EEU44C08

4C8 DIGITAL IMAGE AND VIDEO PROCESSING

Submitted By

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Q1 Block Matching

Q 1.1 Edit the file to add the lines required to find the block with minimum MAE DFD and it to mc_block and assign the offset to motion_x and motion_y. Report relevant code into the report

```
50                    % Find the block with minimum DFD, save it to mc_block
51                    % and assign its offset to 'motion_x(ny,nx)'
52                    % and 'motion_y(ny,nx)'
53
54                    % write your code here
55
56 -                  diff_block = abs(other_block - ref_block);
57 -                  curr_err = mean(diff_block(:));
58
59 -                  if (curr_err < min_error_)
60 -                      min_error_  = curr_err;
61 -                      SAI:_block = other_block;
62 -                      motion_x(ny,nx) = ii;
63 -                      motion_y(ny,nx) = jj;
64 -                  end
65
66
```

When testing the blockmatching function on the testblockmatching script the following was obtained

```
>> testBlockMatching

reading video file:      OK
running blockmatching:   OK
DFD:                OK
vectors x:          OK
vectors y:          OK

fx >> |
```

Q2 Motion Compensation Error

Q 2.1 Plot the motion compensated MAE per frame for the first 30 frames into the report. On the same graph, report the nonmotion compensated MAE per frame for the whole sequence.

Ans -

The defined parameters are listed below

```
%% HARSH DHINGRA 19323904
clear
close all
clear all


%%%%%%%%%%%%%%%% parameters etc %%%%%%%%%%%%%%%%%%%%%%%%%%%%

filename    = './qonly.360x288.y';
hres        = 360;   % horizontal size
vres        = 288;   % versical size
B           = 16;    % block size
w           = 4;    % window search range is +/-w
mae_t       = 2;     % motion threshold MAE per block
start_frame = 1;
nframes     = 30;
```
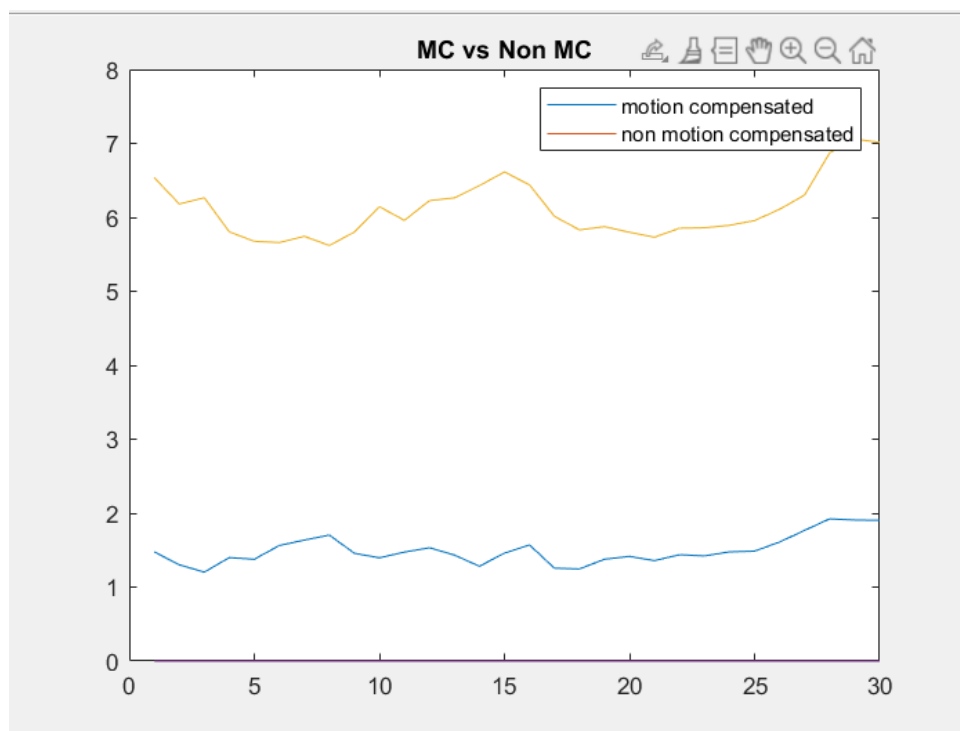
The graph below is a comparing Mae and it depicts Motion Compensated vs Non motion Compensated.   Y-AXIS – MEAN ABSOLUTE DFD
X-AXIS – FRAME NUMBER

Q3 Analysis

Q 3.1 By considering your results point out the regions in the images where Block Matching works well and where it does not. Explain your findings and point to the relevant original frames and DFD's

ANS –

From the graph obtained above we can see that in the initial frames(upto 5) the results are comparable and till frame 15 block matching works in an opposite manner, however after 15th frame the pattern observed for blockmatching is unerring.

Q 3.2 Try changing block sizes, motion threshold and search with w to improve the MAE plots for qonly.360x288.y. Graph a few combinations you try and rank them in terms of their MAE performance and computation times. How do they affect the resulting MAE and motion field?
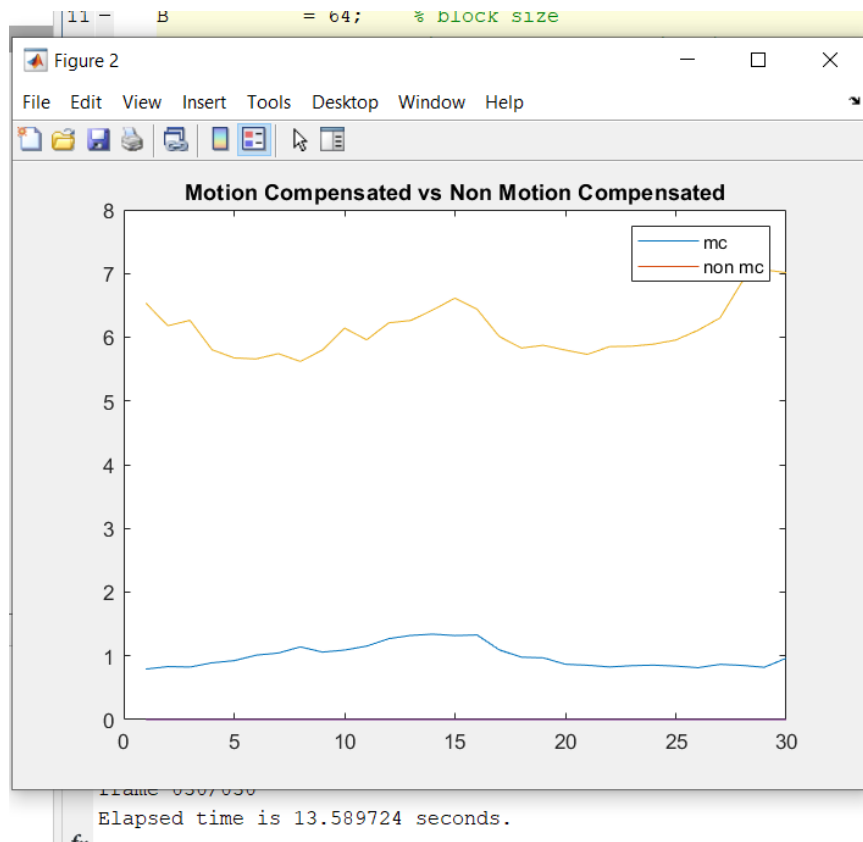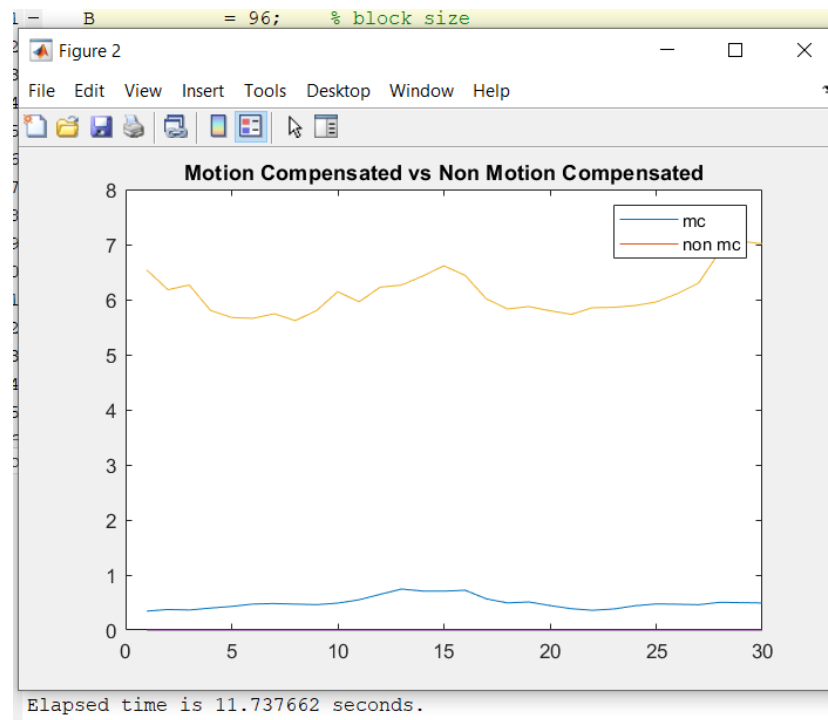
a) On Changing Block Sizes
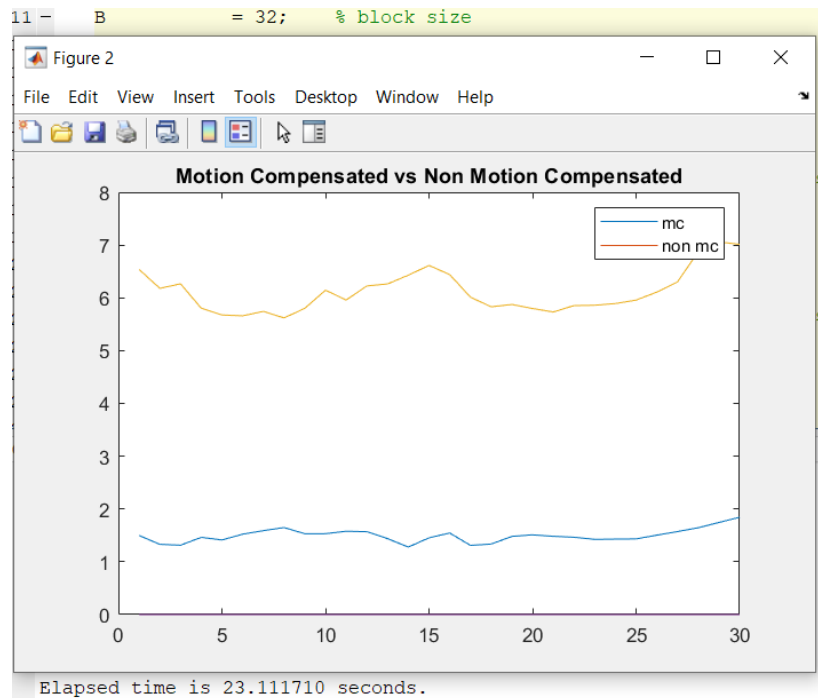
Block Size – 32
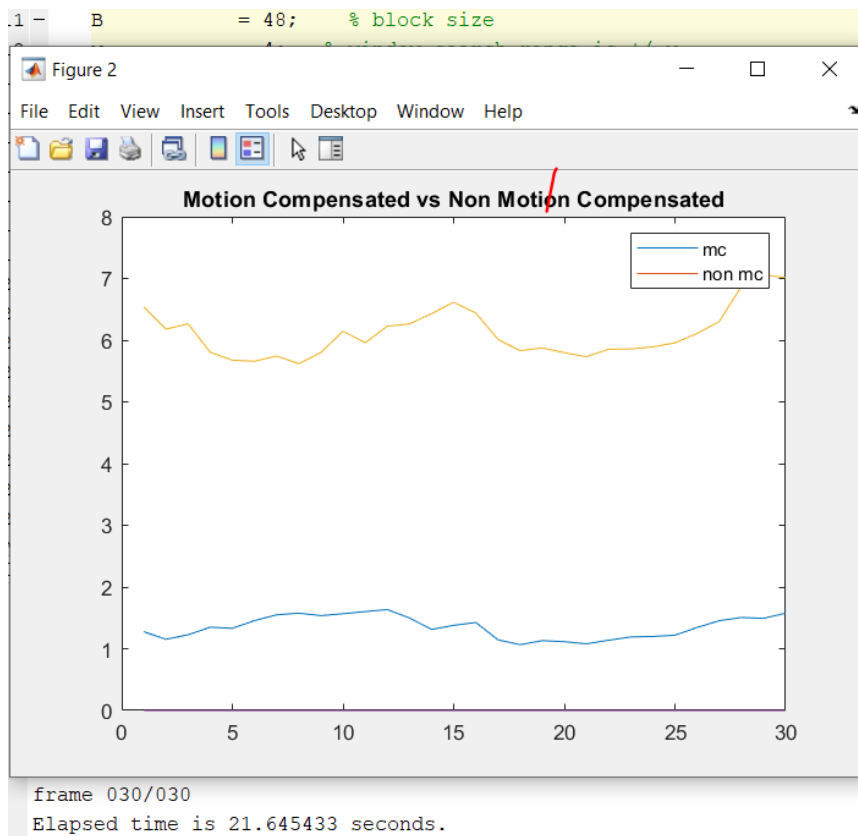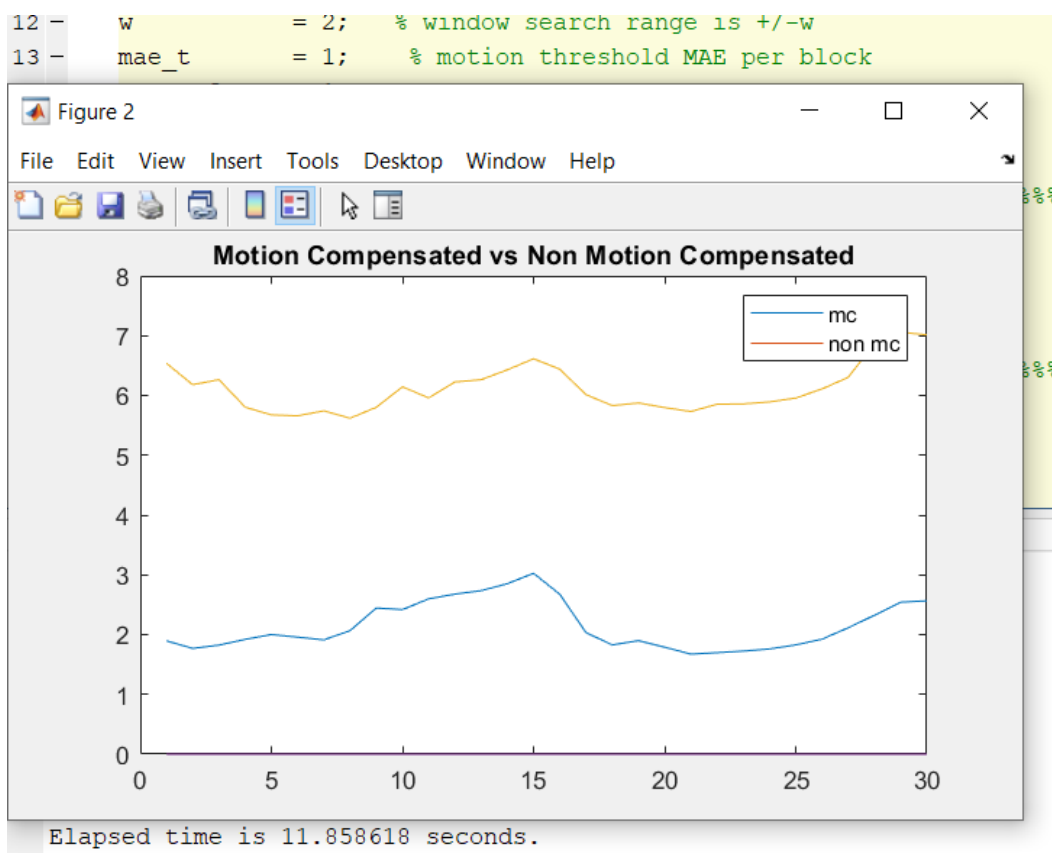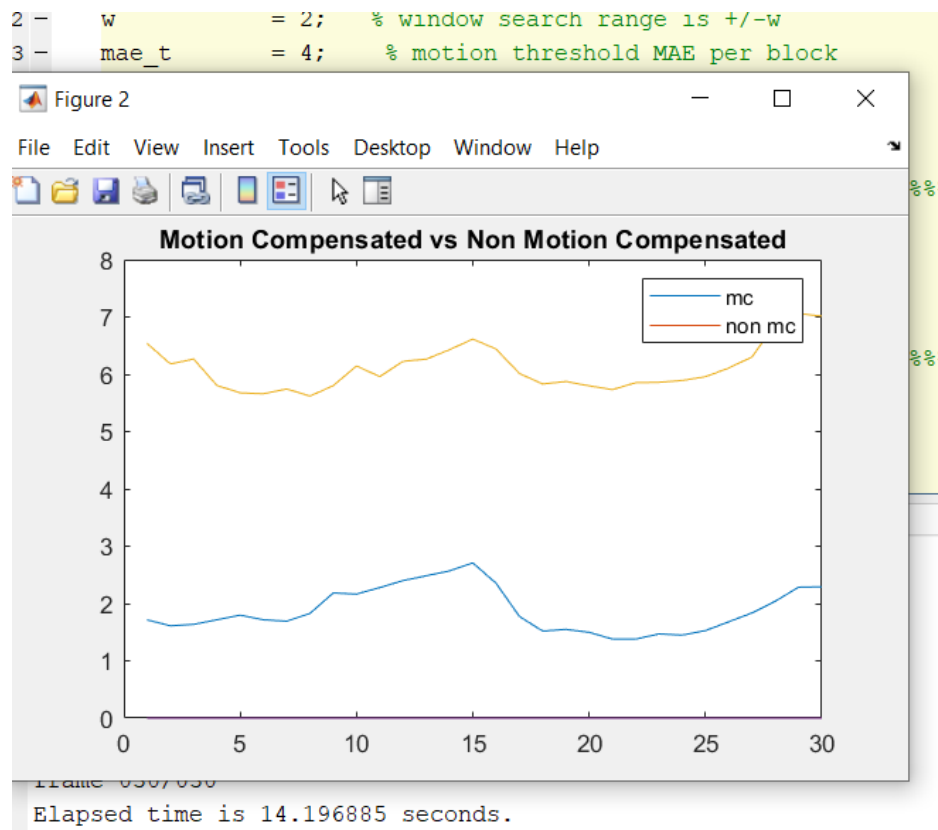
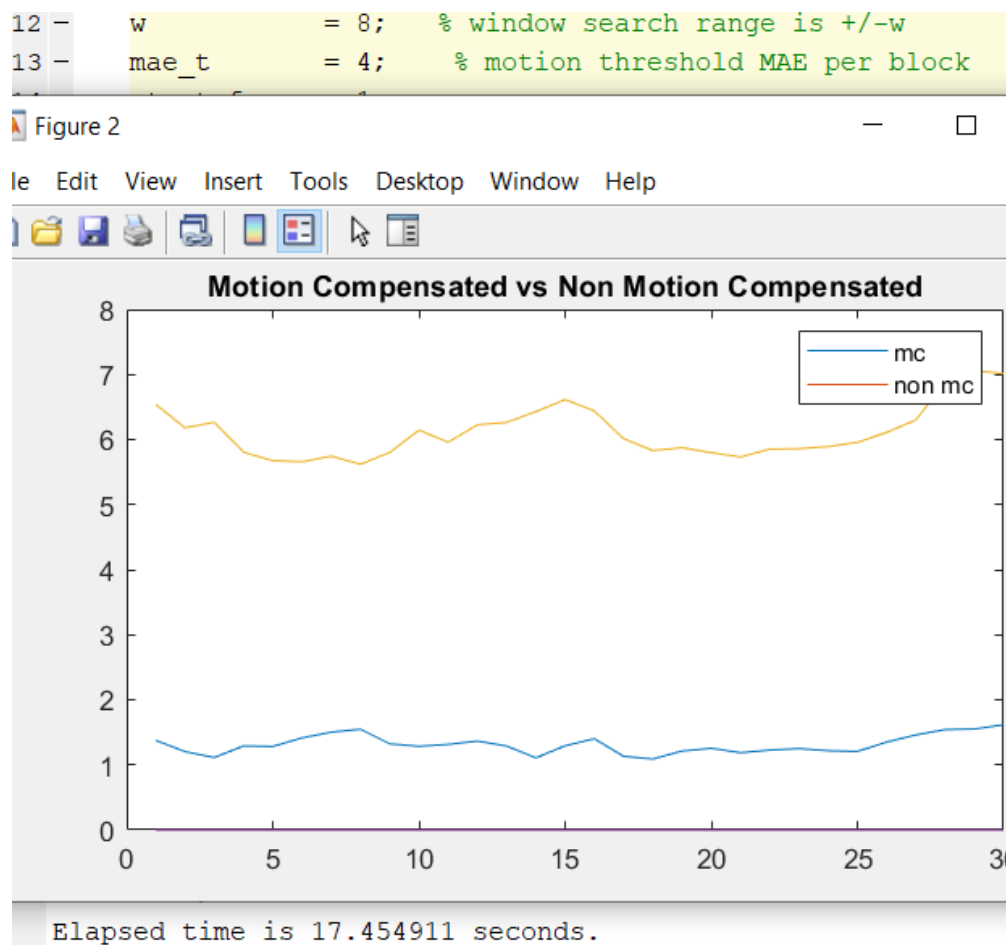Block size – 48

Block Size – 64

Block Size – 96

On increasing the block size, we can see that elapsed time decreases, moreover on increasing block size higher performance is observed

b) Changing Window Search Size and Threshold

W =2 MAE_t =1

```
2 -      w              = 2;      % window search range is +/-w
3 -      mae_t          = 4;      % motion threshold MAE per block
```


Elapsed time is 14.196885 seconds.

W =2 MAE_t =4

```
12 -     w              = 8;      % window search range is +/-w
13 -     mae_t          = 4;      % motion threshold MAE per block
```


Elapsed time is 17.454911 seconds.

W = 8 , MAE_t = 4