valideren onderarm

January 11, 2021

[1]:
```
import sys
sys.path.append('../')
from ortho_lib3 import *
```

[2]:
```
dff = create_dfframes([4],
                extype = ['AF'],
                dfframe_class = DFFrame,
                data_dir = '../sliced_transformed_data',
                print_errors = False,
                show_progress = True)
```

```
VBox(children=(HTML(value=''), IntProgress(value=0, max=233)))
```

[3]:
```
test_df = dff['4'][0][2]
```

[4]:
```
test_df = test_df[['x_3', 'y_3', 'z_3','x_4', 'y_4', 'z_4', 'x_5', 'y_5',␣
 ↪'z_5', 'x_6', 'y_6', 'z_6', 'x_7', 'y_7', 'z_7', 'x_8', 'y_8', 'z_8', 'x_9',␣
 ↪'y_9', 'z_9', 'upper_arm_left', 'upper_arm_right']]
```

[5]:
```
test_df
```

[5]:

	x_3	y_3	z_3	x_4	y_4	z_4	x_5	y_5	z_5	\
0	0.0	0.0	0.0	-0.511318	0.592547	0.412132	-0.247964	0.807164	-0.656676	
1	0.0	0.0	0.0	-0.513028	0.592547	0.414698	-0.213762	0.816570	-0.636155	
2	0.0	0.0	0.0	-0.509608	0.595112	0.412988	-0.127402	0.821700	-0.607938	
3	0.0	0.0	0.0	-0.521578	0.594257	0.410422	-0.017101	0.849916	-0.533549	
4	0.0	0.0	0.0	-0.525854	0.580577	0.413843	0.096620	0.854192	-0.434364	
5	0.0	0.0	0.0	-0.532694	0.565186	0.422393	0.186400	0.858467	-0.319787	
6	0.0	0.0	0.0	-0.542955	0.550650	0.428378	0.244543	0.856757	-0.212052	
7	0.0	0.0	0.0	-0.548085	0.537824	0.427523	0.275325	0.870437	-0.132532	
8	0.0	0.0	0.0	-0.563476	0.521578	0.429233	0.282165	0.874713	-0.072679	
9	0.0	0.0	0.0	-0.577156	0.511318	0.422393	0.277035	0.882408	-0.044462	
10	0.0	0.0	0.0	-0.607938	0.505333	0.396742	0.262499	0.896089	-0.017101	
11	0.0	0.0	0.0	-0.633590	0.495927	0.366815	0.241978	0.916610	0.023941	
12	0.0	0.0	0.0	-0.649835	0.486522	0.348859	0.232573	0.928581	0.046173	
13	0.0	0.0	0.0	-0.654966	0.487377	0.336888	0.224022	0.941406	0.047883	
14	0.0	0.0	0.0	-0.660096	0.486522	0.329193	0.218037	0.948247	0.053013	
15	0.0	0.0	0.0	-0.665226	0.489087	0.319787	0.209486	0.957652	0.046173	

