

# Advanced Computer Vision Homework1

生醫電資所 碩一 R07945029 王思敏

Objective:

Detect motions vectors between trucka.bmp (386×386) and truckb.bmp (386×386)

parameters:

1. trucka.bmp sampled by interval =1 – used as basis  
(block size: 8×8, 11×11, 15×15, 21×21, 31×31)
2. truckb.bmp sampled by interval = block  
(block size: 8×8, 11×11, 15×15, 21×21, 31×31)
3. Threshold of search range: 50 pixels

Method:

1. Read BMP file

```
img1 = im2double(imread('trucka.bmp'));  
img2 = im2double(imread('truckb.bmp'));
```

2. Set search range and parameters of block size

```
blockall = [8,11,15,21,31];  
range = 50;
```

3. trucka.bmp sampled by interval =1 with sampled matrix = block size

```
img1_position = [];  
img1_block = [];  
count1 = 1;  
for i = 1:size(img1,1)-block+1  
    for j = 1:size(img1,2)-block+1  
        img1_position{count1,1} = [i,j];  
        img1_block{count1,1} = img1(i:i+block-1,j:j+block-1);  
        count1 = count1 + 1;  
    end  
end
```

4. truckb.bmp sampled by interval = block with sampled matrix = block size

```

block = blockall(time);
img2_position = [];
img2_block = [];
count1 = 1;
for i = 1:block:size(img2,2)-block+1
    for j = 1:block:size(img2,1)-block+1
        img2_position(count1,1) = [i,j];
        img2_block(count1,1) = img2(i:i+block-1,j:j+block-1);
        count1 = count1 + 1;
    end
end
end

```

## 5. Calculate the motion vectors by searching the position of the closest blocks between trucka.bmp and truckb.bmp

```

motion_vector = [];
count = 0;
for i = 1:length(img2_block)
    for j = 1:length(img1_block)
        count = count + 1;
        if j == 1
            record_minvalue = sum(abs(img1_block{j,1}-img2_block{i,1}), 'all');
            record_position = img1_position{j,1};
            % disp(count)
        end
        if norm(img2_position{i,1} - img1_position{j,1}) <= range...
            && sum(abs(img1_block{j,1}-img2_block{i,1}), 'all') <= record_minvalue
                record_minvalue = sum(abs(img1_block{j,1}-img2_block{i,1}), 'all');
                record_position = img1_position{j,1};
                % disp(count)
            end
        end
        motion_vector{i,1} = record_position-img2_position{i,1};
    end
end
end

