Image thresholding

Thresholding is the process by which we create masks in opencv. Mask are imges which has only 2 colors white and black. We are going to look two thresholding funcions

1. `cv2.threshold`
2. `cv2.adaptiveThreshold`

Note : For thresholding to work we need gray scale images

1) `cv2.threshold`

This fucnion takes in 4 arguments. `cv2.threshold(image array, threshold value, max value, Threshold Type)`

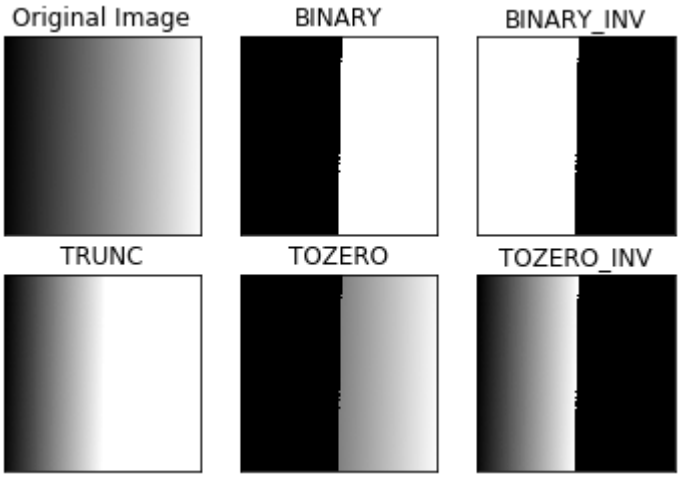
- **Threshold value** - If pixel value is greater than the threshold value, it is assigned one value (may be white), else it is assigned another value (may be black).
- **max value** - The value assigned to the pixel whcih is greater than the threshold
- **Threshold Type** - There are 5 types of threshold availabel in opencv
  - cv2.THRESH_BINARY
  - cv2.THRESH_BINARY_INV
  - cv2.THRESH_TRUNC
  - cv2.THRESH_TOZERO
  - cv2.THRESH_TOZERO_INV

We will have a look at each one of this methods

In [5]:
```
import cv2
import numpy as np


img = cv2.imread('images/gradient.png',0)

ret,thresh1 = cv2.threshold(img,127,255,cv2.THRESH_BINARY)

while True:
    cv2.imshow('image',thresh1)
    cv2.imshow("actual",img)
    key = cv2.waitKey(100)
    if key == ord('q'):
        break

cv2.destroyAllWindows()
```

We Will be using matplotlib to plot all images in a single grid

In [10]:
```python
import cv2
import numpy as np
from matplotlib import pyplot as plt

img = cv2.imread('images/gradient.png',0)
ret,thresh1 = cv2.threshold(img,127,255,cv2.THRESH_BINARY)
ret,thresh2 = cv2.threshold(img,127,255,cv2.THRESH_BINARY_INV)
ret,thresh3 = cv2.threshold(img,127,255,cv2.THRESH_TRUNC)
ret,thresh4 = cv2.threshold(img,127,255,cv2.THRESH_TOZERO)
ret,thresh5 = cv2.threshold(img,127,255,cv2.THRESH_TOZERO_INV)

titles = ['Original Image','BINARY','BINARY_INV','TRUNC','TOZERO','TOZERO_INV']
images = [img, thresh1, thresh2, thresh3, thresh4, thresh5]

for i in range(0,6):
    plt.subplot(2,3,i+1)
    plt.imshow(images[i],'gray')
    plt.title(titles[i])
    plt.xticks([])
    plt.yticks([])

plt.show()
```



2) `cv2.adaptiveThreshold`

There are two types of adaptive thresholding :

1. `cv2.ADAPTIVE_THRESH_MEAN_C` : threshold value is the mean of neighbourhood area.
2. `cv2.ADAPTIVE_THRESH_GAUSSIAN_C` : threshold value is the weighted sum of neighbourhood values where weights are a gaussian window.

syntax for adaptive thresholding

`cv2.adaptiveThreshold(imgage array, max value, adaptive threshold type, threshold type, block size, constant)`

- Threshold type - The threshold can only be `cv2.THRESH_BINARY` or `cv2.THRESH_BINARY_INV`
- block size - The kernal size use to calculate the mean and the weighted mean (the samller the block size fastert the computation)
- consatnt - The value that is dedcucted from the calculated adaptive thershold

