

# COMPUTER VISION

Homework 01

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# Computer Vision Report – Homework 01

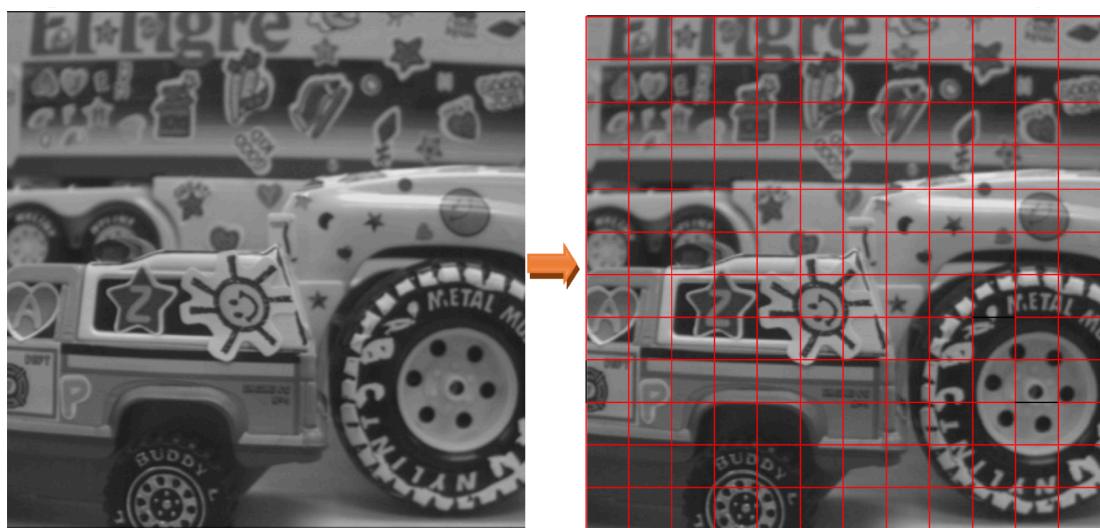
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## ➤ Write a program to generate Image Matching (Detecting Motion Vectors)

- + Detect motions vectors between trucka.im and truckb.im.
- + Use trucka.im as the basis, sample it by an 8x8, 11x11, 15x15, 21x21, 31x31 block.
- + Threshold of search range: 50 pixels. (This is a reference value only!)
- + You must not use any available libraries beyond image I/O (reading or writing image files from/to the disk/memory).

