

Activity Recognition

6.S062

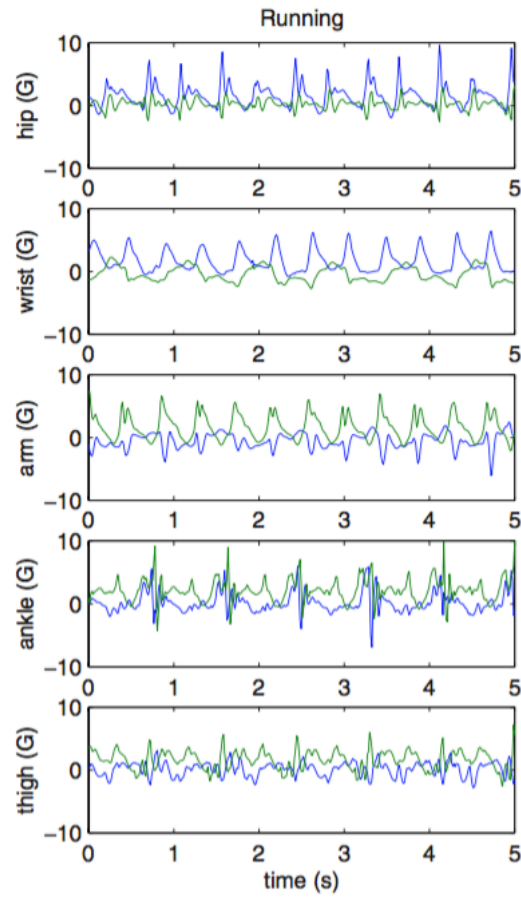
3/17/2017



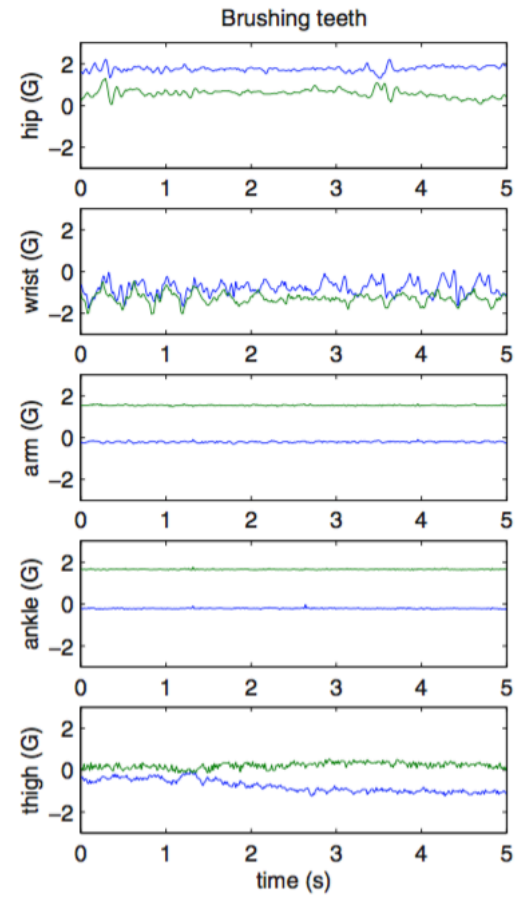
(a)



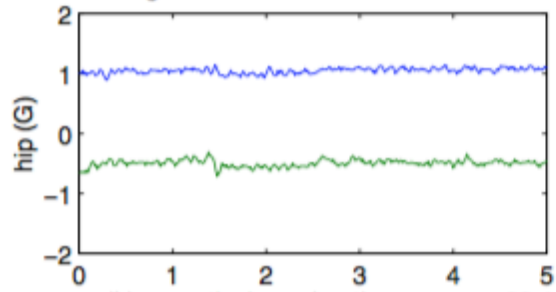
(b)



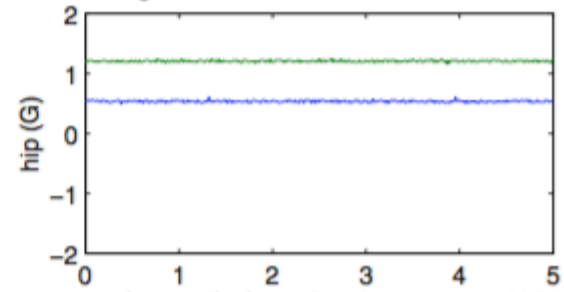
(c)



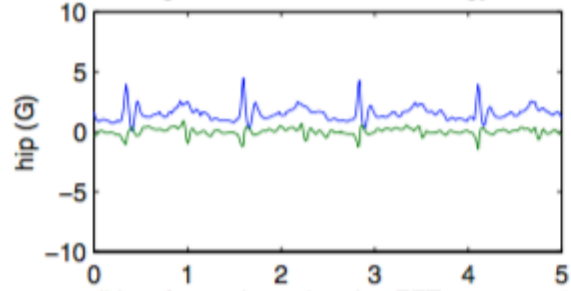
standing: mean vertical acceleration = 1.05 G



