small_circles = cv2.HoughCircles(blurred, cv2.HOUGH_GRADIENT, dp=1, minDist=20,
                                 param1=200, param2=small_param2, minRadius=small_minRadius, maxRadius=small_ma
```

- 確認偵測到的圓

```
if small_circles is not None:
    small_circles = np.uint16(np.around(small_circles))

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```
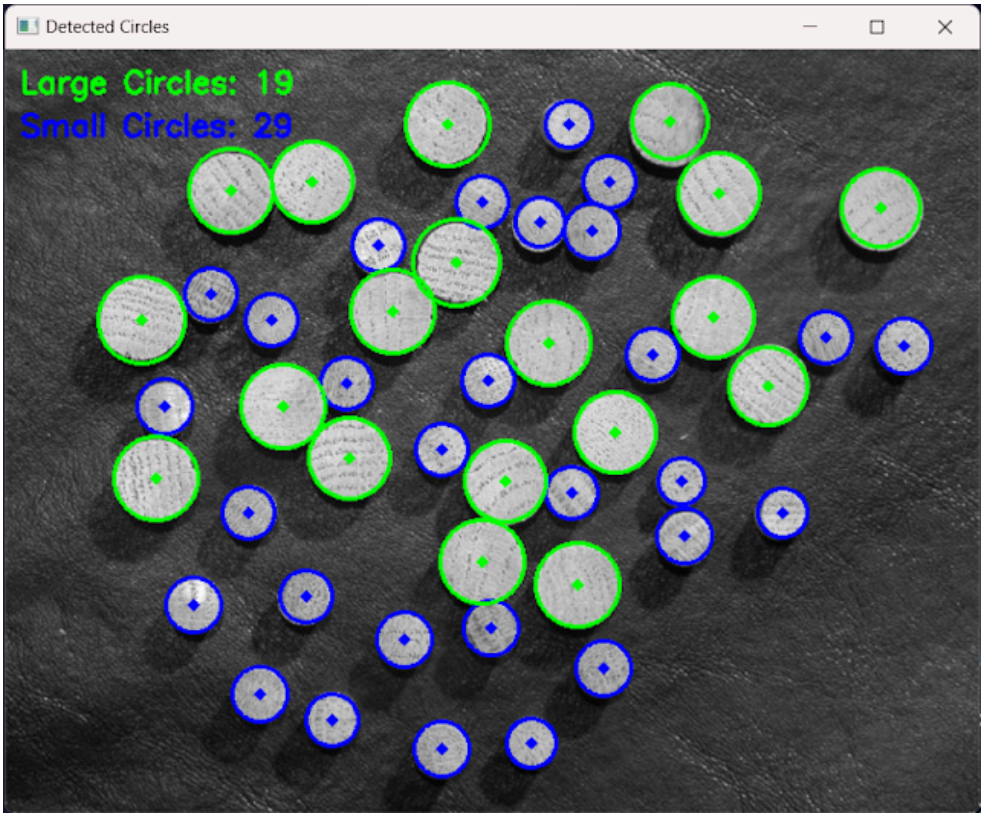

- 結果
  - 繪製偵測到的圓形
  - 計算小圓和大圓的數量
  - 在影像上顯示圓的數量
  - 顯示偵測結果的圖

＊二值化及形態學沒做也可以完成檢測。

成果展示與討論:




```
PS C:\Users\USER\Desktop\影像處理\assignment6> python hw6.py
大木圓榫數量: 19
小木圓榫數量: 29
```