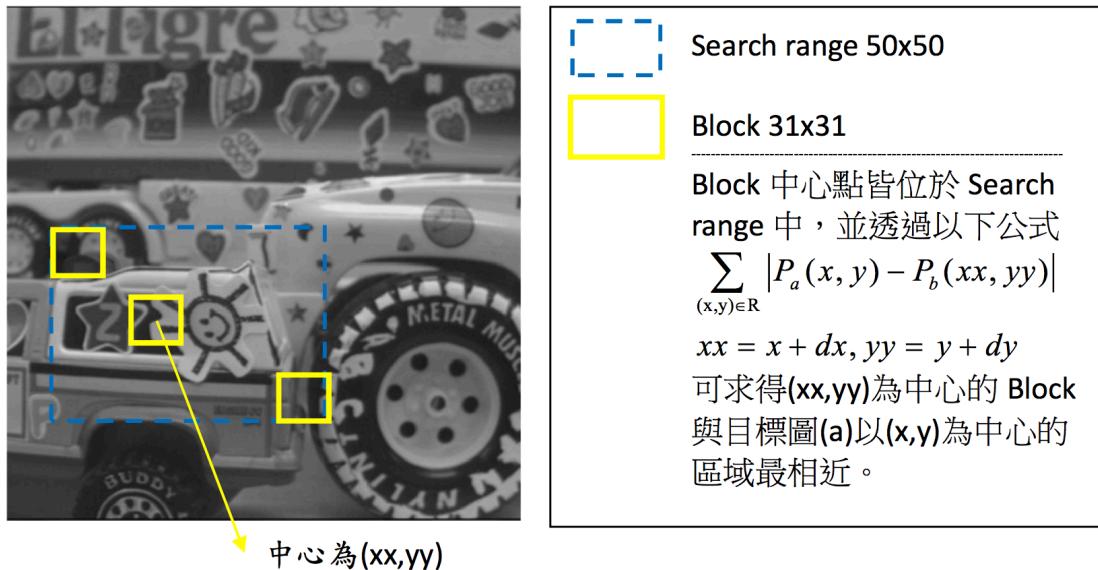
## ➤ 設計原理

Step1. 將下圖(a)大小為386x386切割成31x31的block，每個block中心為(x,y)。



Step2. 假設search range為 50x50，並在圖(b)中以 31x31 的 block，針對圖(a) 中

的每個 block，尋找在圖(b)中與圖(a)最相近的 block



以下兩張圖說明 Step2 的成果。



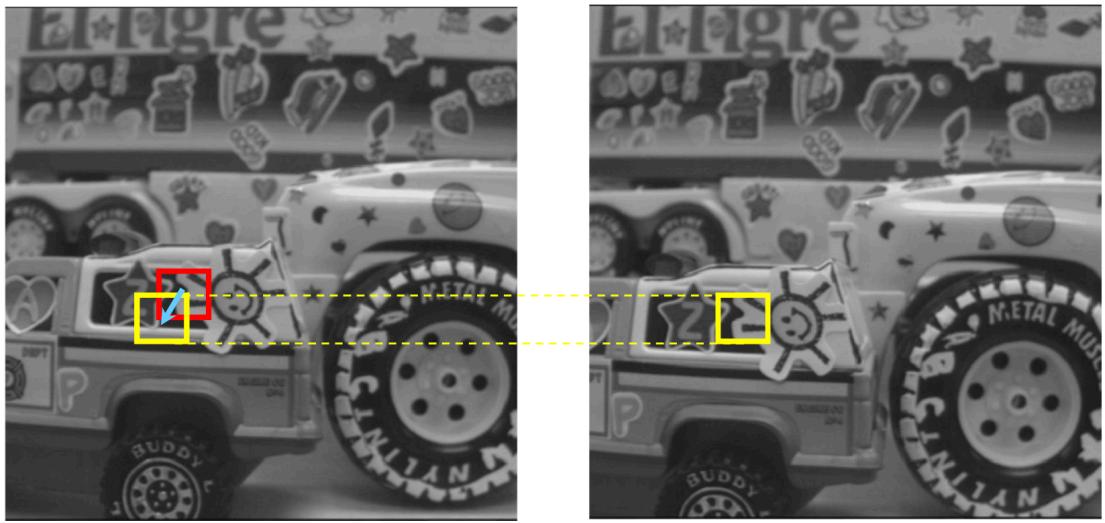
圖(a)



圖(b)