16	0.0	0.0	0.0	-0.668646	0.486522	0.315512	0.204356	0.967913	0.059853
17	0.0	0.0	0.0	-0.666936	0.485667	0.309527	0.206066	0.969623	0.065839
18	0.0	0.0	0.0	-0.670357	0.483956	0.310382	0.201791	0.971333	0.077809
19	0.0	0.0	0.0	-0.664371	0.485667	0.316367	0.200936	0.969623	0.062418
20	0.0	0.0	0.0	-0.667791	0.476261	0.326628	0.192385	0.973898	0.072679
21	0.0	0.0	0.0	-0.666081	0.477971	0.323208	0.192385	0.979883	0.073534
22	0.0	0.0	0.0	-0.679762	0.474551	0.319787	0.180415	0.984159	0.091490
23	0.0	0.0	0.0	-0.680617	0.470276	0.311237	0.178705	0.989289	0.102606
24	0.0	0.0	0.0	-0.685747	0.469421	0.306107	0.176140	0.990999	0.113721
25	0.0	0.0	0.0	-0.688313	0.469421	0.295846	0.173574	0.993564	0.123127
26	0.0	0.0	0.0	-0.692588	0.466000	0.291571	0.171864	0.995274	0.124837
27	0.0	0.0	0.0	-0.698573	0.452320	0.289861	0.158184	0.996129	0.135097
28	0.0	0.0	0.0	-0.698573	0.460870	0.279600	0.160749	0.996129	0.122272
29	0.0	0.0	0.0	-0.696008	0.470276	0.270195	0.166734	0.997839	0.115431
30	0.0	0.0	0.0	-0.697718	0.469421	0.263354	0.170154	0.998694	0.115431
31	0.0	0.0	0.0	-0.700283	0.470276	0.259079	0.166734	1.001260	0.123982
32	0.0	0.0	0.0	-0.701993	0.470276	0.255659	0.168444	0.999550	0.123982
33	0.0	0.0	0.0	-0.700283	0.470276	0.253949	0.168444	0.997839	0.120562
34	0.0	0.0	0.0	-0.700283	0.469421	0.253949	0.168444	0.996984	0.120562
35	0.0	0.0	0.0	-0.700283	0.469421	0.253949	0.168444	0.996984	0.120562
36	0.0	0.0	0.0	-0.695153	0.470276	0.255659	0.168444	0.999550	0.120562
37	0.0	0.0	0.0	-0.698573	0.467711	0.259934	0.166734	0.998694	0.120562
38	0.0	0.0	0.0	-0.689168	0.477971	0.261644	0.165024	1.012375	0.025651
39	0.0	0.0	0.0	-0.660951	0.491652	0.294136	0.142793	1.013230	-0.124837
40	0.0	0.0	0.0	-0.630169	0.506188	0.335178	0.113721	0.996129	-0.228297
41	0.0	0.0	0.0	-0.611358	0.519868	0.359975	0.100896	0.977318	-0.277035
42	0.0	0.0	0.0	-0.602808	0.523289	0.377076	0.087215	0.971333	-0.294991
43	0.0	0.0	0.0	-0.588272	0.539534	0.370235	0.053868	0.961927	-0.379641
44	0.0	0.0	0.0	-0.565186	0.559201	0.372800	-0.001710	0.949957	-0.467711
45	0.0	0.0	0.0	-0.544665	0.582287	0.371945	-0.084650	0.941406	-0.560056
46	0.0	0.0	0.0	-0.527564	0.595968	0.364250	-0.180415	0.920030	-0.635300
47	0.0	0.0	0.0	-0.520723	0.598533	0.362540	-0.284731	0.908915	-0.674632
48	0.0	0.0	0.0	-0.502767	0.601098	0.371090	-0.371945	0.886683	-0.693443
49	0.0	0.0	0.0	-0.495927	0.604518	0.364250	-0.430944	0.891814	-0.701993
50	0.0	0.0	0.0	-0.489087	0.611358	0.354844	-0.490797	0.910625	-0.702848

