Procedure used

$$D(x, y, t) = I(x, y, t) - I(x, y, t-1)$$

$$D(x, y, t) = (I(x, y, t) - I(x, y, t-1)) > \tau$$

$$H_t(x, y, t) = \begin{cases} \tau, & \text{if } D(x, y, t) = 1 \\ max(0, H_t(x, y, t-1)), & \text{otherwise} \end{cases}$$

All the files submitted in this assignment are for $\tau = 5$.

Example Motion History Images

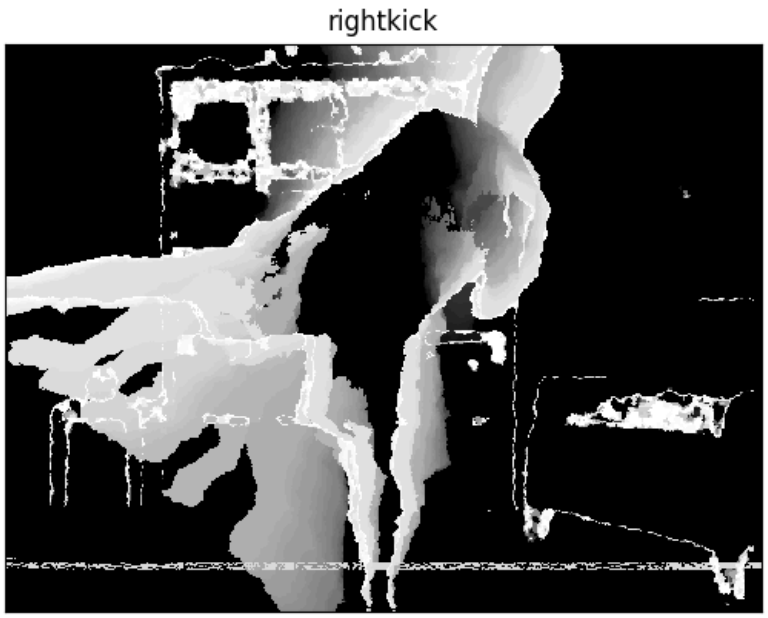

Figure 1

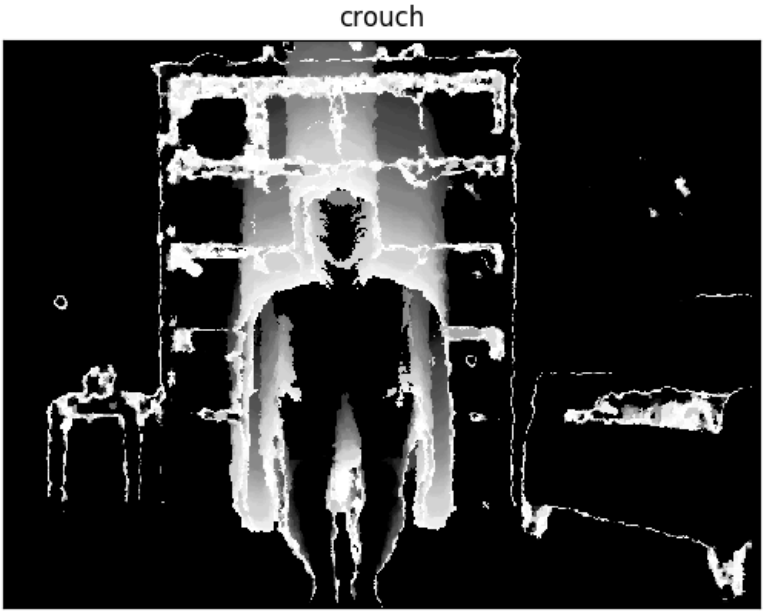

Figure 2

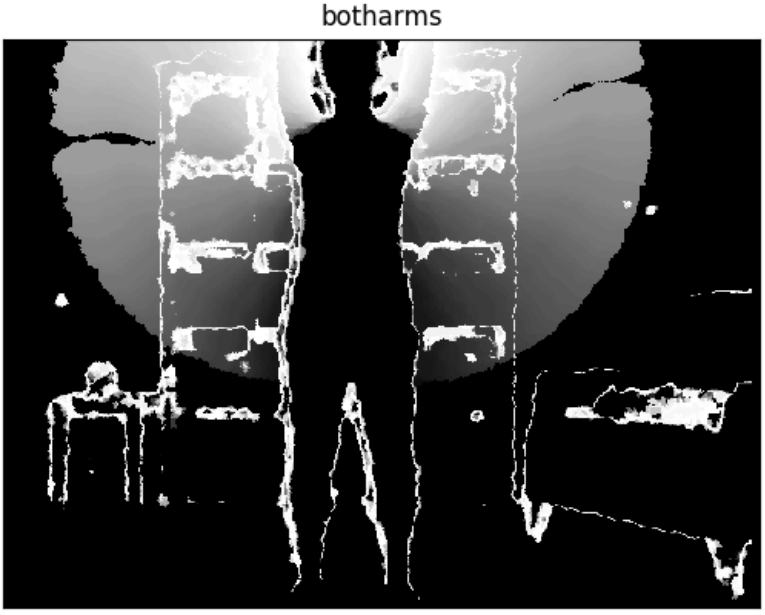

Figure 3

Nearest Neighbour examples

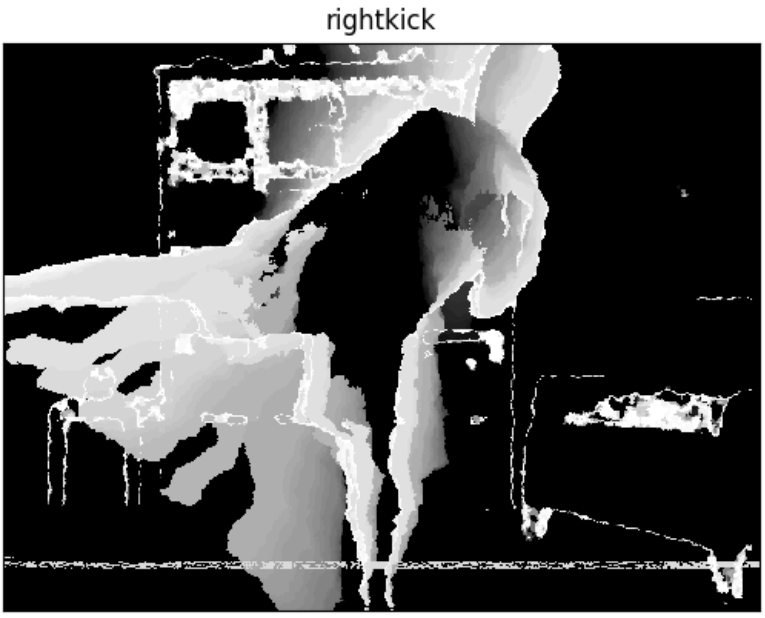

Figure 4: Test MHI

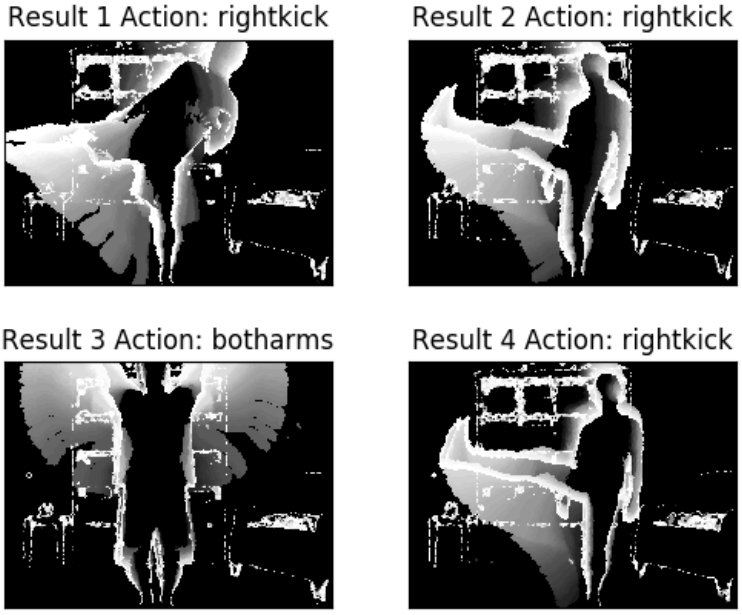

Figure 5: Result MHIs

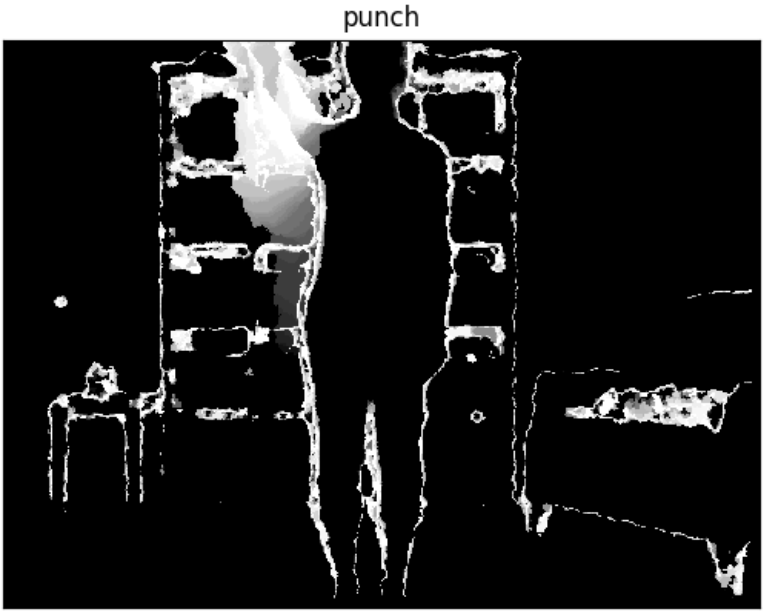

Figure 6: Test MHI

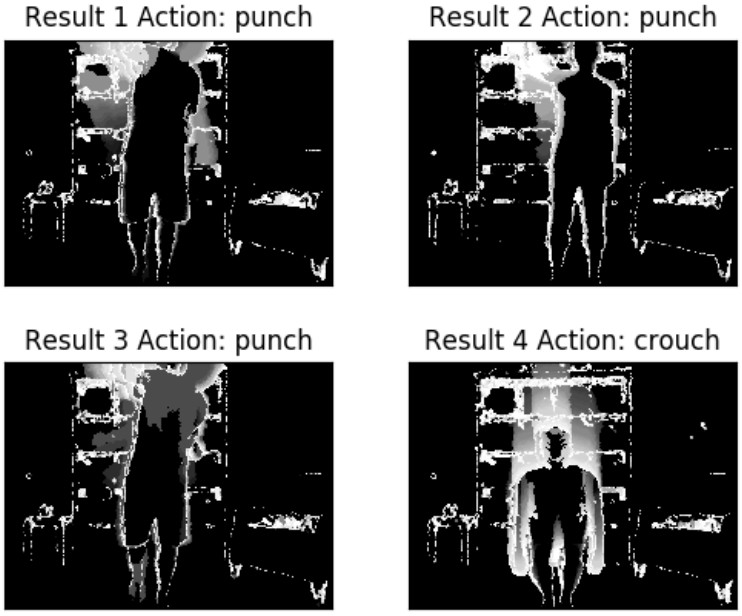