Step3. 接著 Step2 完成後，將圖(a)block 的中心 $(x,y)$ 與圖(b)block 的中

心 $(xx,yy)$  找出兩端點之vector  $(dx,dy)$ ，將整張圖完成即為最終的成果。



Step4. 可以將 block 做修改，改成 8x8,11x11,15x15,21x21,31x31

## ➤ 程式碼

```
%%%% use correlation to do image matching

a = imread('trucka.bmp');

b = imread('truckb.bmp');

%%%% assume the block is 31x31

a1 = padarray(a,[60 60]);

b1 = padarray(b,[60 60]);

[m,n] = size(a1);

center = 76:31:(9*31+76);

x = [];

y = [];

xx = [];

yy = [];
```

```

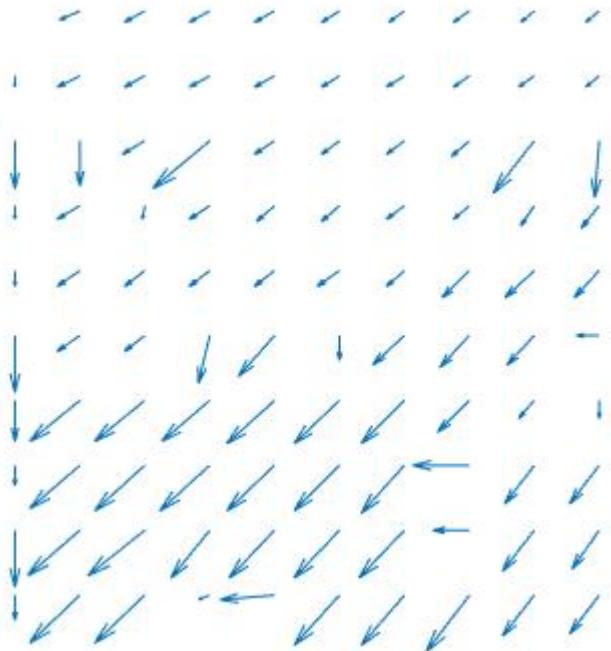
for i = 1:length(center)
    for j = 1:length(center)
        d1 = [];
        r1 = [];
        c1 = [];
        for r = center(i):center(i)+25
            for c = center(j) - 25:center(j)
                d= sum(sum(abs(a1(center(i)-15:center(i)+15,center(j)-
15:center(j)+15)-b1(r-15:r+15,c-15:c+15))));

                r1 = [r1 r];
                c1 = [c1 c];
                d1 = [d1 d];
            end
        end
        index = find(d1 == min(d1));
        x = [x center(i)];
        y = [y center(j)];
        xx = [xx r1(index(end))];
        yy = [yy c1(index(end))];
        end
    end
    dx = xx-x;
    dy = yy-y;
    figure;
    quiver(x,y,dx,dy);
    axis([0 m 0 n]);
    axis square;

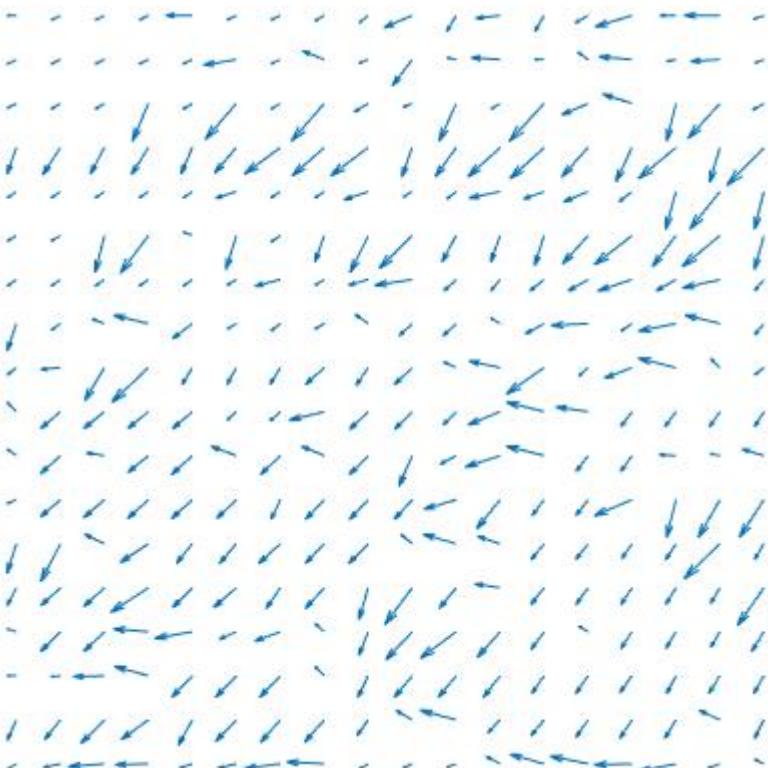
```