	x_6	…	y_7	z_7	x_8	y_8	z_8	x_9	\
0	0.356554	…	-0.602808	0.412132	-0.246253	-0.811439	-0.653256	0.324918	
1	0.436929	…	-0.597678	0.418973	-0.217182	-0.817425	-0.624184	0.395032	
2	0.563476	…	-0.584852	0.438639	-0.124837	-0.856757	-0.558345	0.565186	
3	0.756716	…	-0.564331	0.448044	0.000855	-0.875568	-0.466000	0.785788	
4	0.937986	…	-0.555780	0.451465	0.123982	-0.876423	-0.347149	0.974753	
5	1.055983	…	-0.542955	0.458305	0.216327	-0.862742	-0.226587	1.089329	
6	1.119256	…	-0.537824	0.456595	0.270195	-0.841366	-0.134242	1.148328	
7	1.151748	…	-0.530984	0.453175	0.318932	-0.805454	-0.075244	1.195355	
8	1.152603	…	-0.533549	0.448899	0.342874	-0.779803	-0.049593	1.217586	
9	1.142342	…	-0.530984	0.439494	0.348859	-0.775527	-0.008550	1.213311	

```
10  1.108996  … -0.523289  0.417263  0.335178 -0.790063  0.043607  1.170559
11  1.064533  … -0.517303  0.394177  0.336888 -0.798614  0.096620  1.145763
12  1.029476  … -0.513883  0.377076  0.329193 -0.813149  0.120562  1.110706
13  1.002970  … -0.510463  0.372800  0.313802 -0.838801  0.158184  1.070518
14  0.966203  … -0.507898  0.371945  0.291571 -0.870437  0.206066  0.996129
15  0.912335  … -0.504478  0.366815  0.265064 -0.898654  0.255659  0.918320
16  0.867017  … -0.501912  0.366815  0.243688 -0.918320  0.300121  0.845641
17  0.822555  … -0.501912  0.365960  0.228297 -0.932856  0.322353  0.810584
18  0.808874  … -0.501912  0.365105  0.221457 -0.943972  0.321498  0.801179
19  0.844786  … -0.507898  0.366815  0.224022 -0.948247  0.306962  0.819135
20  0.837946  … -0.509608  0.371945  0.223167 -0.949957  0.311237  0.819135
21  0.819135  … -0.503622  0.372800  0.220602 -0.946537  0.321498  0.807164
22  0.781513  … -0.503622  0.372800  0.201791 -0.957652  0.349714  0.749876
23  0.737905  … -0.503622  0.360830  0.176140 -0.981594  0.375365  0.681472
24  0.709689  … -0.498492  0.357410  0.153053 -0.982449  0.403582  0.626749
25  0.676342  … -0.497637  0.351424  0.144503 -0.988434  0.415553  0.601953
26  0.667791  … -0.506188  0.346294  0.150488 -0.996129  0.413843  0.587417
27  0.646415  … -0.511318  0.335178  0.092345 -1.017506  0.478826  0.383916
28  0.654111  … -0.493362  0.330903 -0.000855 -1.032896  0.559201  0.153908
29  0.648980  … -0.481391  0.323208 -0.064984 -1.043157  0.597678  0.011971
30  0.646415  … -0.478826  0.312947 -0.083795 -1.051707  0.596823 -0.033347
31  0.626749  … -0.471986  0.308672 -0.084650 -1.045722  0.594257 -0.041042
32  0.628459  … -0.470276  0.308672 -0.077809 -1.043157  0.595968 -0.038477
33  0.628459  … -0.470276  0.306962 -0.074389 -1.041447  0.594257 -0.036767
34  0.625894  … -0.471131  0.306962 -0.073534 -1.041447  0.594257 -0.035912
35  0.625894  … -0.471131  0.306962 -0.068404 -1.039737  0.588272 -0.028217
36  0.625894  … -0.470276  0.308672 -0.061563 -1.035462  0.588272 -0.012826
37  0.623329  … -0.472841  0.315512 -0.037622 -1.047432  0.553215  0.046173
38  0.698573  … -0.485667  0.312092  0.073534 -1.068808  0.365105  0.312092
39  0.813149  … -0.507898  0.319787  0.153908 -1.065388  0.138518  0.602808
40  0.880698  … -0.526709  0.348859  0.163314 -1.058548  0.013681  0.763557
41  0.906349  … -0.531839  0.369380  0.158184 -1.047432 -0.053013  0.840511
42  0.906349  … -0.537824  0.380496  0.147923 -1.030331 -0.118851  0.894379
43  0.910625  … -0.551505  0.378786  0.117141 -1.014940 -0.246253  0.955942
44  0.886683  … -0.567751  0.381351  0.091490 -0.984159 -0.359120  0.967913