```

## 6. Quiver plot

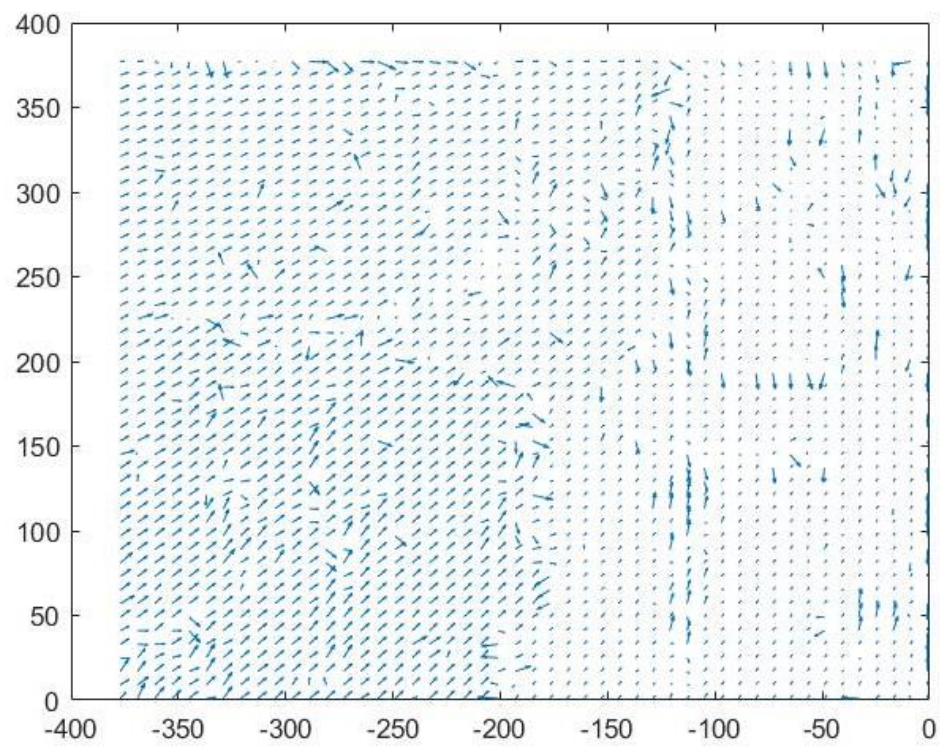
```

figure(time)
x = cellfun(@(v)v(1),img2_position);
y = cellfun(@(v)v(2),img2_position);
u = cellfun(@(v)v(1),motion_vector);
v = cellfun(@(v)v(2),motion_vector);
quiver(-x, y, -u, v)

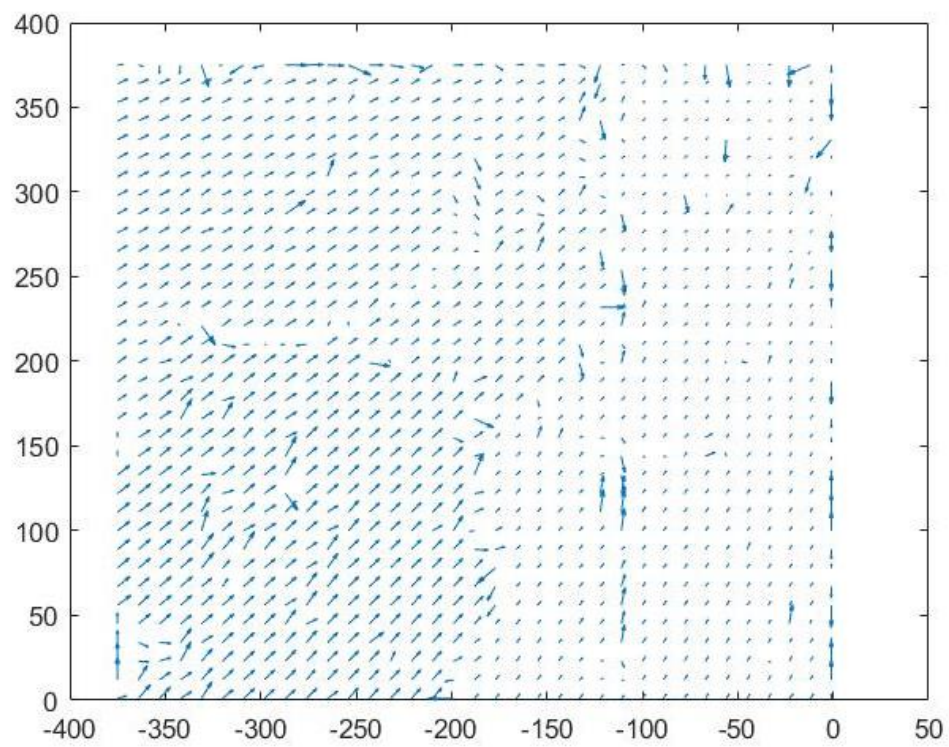
```

Result:

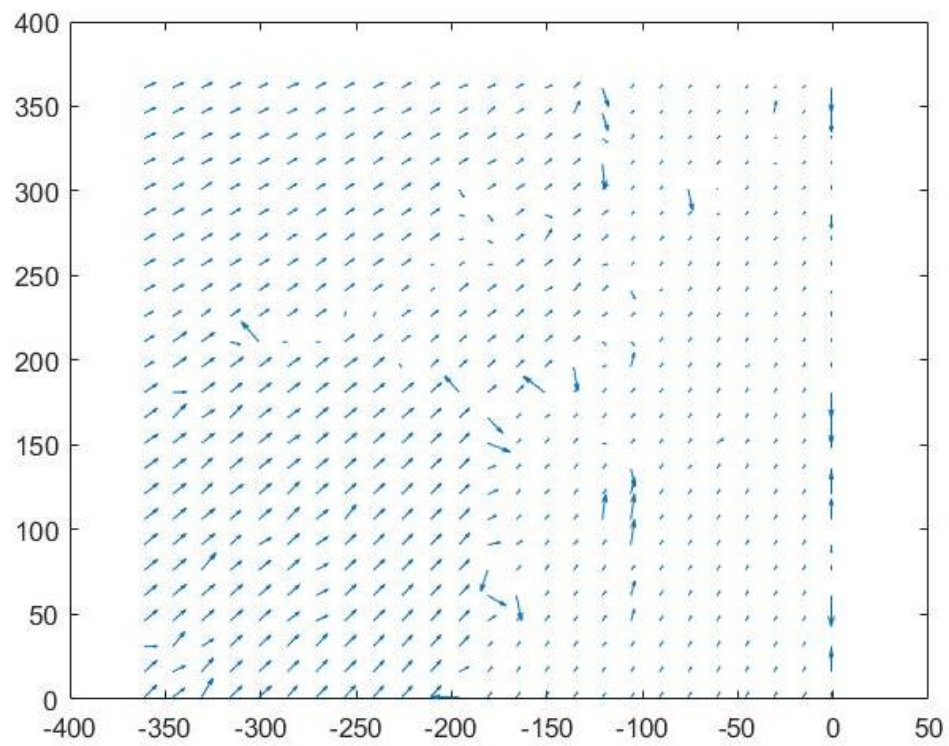
1. Block size =  $8 \times 8$



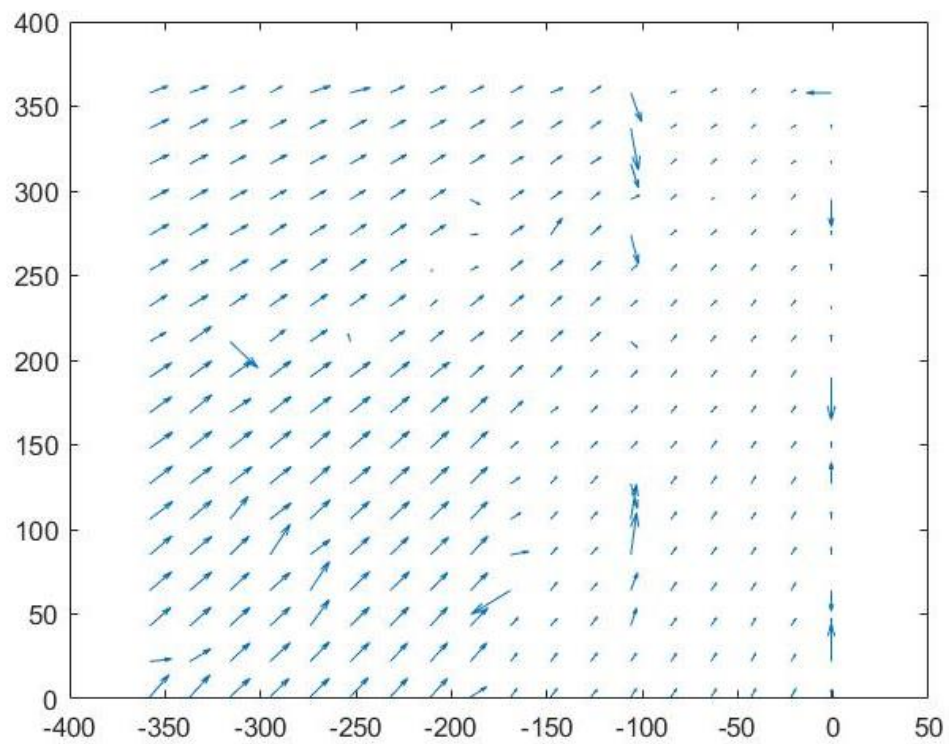
2. Block size =  $11 \times 11$



3. Block size = 15 x 15



4. Block size = 21 x 21



5. Block size = 31 x 31