➤ 實驗結果

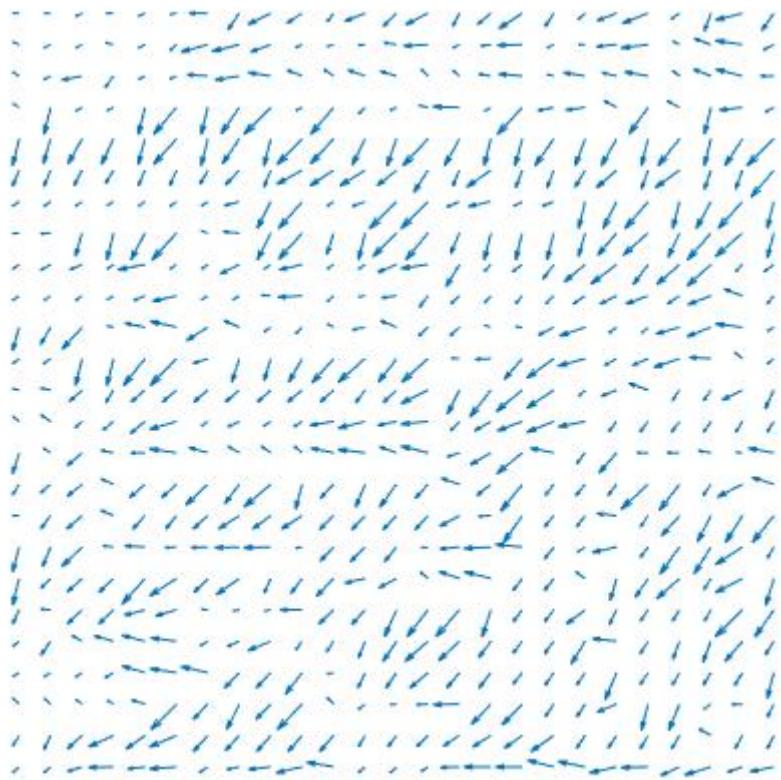
Search range : 40x40 ; block : 31x31



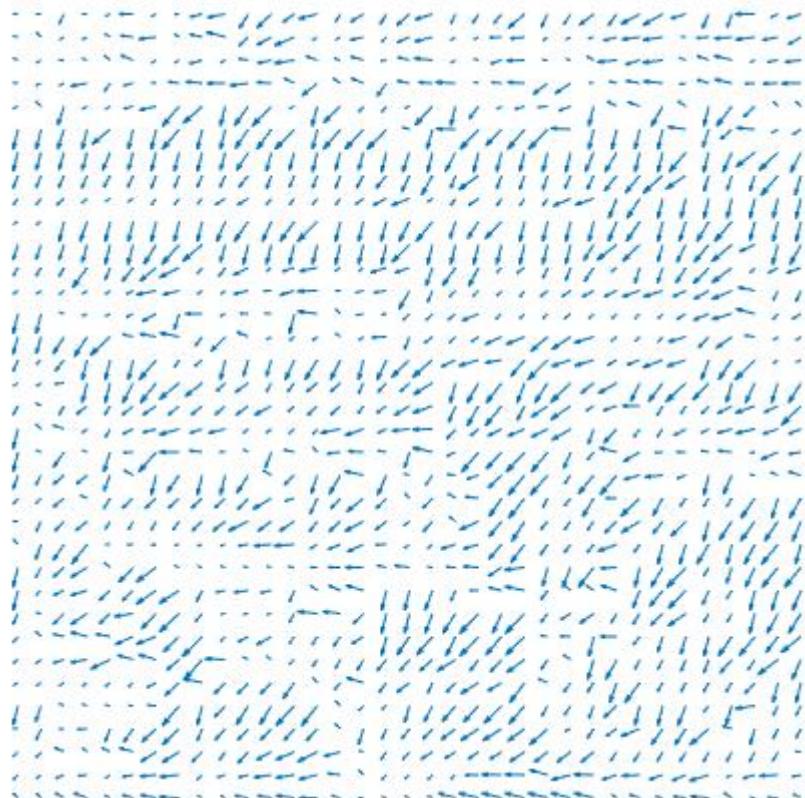
Search range : 30x30 ; block : 21x21



Search range : 30x30 ; block : 15x15



Search range : 20x20 ; block : 11x11



Search range : 20x20 ; block : 8x8