45  0.811439  … -0.575446  0.384771  0.043607 -0.954232 -0.446334  0.924305
46  0.705413  … -0.589127  0.382206 -0.016246 -0.931146 -0.533549  0.837946
47  0.573736  … -0.604518  0.372800 -0.128257 -0.920030 -0.622474  0.684037
48  0.436074  … -0.616489  0.371090 -0.216327 -0.898654 -0.662661  0.542955
49  0.330903  … -0.619054  0.364250 -0.301831 -0.873003 -0.692588  0.383061
50  0.240268  … -0.618199  0.356554 -0.360830 -0.853337 -0.707979  0.300121

        y_9       z_9  upper_arm_left  upper_arm_right
0  -1.007245 -1.434768        1.121502         1.101079
1  -1.049997 -1.358669        1.115364         1.087779
2  -1.146618 -1.156023        1.113424         1.079496
3  -1.172269 -0.867017        1.100428         1.068094
```

```
4  -1.125241 -0.547230        1.087103         1.040503
5  -1.079069 -0.259934        1.074217         1.018289
6  -1.023491 -0.043607        1.060191         0.999850
7  -0.963638  0.089780        1.049904         0.985912
8  -0.908060  0.159039        1.044858         0.980127
9  -0.891814  0.272760        1.041780         0.973880
10 -0.900364  0.434364        1.040008         0.962986
11 -0.898654  0.574591        1.030124         0.953442
12 -0.918320  0.670357        1.032318         0.944630
13 -0.940551  0.763557        1.030673         0.936068
14 -0.989289  0.887538        1.029846         0.927185
15 -1.024346  1.017506        1.029340         0.911991
16 -1.053417  1.113271        1.029190         0.904633
17 -1.061968  1.166284        1.027488         0.897261
18 -1.067098  1.172269        1.025801         0.898933
19 -1.080779  1.141487        1.023455         0.893830
20 -1.086764  1.142342        1.025689         0.892405
21 -1.076504  1.163719        1.025289         0.890862
22 -1.079069  1.226137        1.025536         0.890118
23 -1.085054  1.298816        1.025347         0.882174
24 -1.085054  1.355249        1.025624         0.875818
25 -1.086764  1.373205        1.023429         0.873682
26 -1.124386  1.383465        1.027233         0.873460
27 -1.144907  1.527968        1.026505         0.854889
28 -1.138067  1.663066        1.024543         0.846127
29 -1.103010  1.711803        1.023034         0.846848
30 -1.093605  1.715224        1.027236         0.848839
31 -1.080779  1.713514        1.025629         0.850551
32 -1.070518  1.715224        1.027196         0.852803
33 -1.067098  1.713514        1.025087         0.852786
34 -1.067098  1.711803        1.025087         0.852780
35 -1.065388  1.709238        1.025087         0.851916
36 -1.061113  1.704963        1.021852         0.850792
37 -1.065388  1.641690        1.024756         0.860707
38 -1.061113  1.404842        1.034854         0.900429
39 -1.068808  1.086764        1.045747         0.937075
40 -1.102155  0.855047        1.054002         0.955785
41 -1.112416  0.695153        1.059409         0.971117
42 -1.113271  0.525854        1.062332         0.983292
43 -1.163719  0.191530        1.073813         1.007768
44 -1.191080 -0.142793        1.084737         1.032836
45 -1.196210 -0.435219        1.099639         1.051365
46 -1.206471 -0.722514        1.106629         1.068315
47 -1.196210 -0.985869        1.108041         1.090225
48 -1.160298 -1.164574        1.109912         1.093526
49 -1.091895 -1.339003        1.106181         1.095711
50 -1.043157 -1.420233        1.099217         1.093343
```

```
[51 rows x 23 columns]
```

