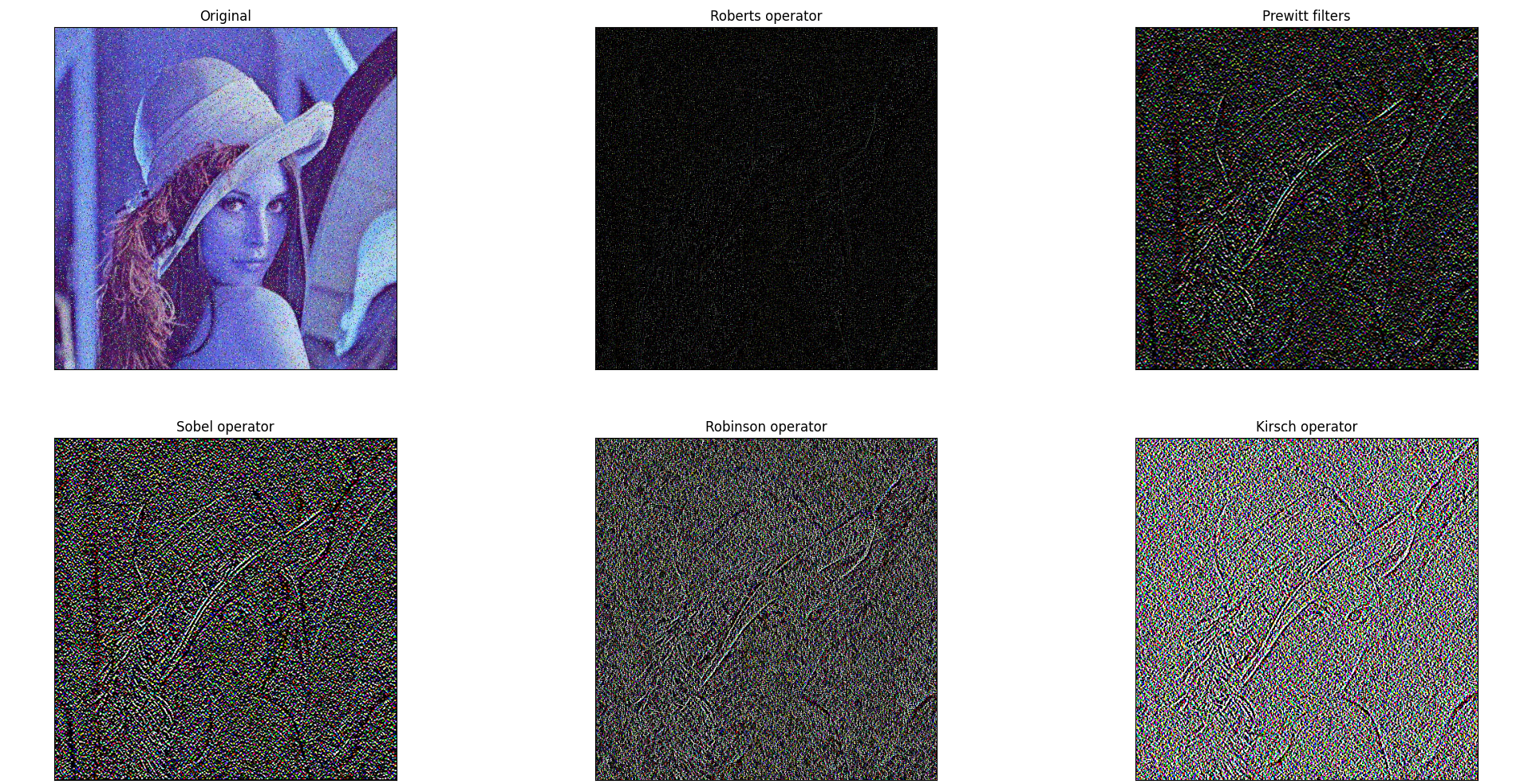
**Computer vision – HW5**

# 程式碼

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| # WeiWen Wu 2023-10-18  **from** numpy **import** ndarray**,**array**,**float32  **import** cv2 **as** cv  **from** matplotlib **import** pyplot **as** plt  img **=** cv**.**imread**(**'lena\_noise.jpg'**)**  **def** filter2D**(**name**:str,**kernel**:tuple[**ndarray**,**ndarray**],**n**:int):**  kernel\_x**,** kernel\_y **=** kernel  dst **=** cv**.**filter2D**(**img**,** **-**1**,** kernel\_x**)**  dst **=** cv**.**filter2D**(**dst**,** **-**1**,** kernel\_y**)**  plt**.**subplot**(**n**),** plt**.**imshow**(**dst**),** plt**.**title**(**name**)**  plt**.**xticks**([]),** plt**.**yticks**([])**    cv**.**imwrite**(**f"./HW5/{name}.png"**,**dst**,[int(**cv**.**IMWRITE\_PNG\_COMPRESSION**),**0**])**  ### Plot original image. ###  plt**.**subplot**(**231**),** plt**.**imshow**(**img**),** plt**.**title**(**"Original"**)**  plt**.**xticks**([]),** plt**.**yticks**([])**  # Define the kernel, using a N×N NumPy array, where N is odd.  roberts\_operator **=** array**([[**1**,**0**,**0**],[**0**,-**1**,**0**],[**0**,**0**,**0**]],**float32**),** \  array**([[**0**,**1**,**0**],[-**1**,**0**,**0**],[**0**,**0**,**0**]],**float32**)**  filter2D**(**"Roberts operator"**,**roberts\_operator**,**232**)**  