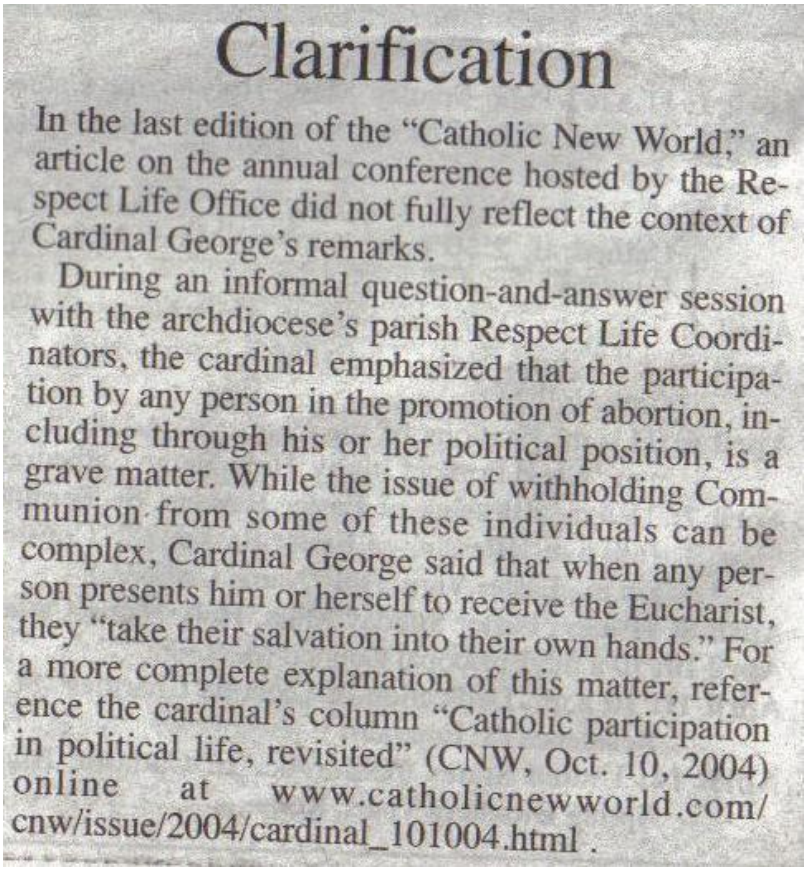
In [6]:

```
import cv2
import numpy as np
from matplotlib import pyplot as plt

img = cv2.imread('images/sudoku.png',0)
img = cv2.medianBlur(img,5)

ret,th1 = cv2.threshold(img,127, 255, cv2.THRESH_BINARY)
th2 = cv2.adaptiveThreshold(img, 255, cv2.ADAPTIVE_THRESH_MEAN_C, cv2.THRESH_BINARY,5,2
th3 = cv2.adaptiveThreshold(img, 255, cv2.ADAPTIVE_THRESH_GAUSSIAN_C, cv2.THRESH_BINARY

while True:
    cv2.imshow('original', img)
    cv2.imshow('notmal threshold', th1)
    cv2.imshow('adaptive threshold mean', th2)
    cv2.imshow('adaptive threshold Gaussian', th2)

    if cv2.waitKey(50) == ord('q'):
        break

cv2.destroyAllWindows()
```

Home Work

1) Threshold the below image such that the shaded region of the circle becomes black

2) Threshold the below image such that the text becomes clear



Clarification

In the last edition of the "Catholic New World," an article on the annual conference hosted by the Respect Life Office did not fully reflect the context of Cardinal George's remarks.

During an informal question-and-answer session with the archdiocese's parish Respect Life Coordinators, the cardinal emphasized that the participation by any person in the promotion of abortion, including through his or her political position, is a grave matter. While the issue of withholding Communion from some of these individuals can be complex, Cardinal George said that when any person presents him or herself to receive the Eucharist, they "take their salvation into their own hands." For a more complete explanation of this matter, reference the cardinal's column "Catholic participation in political life, revisited" (CNW, Oct. 10, 2004) online at www.catholicnewworld.com/cnw/issue/2004/cardinal_101004.html .

In [ ]:

Otsu's Binarization

To be only done later if required else skip()