[6]:
```
test_df['forearm_left'] = (((test_df['x_5']-test_df['x_6'])**2) +␣
↪((test_df['y_5']-test_df['y_6'])**2) +␣
↪((test_df['z_5']-test_df['z_6'])**2))**0.5
```

```
/opt/jupyterhub/anaconda/lib/python3.6/site-packages/ipykernel_launcher.py:1:
SettingWithCopyWarning:


A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
```

[7]:
```
test_df['forearm_right'] = (((test_df['x_8']-test_df['x_9'])**2) +␣
↪((test_df['y_8']-test_df['y_9'])**2) +␣
↪((test_df['z_8']-test_df['z_9'])**2))**0.5
```

```
/opt/jupyterhub/anaconda/lib/python3.6/site-packages/ipykernel_launcher.py:1:
SettingWithCopyWarning:


A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
```

[8]:
```
test_df['verhouding_links'] = test_df['upper_arm_left']/test_df['forearm_left']
test_df['verhouding_rechts'] = test_df['upper_arm_right']/
↪test_df['forearm_right']
```

```
/opt/jupyterhub/anaconda/lib/python3.6/site-packages/ipykernel_launcher.py:1:
SettingWithCopyWarning:


A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

/opt/jupyterhub/anaconda/lib/python3.6/site-packages/ipykernel_launcher.py:2:
```

```
SettingWithCopyWarning:


A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
```

[9]:
```
test_df
```

[9]:

	x_3	y_3	z_3	x_4	y_4	z_4	x_5	y_5	z_5
0	0.0	0.0	0.0	-0.511318	0.592547	0.412132	-0.247964	0.807164	-0.656676
1	0.0	0.0	0.0	-0.513028	0.592547	0.414698	-0.213762	0.816570	-0.636155
2	0.0	0.0	0.0	-0.509608	0.595112	0.412988	-0.127402	0.821700	-0.607938
3	0.0	0.0	0.0	-0.521578	0.594257	0.410422	-0.017101	0.849916	-0.533549
4	0.0	0.0	0.0	-0.525854	0.580577	0.413843	0.096620	0.854192	-0.434364
5	0.0	0.0	0.0	-0.532694	0.565186	0.422393	0.186400	0.858467	-0.319787
6	0.0	0.0	0.0	-0.542955	0.550650	0.428378	0.244543	0.856757	-0.212052
7	0.0	0.0	0.0	-0.548085	0.537824	0.427523	0.275325	0.870437	-0.132532
8	0.0	0.0	0.0	-0.563476	0.521578	0.429233	0.282165	0.874713	-0.072679
9	0.0	0.0	0.0	-0.577156	0.511318	0.422393	0.277035	0.882408	-0.044462
10	0.0	0.0	0.0	-0.607938	0.505333	0.396742	0.262499	0.896089	-0.017101
11	0.0	0.0	0.0	-0.633590	0.495927	0.366815	0.241978	0.916610	0.023941
12	0.0	0.0	0.0	-0.649835	0.486522	0.348859	0.232573	0.928581	0.046173
13	0.0	0.0	0.0	-0.654966	0.487377	0.336888	0.224022	0.941406	0.047883
14	0.0	0.0	0.0	-0.660096	0.486522	0.329193	0.218037	0.948247	0.053013
15	0.0	0.0	0.0	-0.665226	0.489087	0.319787	0.209486	0.957652	0.046173
16	0.0	0.0	0.0	-0.668646	0.486522	0.315512	0.204356	0.967913	0.059853
17	0.0	0.0	0.0	-0.666936	0.485667	0.309527	0.206066	0.969623	0.065839
18	0.0	0.0	0.0	-0.670357	0.483956	0.310382	0.201791	0.971333	0.077809
19	0.0	0.0	0.0	-0.664371	0.485667	0.316367	0.200936	0.969623	0.062418
20	0.0	0.0	0.0	-0.667791	0.476261	0.326628	0.192385	0.973898	0.072679
21	0.0	0.0	0.0	-0.666081	0.477971	0.323208	0.192385	0.979883	0.073534
22	0.0	0.0	0.0	-0.679762	0.474551	0.319787	0.180415	0.984159	0.091490
23	0.0	0.0	0.0	-0.680617	0.470276	0.311237	0.178705	0.989289	0.102606
24	0.0	0.0	0.0	-0.685747	0.469421	0.306107	0.176140	0.990999	0.113721
25	0.0	0.0	0.0	-0.688313	0.469421	0.295846	0.173574	0.993564	0.123127
26	0.0	0.0	0.0	-0.692588	0.466000	0.291571	0.171864	0.995274	0.124837
27	0.0	0.0	0.0	-0.698573	0.452320	0.289861	0.158184	0.996129	0.135097
28	0.0	0.0	0.0	-0.698573	0.460870	0.279600	0.160749	0.996129	0.122272
29	0.0	0.0	0.0	-0.696008	0.470276	0.270195	0.166734	0.997839	0.115431
30	0.0	0.0	0.0	-0.697718	0.469421	0.263354	0.170154	0.998694	0.115431
31	0.0	0.0	0.0	-0.700283	0.470276	0.259079	0.166734	1.001260	0.123982
32	0.0	0.0	0.0	-0.701993	0.470276	0.255659	0.168444	0.999550	0.123982
33	0.0	0.0	0.0	-0.700283	0.470276	0.253949	0.168444	0.997839	0.120562

