

Principles and Applications of Digital Image Processing

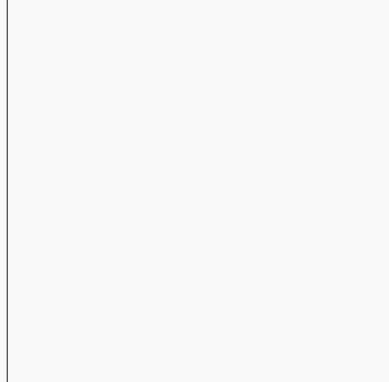
HW06 Report R12631001 許喬淇

User Interface

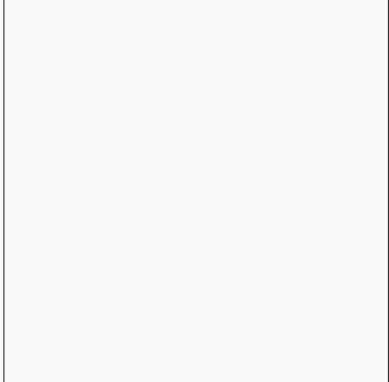
Part 1

Part1 - Trapezoid Part1 - Wavy Part1 - Circular Part2 Part3

Original Image



Trapezoidal Transformation

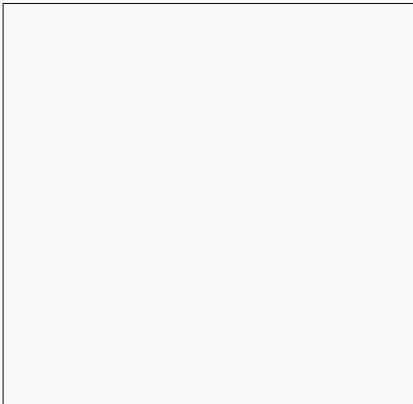


Rate of shrink(width) =

Rate of shrink(height) =

* In the beginning, you can set this two coefficient by 0.5 and 0.5, respectively.

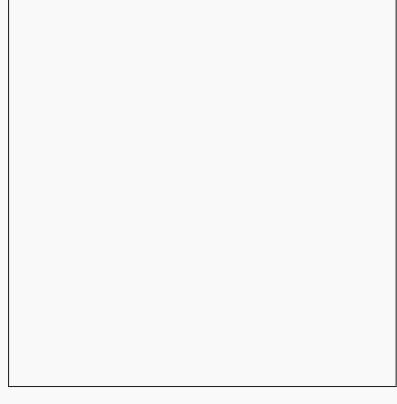
Wavy Transformation



Coefficient A =

* In the beginning, you can set this coefficient by 20.

