Validation study of Wearable Technology for action recognition in a sport context

Presented by
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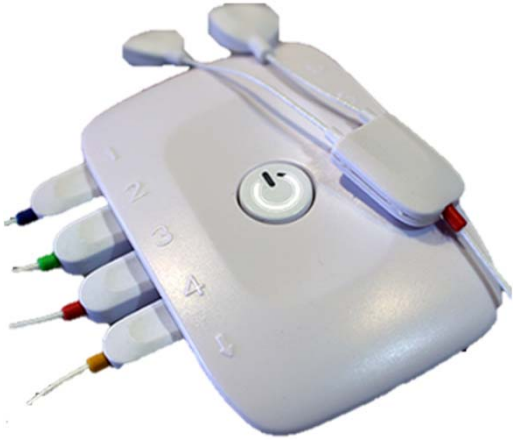
Topic Highlights

- Purpose
- Equipment
- Methodology
  - Data Collection
  - Processing
  - Architecture
  - Evaluation
- Conclusion

Purpose

Assess the feasibility
of a wearable device

03 Equipment

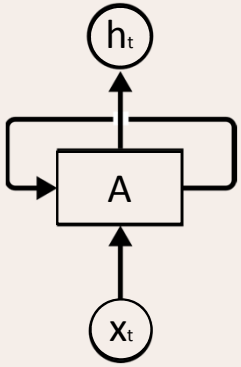


04

Methodology

Data Collection

Processing



Architecture

Evaluation

05 Data Collection

- 4 healthy males
- Simultaneously wore both systems
- Cycling, Stepping, Running and Strength exercices
- Filtering data to obtain 25 samples/second

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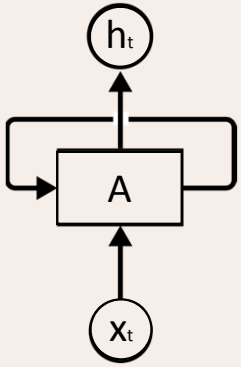
Methodology

Data Collection

Processing



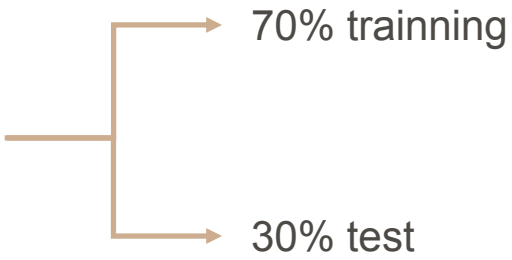
Architecture

Evaluation

07 Processing

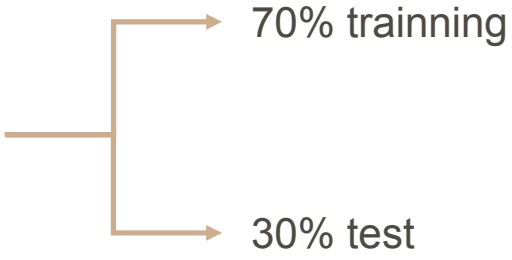
Number of Data Samples for 1st Approach

Activities	Number of Samples
Running	264
Cycling	140
Stepping	57



Number of Data Samples for 2nd Approach

Activities	Number of Samples
Gluteo	18
Right Isokinetic	31
Left Isokinetic	32

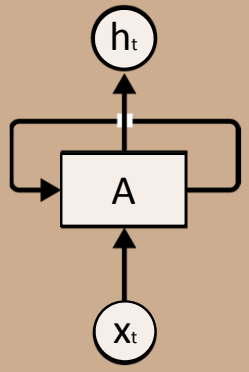


08

Methodology

Data Collection

Processing



Architecture

Evaluation

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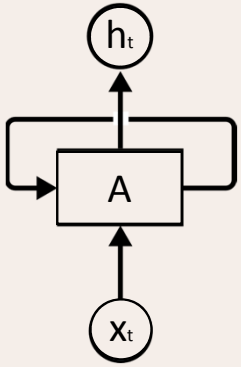
Methodology