34	0.0	0.0	0.0	-0.700283	0.469421	0.253949	0.168444	0.996984	0.120562
35	0.0	0.0	0.0	-0.700283	0.469421	0.253949	0.168444	0.996984	0.120562
36	0.0	0.0	0.0	-0.695153	0.470276	0.255659	0.168444	0.999550	0.120562
37	0.0	0.0	0.0	-0.698573	0.467711	0.259934	0.166734	0.998694	0.120562
38	0.0	0.0	0.0	-0.689168	0.477971	0.261644	0.165024	1.012375	0.025651
39	0.0	0.0	0.0	-0.660951	0.491652	0.294136	0.142793	1.013230	-0.124837
40	0.0	0.0	0.0	-0.630169	0.506188	0.335178	0.113721	0.996129	-0.228297
41	0.0	0.0	0.0	-0.611358	0.519868	0.359975	0.100896	0.977318	-0.277035
42	0.0	0.0	0.0	-0.602808	0.523289	0.377076	0.087215	0.971333	-0.294991
43	0.0	0.0	0.0	-0.588272	0.539534	0.370235	0.053868	0.961927	-0.379641
44	0.0	0.0	0.0	-0.565186	0.559201	0.372800	-0.001710	0.949957	-0.467711
45	0.0	0.0	0.0	-0.544665	0.582287	0.371945	-0.084650	0.941406	-0.560056
46	0.0	0.0	0.0	-0.527564	0.595968	0.364250	-0.180415	0.920030	-0.635300
47	0.0	0.0	0.0	-0.520723	0.598533	0.362540	-0.284731	0.908915	-0.674632
48	0.0	0.0	0.0	-0.502767	0.601098	0.371090	-0.371945	0.886683	-0.693443
49	0.0	0.0	0.0	-0.495927	0.604518	0.364250	-0.430944	0.891814	-0.701993
50	0.0	0.0	0.0	-0.489087	0.611358	0.354844	-0.490797	0.910625	-0.702848