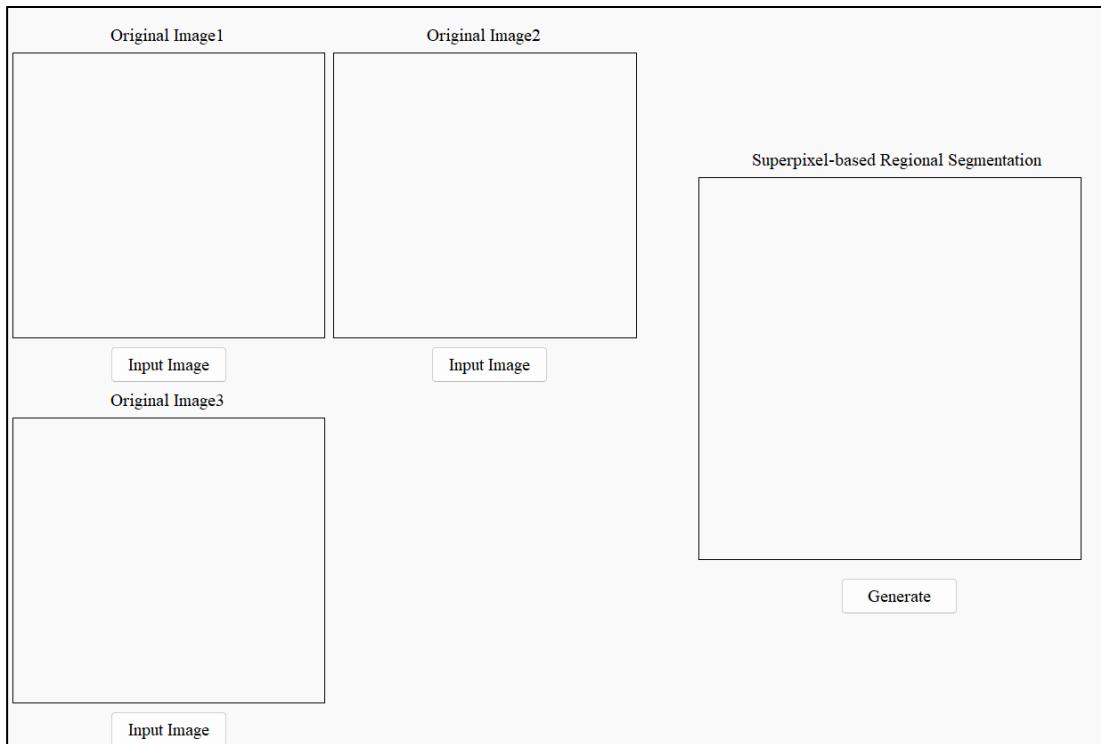
Circular Transformation



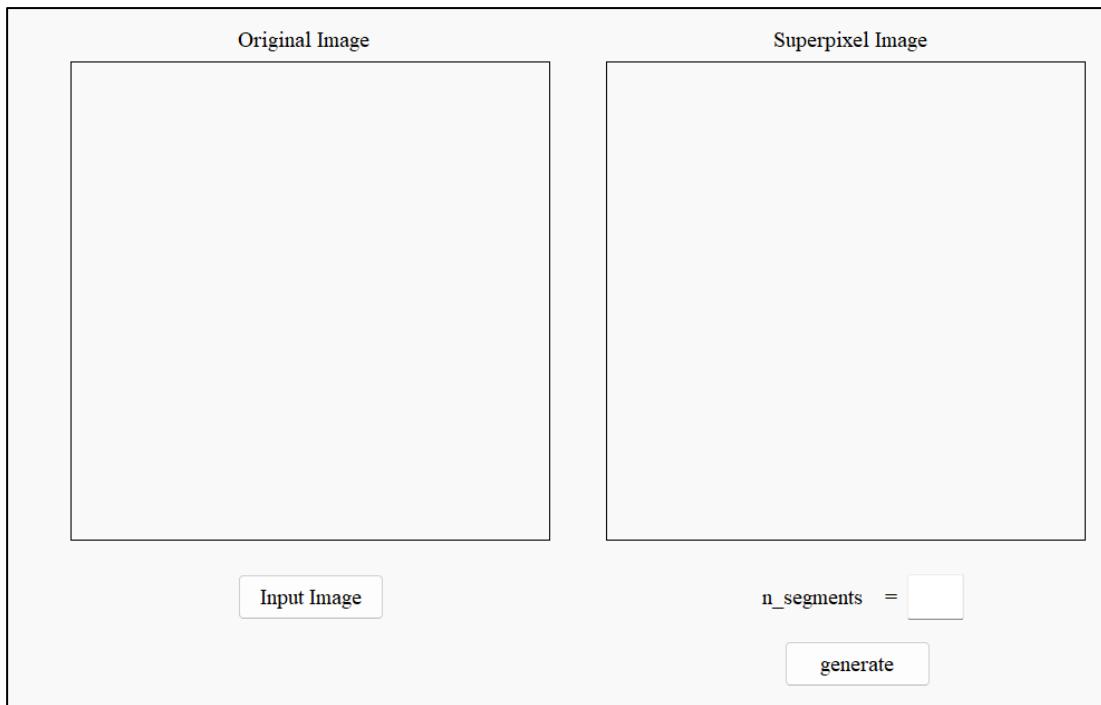
Rate of shrink(width) =

* In the beginning, you can set this coefficient by 1.