Data Collection

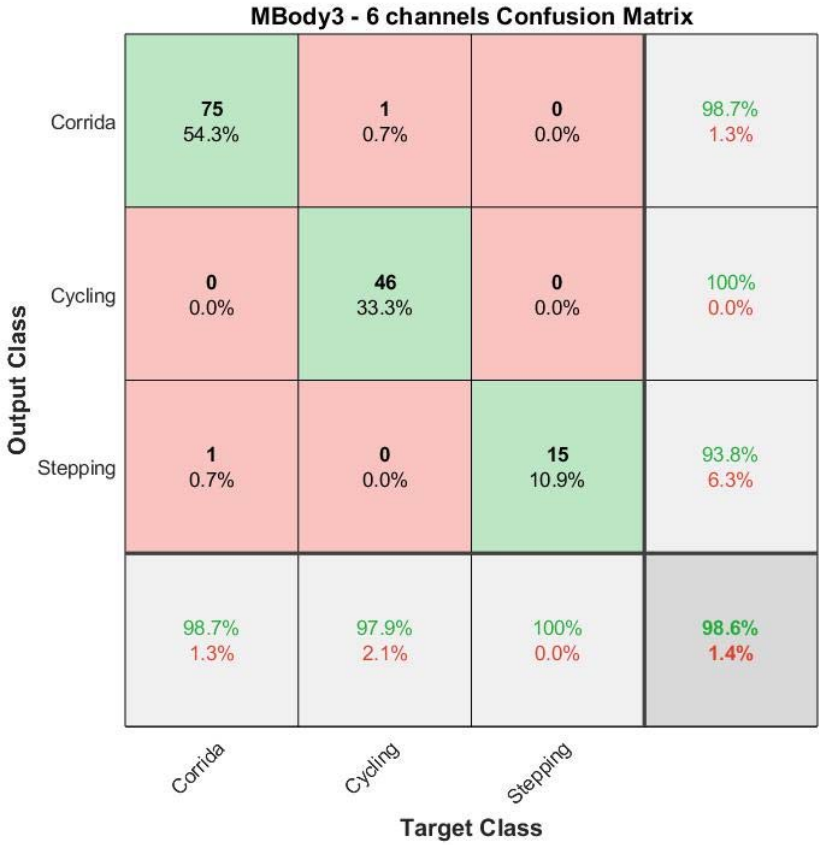
Processing

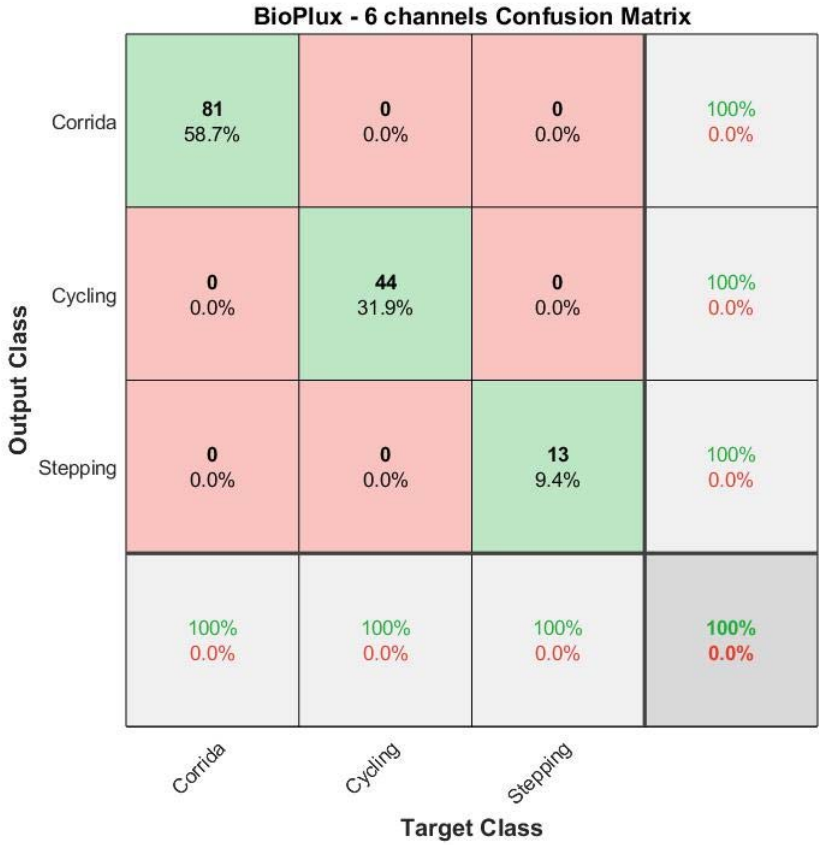


Architecture

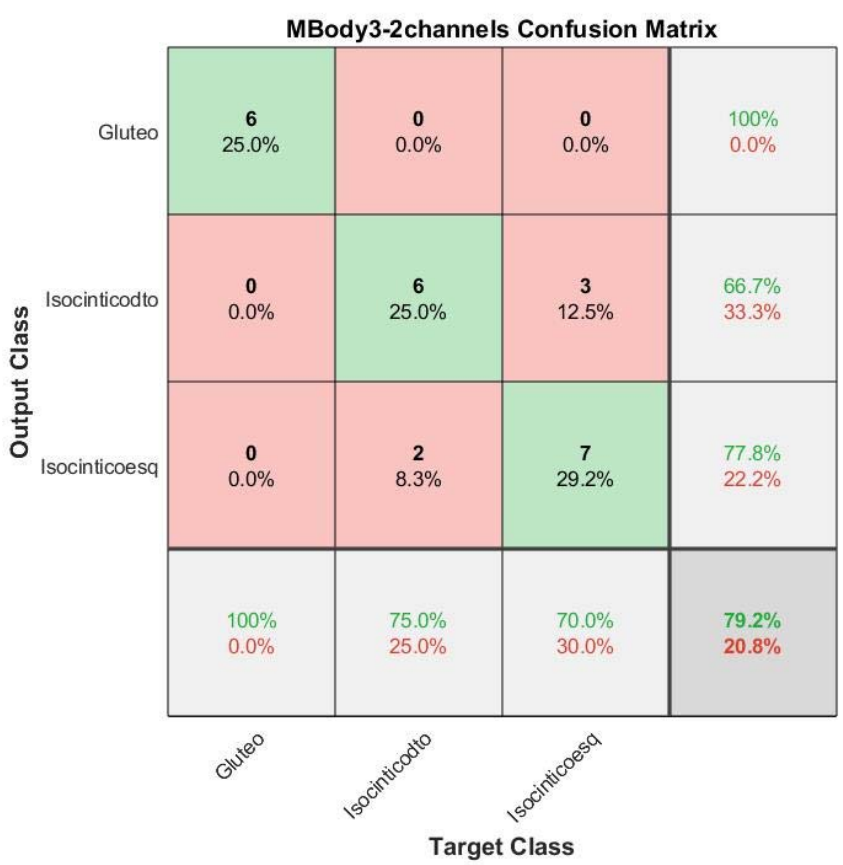
Evaluation

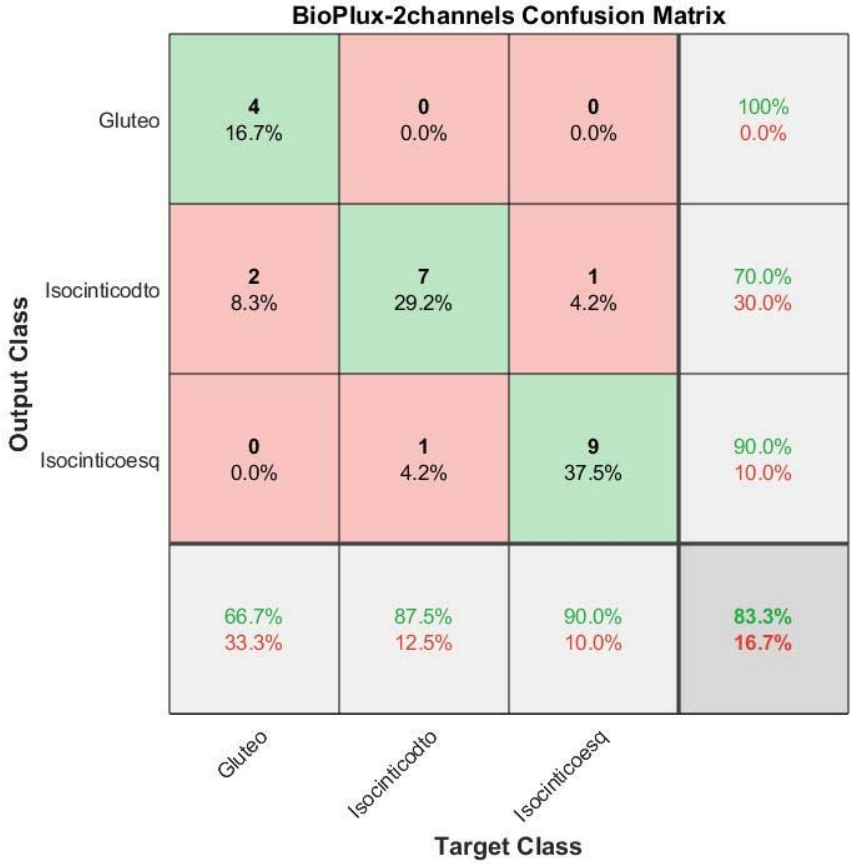
Evaluation


MBody3 - 6 channels Confusion Matrix
Output Class
Corrida
Cycling
Stepping
75
54.3%
1
0.7%
0
0.0%
98.7%
1.3%
0
0.0%
46
33.3%
0
0.0%
100%
0.0%
1
0.7%
0
0.0%
15
10.9%
93.8%
6.3%
98.7%
1.3%
97.9%
2.1%
100%
0.0%
98.6%
1.4%
Corrida
Cycling
Stepping
Target Class