prewitt\_filters**=**array**([[-**1**,**0**,**1**],[-**1**,**0**,**1**],[-**1**,**0**,**1**]],**float32**),** \  array**([[-**1**,-**1**,-**1**],[**0**,**0**,**0**],[**1**,**1**,**1**]],**float32**)**  filter2D**(**"Prewitt filters"**,**prewitt\_filters**,**233**)**  sobel\_operator**=**array**([[-**1**,**0**,**1**],[-**2**,**0**,**2**],[-**1**,**0**,**1**]],**float32**),** \  array**([[-**1**,-**2**,-**1**],[**0**,**0**,**0**],[**1**,**2**,**1**]],**float32**)**  filter2D**(**"Sobel operator"**,**sobel\_operator**,**234**)**  robinson\_operator**=**array**([[**1**,**1**,**1**],[**1**,-**2**,**1**],[-**1**,-**1**,-**1**]],**float32**),** \  array**([[-**1**,**1**,**1**],[-**1**,-**2**,**1**],[-**1**,**1**,**1**]],**float32**)**  filter2D**(**"Robinson operator"**,**robinson\_operator**,**235**)**  kirsch\_operator**=**array**([[**3**,**3**,**3**],[**3**,**0**,**3**],[-**5**,-**5**,-**5**]],**float32**),** \  array**([[-**5**,**3**,**3**],[-**5**,**0**,**3**],[-**5**,**3**,**3**]],**float32**)**  filter2D**(**"Kirsch operator"**,**kirsch\_operator**,**236**)**  ### Show matplotlib. ###  plt**.**show**()** |

# 成果圖

從下圖來看，使用基爾希運算符(Kirsch operator)效果較好。



# 附錄(原始圖片)

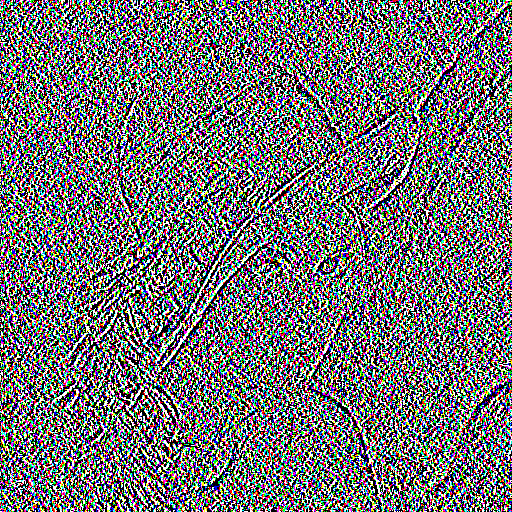


Figure 1 Kirsch operator

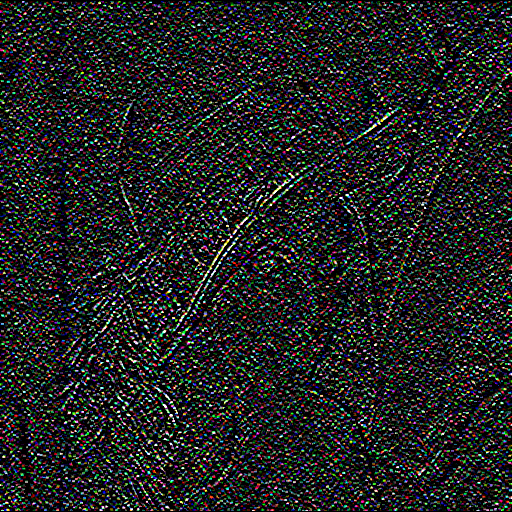


Figure 2 Prewitt filters



Figure 3 Roberts operator

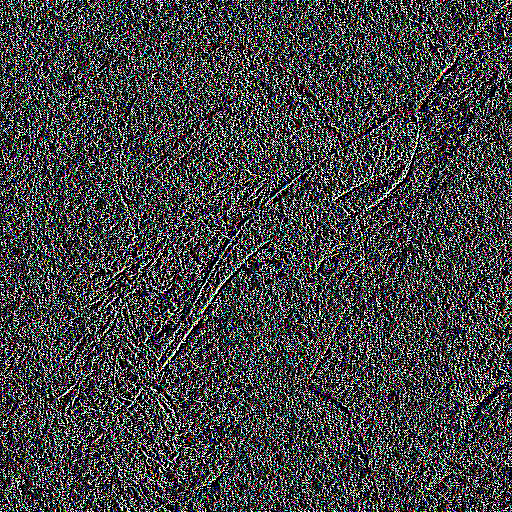


Figure 4 Robinson operator



Figure 5 Sobel operator