

Name: _____

Score: /11

CSE 5524

Computer Vision for HCI

AU'22

Homework Assignment #5

Due: Tuesday 9/29

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- 1) Using the images (aerobic-[001-022].bmp) provided on the class materials site, experiment with simple “motion detection” between consecutive frames using (abs) image differencing. Clean-up and remove any tiny regions (e.g., use techniques such as `bwareaopen`, median filtering, etc.). Experiment with different thresholds. [2 pts]
 - 2) Compute an MEI and MHI on the image sequence (using your best motion differencing approach from problem #1 above for each image pair i and $i-1$), simulating the current MHI “timestamp” for each image pair using the larger of the image pair index values (i.e., use i , not $i-1$). Therefore, you will have difference images from $i=2$ to 22. The MEI/MHI duration should include all image diff results in the sequence into the final template. Use `imagesc` (Matlab) to show your results. Compute the 7 similitude moments for the final MEI and the MHI. Make sure to *normalize* the MEI and MHI values to be between 0-1 before computing the moments using the given formula in the class notes ($\max[0, (i-1.0)/21.0]$ for this example). [4 pts]
 - 3) Create a 101x101 image with a black (0) background and a white (255) box of size 21x21, placing the upper-left corner at pixel (row=40, col=6). Create another new box image, but shift the box 1-pixel to the right and 1-pixel down. Compute the **normal flow** between the images. Use 3x3 Sobel F_x , F_y gradient masks (with the proper normalization values – see notes) and a 3x3 average mask on each image when computing F_t . Use MATLAB’s `quiver` function to draw the motion vectors on the image (call `imagesc`, then ‘`hold on`’, and lastly call `quiver`). (Make sure your gradient mask orientations/directions [and the plot axes] are consistent and point in the proper directions!!!) Is the result what you expected? Why or why not? Comment on the flow for the 4 sides of the box and also for the 4 corners. [5 pts]
 - 4) As usual, submit all code, images, printouts of images, and report/discussion of results to Carmen.