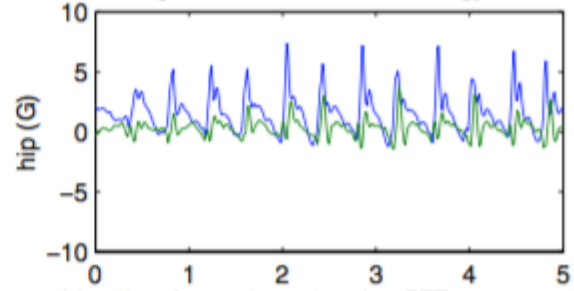
sitting: mean vertical acceleration = 0.54 G



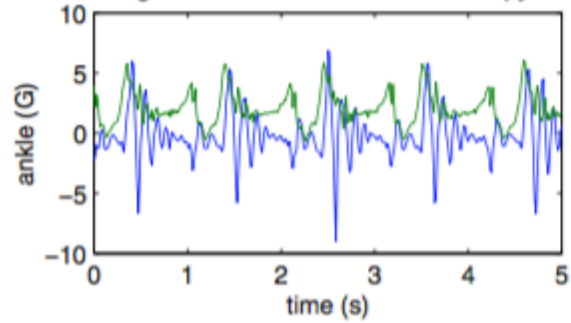
walking: vertical acceleration energy = 68.4



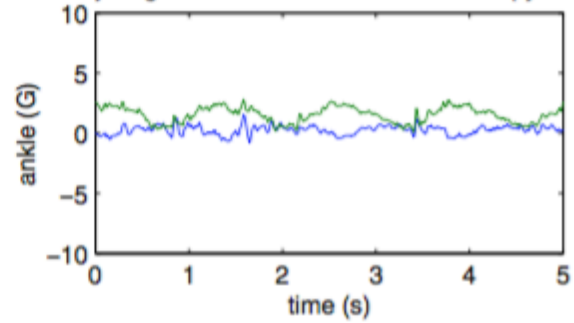
running: vertical acceleration energy = 685.2



walking: forward acceleration FFT entropy = 0.7



bicycling: forward acceleration FFT entropy = 0.9



Accuracy

Classifier	User-specific Training	Leave-one-subject-out Training
Decision Table	36.32 ± 14.501	46.75 ± 9.296
IBL	69.21 ± 6.822	82.70 ± 6.416
C4.5	71.58 ± 7.438	84.26 ± 5.178
Naive Bayes	34.94 ± 5.818	52.35 ± 1.690

Fig. 4. Summary of classifier results (mean ± standard deviation) using user-specific training and leave-one-subject-out training. Classifiers were trained on laboratory data and tested on obstacle course data.

Activity	Accuracy	Activity	Accuracy
Walking	89.71	Walking carrying items	82.10
Sitting & relaxing	94.78	Working on computer	97.49
Standing still	95.67	Eating or drinking	88.67
Watching TV	77.29	Reading	91.79
Running	87.68	Bicycling	96.29
Stretching	41.42	Strength-training	82.51
Scrubbing	81.09	Vacuuming	96.41
Folding laundry	95.14	Lying down & relaxing	94.96
Brushing teeth	85.27	Climbing stairs	85.61
Riding elevator	43.58	Riding escalator	70.56

Fig. 5. Aggregate recognition rates (%) for activities studied using leave-one-subject-out validation over 20 subjects.

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	< classified as
942	46	0	0	2	0	0	0	8	3	8	1	4	2	7	0	3	8	8	8	a = walking
83	1183	9	0	3	2	0	0	8	1	3	8	14	1	16	0	8	53	38	11	b = walking/carry
0	9	762	11	0	1	17	3	0	0	0	0	0	0	0	1	0	0	0	0	c = sitting relaxed
0	0	10	893	9	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	d = computer work
0	0	0	7	774	11	0	0	0	6	1	2	2	0	4	0	2	0	0	0	e = standing still
0	2	1	0	12	712	9	1	0	0	2	1	10	1	18	0	26	1	4	3	f = eating/drinking
0	0	42	21	0	1	320	28	0	0	0	0	0	0	0	0	0	0	0	1	g = watching TV
0	0	23	1	1	6	16	961	9	0	2	0	0	1	0	1	2	0	2	22	h = reading
14	12	0	0	1	1	0	17	491	10	1	1	1	1	1	0	1	3	4	1	i = running
0	1	0	0	5	0	0	0	8	830	10	0	1	0	3	0	2	1	0	1	j = bicycling
9	3	2	16	30	22	45	9	3	35	309	37	26	21	99	1	38	12	3	26	k = stretching
4	10	0	0	6	5	2	7	0	6	23	500	13	2	9	3	6	5	3	2	l = strength train
1	7	0	0	5	10	0	0	0	0	3	9	403	11	10	1	26	1	6	4	m = scrubbing
1	0	0	0	0	3	1	0	0	2	0	1	9	885	11	0	1	0	2	2	n = vacuuming
1	1	0	0	1	6	0	0	0	1	4	1	4	7	822	8	4	0	1	3	o = folding laundry
0	0	4	9	0	2	1	7	0	0	0	0	1	0	10	791	8	0	0	0	p = lying down
1	2	0	0	3	32	0	0	0	1	5	0	18	7	10	9	637	10	2	10	q = brushing teeth
7	14	0	0	1	1	0	0	0	3	2	1	1	0	2	0	12	351	10	5	r = climbing stairs
84	70	0	7	20	60	0	0	8	40	33	11	24	34	40	0	0	59	502	160	s = riding elevator
5	2	0	0	5	6	0	1	0	1	0	3	3	1	0	0	3	7	16	127	t = riding escalator