Figure 7: Result MHIs

Leave one out cross validation

$$\tau = 10$$

	botharms	crouch	leftarmup	punch	rightkick
botharms	3	0	0	1	0
crouch	0	3	0	1	0
leftarmup	0	0	4	0	0
punch	0	0	0	4	0
rightkick	0	0	0	0	4

Overall recognition rate = 0.9

Per category recognition rate

botharms	crouch	leftarmup	punch	rightkick
0.75	0.75	1.0	1.0	1.0

$$\tau = 20$$

	botharms	crouch	leftarmup	punch	rightkick
botharms	4	0	0	0	0
crouch	0	3	0	1	0
leftarmup	0	0	4	0	0
punch	0	0	0	4	0
rightkick	0	0	0	0	4

Overall recognition rate = 0.95

Per category recognition rate

botharms	crouch	leftarmup	punch	rightkick
1.0	0.75	1.0	1.0	1.0

$\tau = 5$

	botharms	crouch	leftarmup	punch	rightkick
botharms	1	1	0	1	1
crouch	0	3	0	1	0
leftarmup	0	0	4	0	0
punch	0	0	0	4	0
rightkick	1	0	0	0	3

Overall recognition rate = 0.75

Per category recognition rate

botharms	crouch	leftarmup	punch	rightkick
0.25	0.75	1.0	1.0	0.75

The performance of the recognition varies on threshold τ. As we can see from the above results, $\tau = 20$ gives the best results and the performance decreases on a greater or lesser τ. This implies that the results of the recognition are very sensitive to the threshold used.

One of the sequences of action crouch is confused with action punch for all the thresholds. The performance of actions leftarmup and punch are very consistent. We can also observe that the performance of action botharms decreases as the threshold is lowered, giving a very bad recognition rate at $\tau = 5$.