	x_6	…	z_8	x_9	y_9	z_9	upper_arm_left	\
0	0.356554	…	-0.653256	0.324918	-1.007245	-1.434768	1.121502	
1	0.436929	…	-0.624184	0.395032	-1.049997	-1.358669	1.115364	
2	0.563476	…	-0.558345	0.565186	-1.146618	-1.156023	1.113424	
3	0.756716	…	-0.466000	0.785788	-1.172269	-0.867017	1.100428	
4	0.937986	…	-0.347149	0.974753	-1.125241	-0.547230	1.087103	
5	1.055983	…	-0.226587	1.089329	-1.079069	-0.259934	1.074217	
6	1.119256	…	-0.134242	1.148328	-1.023491	-0.043607	1.060191	
7	1.151748	…	-0.075244	1.195355	-0.963638	0.089780	1.049904	
8	1.152603	…	-0.049593	1.217586	-0.908060	0.159039	1.044858	
9	1.142342	…	-0.008550	1.213311	-0.891814	0.272760	1.041780	
10	1.108996	…	0.043607	1.170559	-0.900364	0.434364	1.040008	
11	1.064533	…	0.096620	1.145763	-0.898654	0.574591	1.030124	
12	1.029476	…	0.120562	1.110706	-0.918320	0.670357	1.032318	
13	1.002970	…	0.158184	1.070518	-0.940551	0.763557	1.030673	
14	0.966203	…	0.206066	0.996129	-0.989289	0.887538	1.029846	
15	0.912335	…	0.255659	0.918320	-1.024346	1.017506	1.029340	
16	0.867017	…	0.300121	0.845641	-1.053417	1.113271	1.029190	
17	0.822555	…	0.322353	0.810584	-1.061968	1.166284	1.027488	
18	0.808874	…	0.321498	0.801179	-1.067098	1.172269	1.025801	
19	0.844786	…	0.306962	0.819135	-1.080779	1.141487	1.023455	
20	0.837946	…	0.311237	0.819135	-1.086764	1.142342	1.025689	
21	0.819135	…	0.321498	0.807164	-1.076504	1.163719	1.025289	
22	0.781513	…	0.349714	0.749876	-1.079069	1.226137	1.025536	
23	0.737905	…	0.375365	0.681472	-1.085054	1.298816	1.025347	
24	0.709689	…	0.403582	0.626749	-1.085054	1.355249	1.025624	
25	0.676342	…	0.415553	0.601953	-1.086764	1.373205	1.023429	
26	0.667791	…	0.413843	0.587417	-1.124386	1.383465	1.027233	
27	0.646415	…	0.478826	0.383916	-1.144907	1.527968	1.026505	

```
28  0.654111  …  0.559201  0.153908 -1.138067  1.663066        1.024543
29  0.648980  …  0.597678  0.011971 -1.103010  1.711803        1.023034
30  0.646415  …  0.596823 -0.033347 -1.093605  1.715224        1.027236
31  0.626749  …  0.594257 -0.041042 -1.080779  1.713514        1.025629
32  0.628459  …  0.595968 -0.038477 -1.070518  1.715224        1.027196
33  0.628459  …  0.594257 -0.036767 -1.067098  1.713514        1.025087
34  0.625894  …  0.594257 -0.035912 -1.067098  1.711803        1.025087
35  0.625894  …  0.588272 -0.028217 -1.065388  1.709238        1.025087
36  0.625894  …  0.588272 -0.012826 -1.061113  1.704963        1.021852
37  0.623329  …  0.553215  0.046173 -1.065388  1.641690        1.024756
38  0.698573  …  0.365105  0.312092 -1.061113  1.404842        1.034854
39  0.813149  …  0.138518  0.602808 -1.068808  1.086764        1.045747
40  0.880698  …  0.013681  0.763557 -1.102155  0.855047        1.054002
41  0.906349  … -0.053013  0.840511 -1.112416  0.695153        1.059409
42  0.906349  … -0.118851  0.894379 -1.113271  0.525854        1.062332
43  0.910625  … -0.246253  0.955942 -1.163719  0.191530        1.073813
44  0.886683  … -0.359120  0.967913 -1.191080 -0.142793        1.084737
45  0.811439  … -0.446334  0.924305 -1.196210 -0.435219        1.099639
46  0.705413  … -0.533549  0.837946 -1.206471 -0.722514        1.106629
47  0.573736  … -0.622474  0.684037 -1.196210 -0.985869        1.108041
48  0.436074  … -0.662661  0.542955 -1.160298 -1.164574        1.109912
49  0.330903  … -0.692588  0.383061 -1.091895 -1.339003        1.106181
50  0.240268  … -0.707979  0.300121 -1.043157 -1.420233        1.099217

    upper_arm_right  forearm_left  forearm_right  verhouding_links  \
0          1.101079      0.958047       0.987592          1.170613
1          1.087779      0.960337       0.984055          1.161430
2          1.079496      0.943161       0.957794          1.180523
3          1.068094      0.923896       0.930035          1.191074
4          1.040503      0.903589       0.908711          1.203095
5          1.018289      0.885856       0.900024          1.212632
6          0.999850      0.875777       0.901389          1.210572
7          0.985912      0.878468       0.905744          1.195153
8          0.980127      0.881664       0.908350          1.185098
9          0.973880      0.885226       0.916480          1.176852
10         0.962986      0.888477       0.928826          1.170551
11         0.953442      0.904117       0.944850          1.139370
12         0.944630      0.905829       0.961300          1.139639
13         0.936068      0.920879       0.974397          1.119227
14         0.927185      0.926969       0.987387          1.110983
15         0.911991      0.942964       1.011411          1.091601
16         0.904633      0.948802       1.020691          1.084726
17         0.897261      0.960456       1.033415          1.069792
18         0.898933      0.956654       1.036846          1.072280
19         0.893830      0.955724       1.033517          1.070869
20         0.892405      0.954898       1.031809          1.074134
21         0.890862      0.959444       1.034545          1.068629
```