BioPlux - 6 channels Confusion Matrix
Output Class
Corrida
Cycling
Stepping
81
58.7%
0
0.0%
0
0.0%
100%
0.0%
0
0.0%
44
31.9%
0
0.0%
100%
0.0%
0
0.0%
0
0.0%
13
9.4%
100%
0.0%
100%
0.0%
100%
0.0%
100%
0.0%
100%
0.0%
Corrida
Cycling
Stepping
Target Class

Evaluation


MBody3-2channels Confusion Matrix
Output Class
Gluteo
Isocinticodto
Isocinticoesq
6
25.0%
0
0.0%
0
0.0%
100%
0.0%
0
0.0%
6
25.0%
3
12.5%
66.7%
33.3%
0
0.0%
2
8.3%
7
29.2%
77.8%
22.2%
100%
0.0%
75.0%
25.0%
70.0%
30.0%
79.2%
20.8%
Gluteo
Isocinticodto
Isocinticoesq
Target Class


BioPlux-2channels Confusion Matrix
Output Class
Gluteo
Isocinticodto
Isocinticoesq
4
16.7%
0
0.0%
0
0.0%
100%
0.0%
2
8.3%
7
29.2%
1
4.2%
70.0%
30.0%
0
0.0%
1
4.2%
9
37.5%
90.0%
10.0%
66.7%
33.3%
87.5%
12.5%
90.0%
10.0%
83.3%
16.7%
Gluteo
Isocinticodto
Isocinticoesq
Target Class

Conclusion

- Assess the feasibility of a wearable device
- Combining LSTM with this wearable lead to a good performance
- Capable of recognizing activities using its EMG data

Thank you!

Questions