Part 2



Part 3

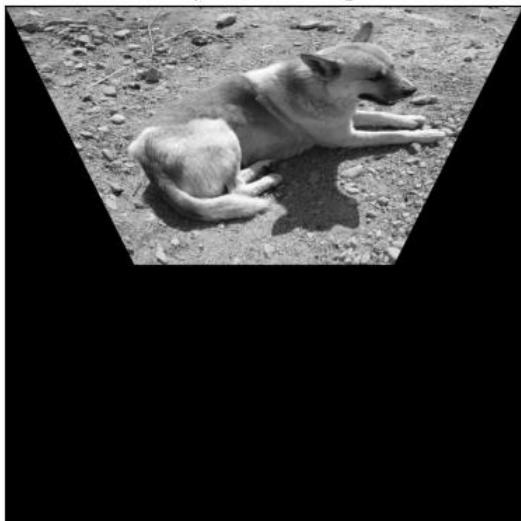


Part 1

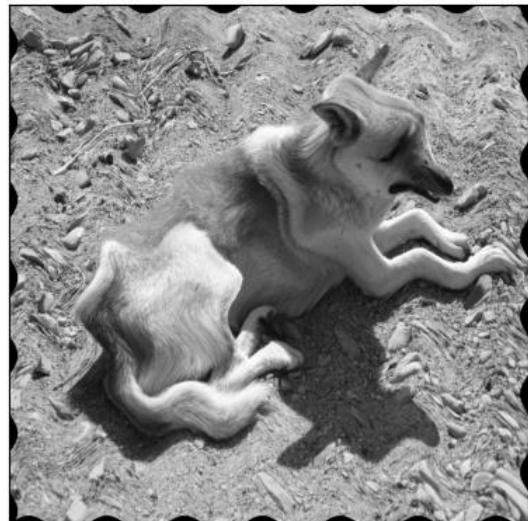
以梯形圖片為例：

1. 輸入原圖在新圖中的比例根據 w 與 h 的數值，算出梯形四個角的位置以及每一列的長度(圖形皆往下縮放，形成下梯形)。
2. 計算新舊圖片的位置對應關係根據算出的每一列長度的關係，用兩層 for loop 更新圖片，例如新的梯形圖片中距左方 20%、距上方 70%，就抓原圖中對應距左方 20%、距上方 70%位置的點填進去，便能在不損失內容的情況下轉換圖片。
3. Wavy 及 Circular 之概念亦如此。

Trapezoidal Image



Wavy Image

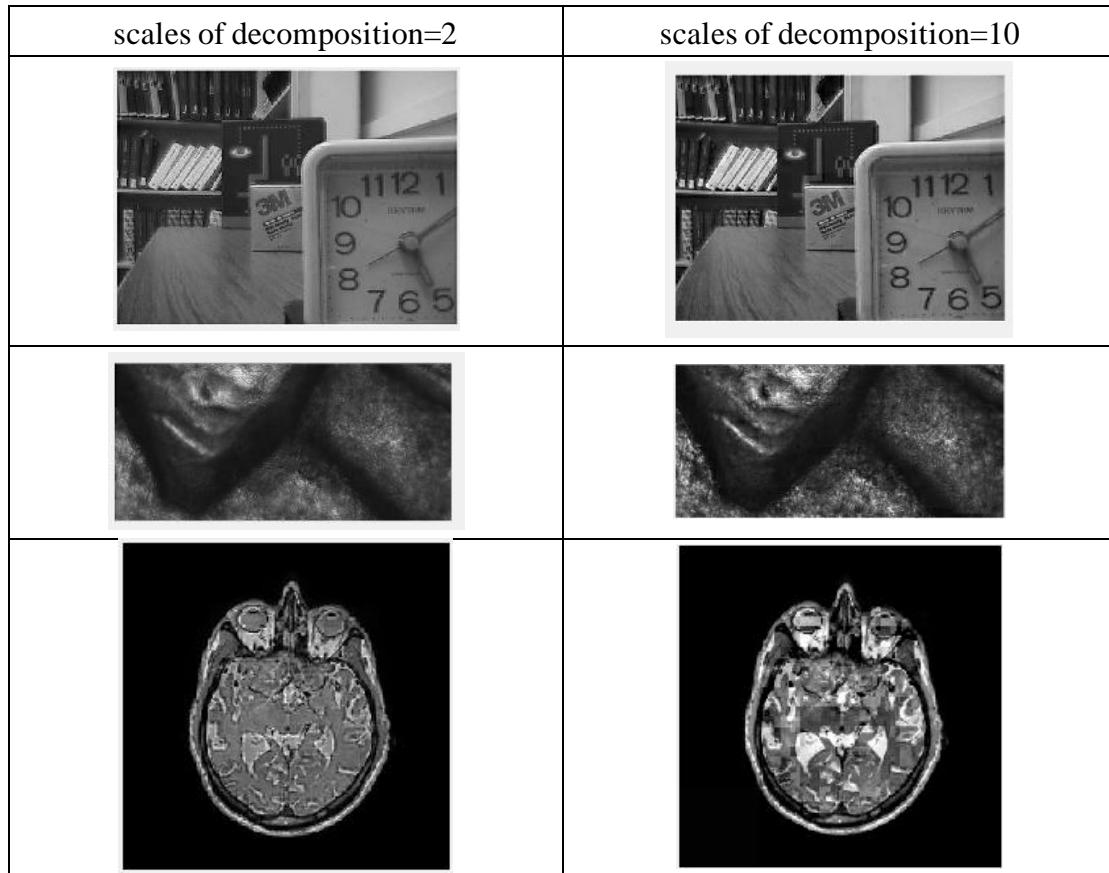


Circular Image



Part 2

scale of decomposition越大，低頻特徵越少，高頻的部分越明顯，能夠增加圖片的對比度，缺點是會失真。



Part 3

使用 skimage 函式庫之 slic() 對影像進行分割，可用 mark_boundaries() 得到分割之區域分布情形。當 superpixels 越大，影像越接近原影像(圖 3-1)，compactness 越大則分割區域越接近方形(圖 3-2)。

優點：計算效率高、較能夠保留邊界、對躁點的敏感度較小

缺點：可能產生過於分割、欠分割的現象

圖 3-3 為使用 K-means 分群對影像進行分割之結果圖，其群集設為 20 就有比使用 superpixels 設為 1000 更好的結果影像品質，然使用 K-means 分群之運算時間較長(圖 3-4)。

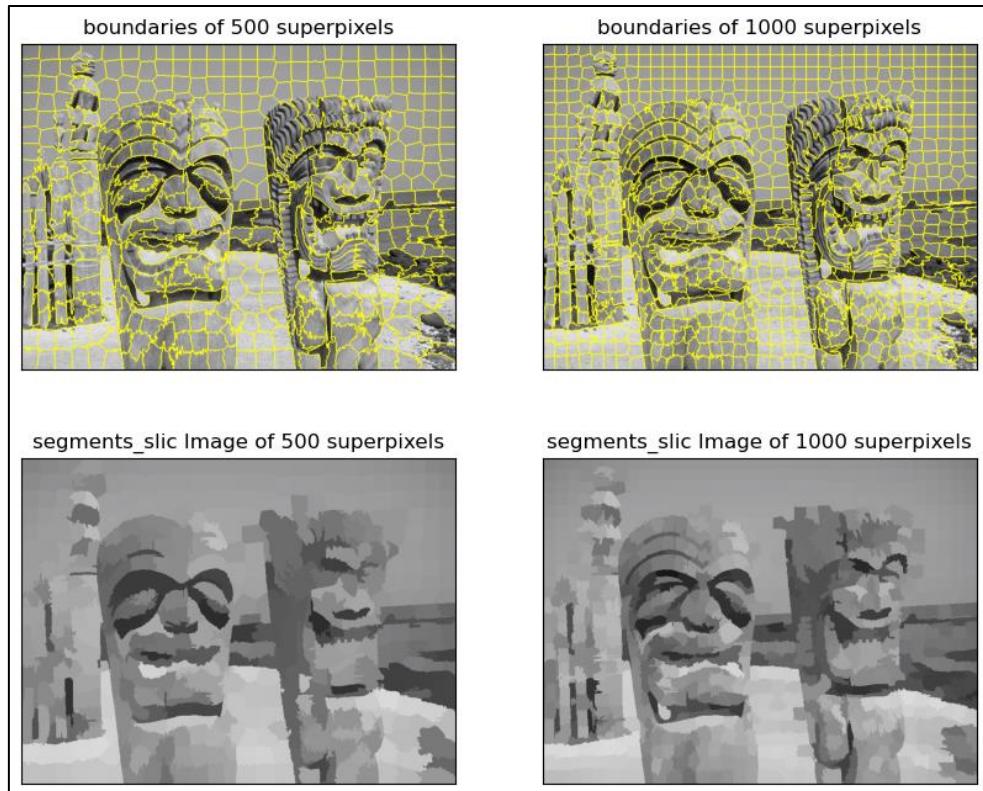


圖 3-1

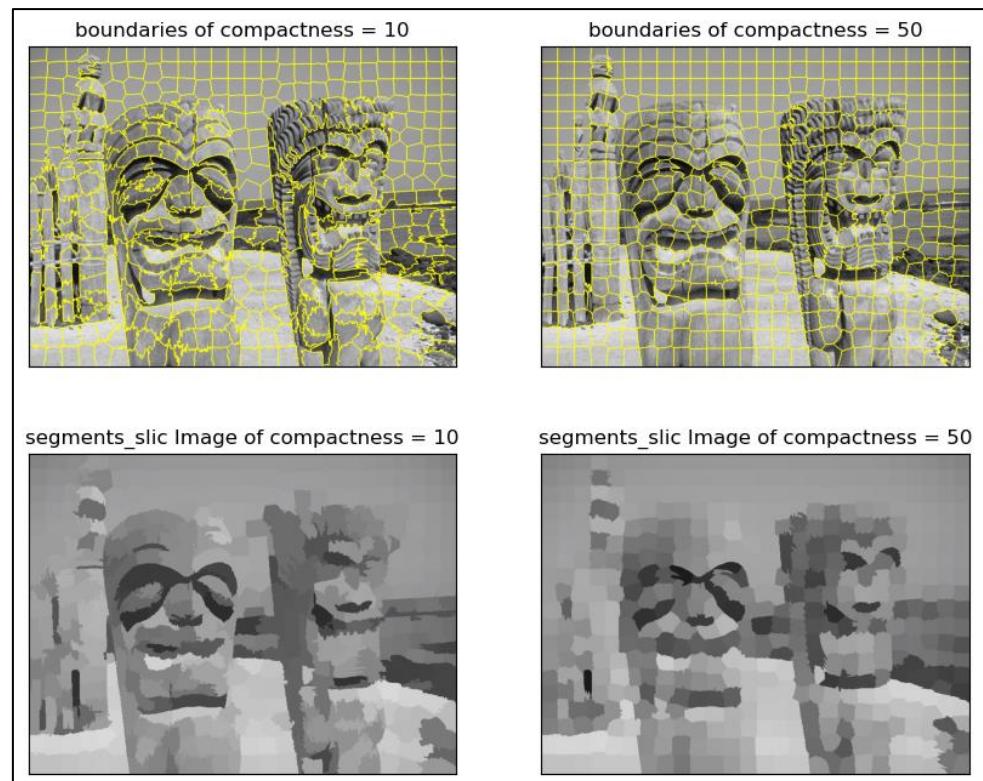


圖 3-2



圖 3-3

The computing time of using 250, 500, 1000 superpixels, respectively:

250 superpixels : 0.5097537040710449 sec

500 superpixels : 0.7251131534576416 sec

1000 superpixels : 1.0327656269073486 sec

The computing time of using 250, 500, 1000 clusters, respectively:

250 clusters : 38.70452952384949 sec

500 clusters : 99.93860292434692 sec

1000 clusters : 195.29767727851868 sec

圖 3-4