22	0.890118	0.961678	1.040796	1.066403
23	0.882174	0.966149	1.057746	1.061272
24	0.875818	0.969262	1.067982	1.058149
25	0.873682	0.974267	1.065846	1.050460
26	0.873460	0.974302	1.071226	1.054328
27	0.854889	0.974364	1.096332	1.053513
28	0.846127	0.979351	1.119612	1.046145
29	0.846848	0.976672	1.118383	1.047470
30	0.848839	0.978690	1.120322	1.049604
31	0.850551	0.978386	1.120654	1.048287
32	0.852803	0.978386	1.120281	1.049888
33	0.852786	0.979839	1.120182	1.046179
34	0.852780	0.979048	1.118473	1.047024
35	0.851916	0.978008	1.121980	1.048138
36	0.850792	0.978845	1.118048	1.043937
37	0.860707	0.977039	1.091843	1.048839
38	0.900429	0.960363	1.066781	1.077566
39	0.937075	0.941357	1.049140	1.110893
40	0.955785	0.924193	1.034451	1.140457
41	0.971117	0.917200	1.014665	1.155047
42	0.983292	0.906950	0.989808	1.171324
43	1.007768	0.899319	0.957798	1.194028
44	1.032836	0.899983	0.926138	1.205286
45	1.051365	0.899773	0.913404	1.222129
46	1.068315	0.906331	0.917145	1.220999
47	1.090225	0.921605	0.931747	1.202294
48	1.093526	0.941868	0.947039	1.178416
49	1.095711	0.963062	0.966873	1.148609
50	1.093343	0.986259	0.990047	1.114531

	verhouding_rechts
0	1.114912
1	1.105405
2	1.127065
3	1.148445
4	1.145033
5	1.131402
6	1.109233
7	1.088511
8	1.079019
9	1.062631
10	1.036778
11	1.009093
12	0.982659
13	0.960664
14	0.939029
15	0.901702

```
16          0.886295
17          0.868248
18          0.866988
19          0.864844
20          0.864893
21          0.861115
22          0.855228
23          0.834013
24          0.820068
25          0.819708
26          0.815384
27          0.779772
28          0.755733
29          0.757207
30          0.757674
31          0.758978
32          0.761241
33          0.761293
34          0.762450
35          0.759297
36          0.760962
37          0.788307
38          0.844061
39          0.893184
40          0.923953
41          0.957081
42          0.993417
43          1.052172
44          1.115208
45          1.151041
46          1.164826
47          1.170086
48          1.154680
49          1.133252
50          1.104334

[51 rows x 27 columns]
```

[10]:
```
print('links', test_df['verhouding_links'].min(), test_df['verhouding_links'].
 ↪max())
print('rechts', test_df['verhouding_rechts'].min(),␣
 ↪test_df['verhouding_rechts'].max())
```

```
links 1.0439371065932577 1.2221293136326923
rechts 0.7557326163961912 1.1700864488820613
```

[13]:
```
(test_df['upper_arm_right'].mean()+test_df['upper_arm_left'].mean())/2
```

[13]: 1.0

[ ]: